

NUCLEAR REGULATORY COMMISSION ISSUANCES

OPINIONS AND DECISIONS OF THE NUCLEAR REGULATORY COMMISSION WITH SELECTED ORDERS

January 1, 1985 - April 30, 1985

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PREFACE

This is Book I of the twenty-first volume of issuances (1 - 1041) of the Nuclear Regulatory Commission and its Atomic Safety and Licensing Appeal Boards, Atomic Safety and Licensing Boards, and Administrative Law Judge. It covers the period from January 1, 1985 to April 30, 1985.

Atomic Safety and Licensing Boards are authorized by Section 191 of the Atomic Energy Act of 1954. These Boards, comprised of three members conduct adjudicatory hearings on applications to construct and operate nuclear power plants and related facilities and issue initial decisions which, subject to internal review and appellate procedures, become the final Commission action with respect to those applications. Boards are drawn from the Atomic Safety and Licensing Board Panel, comprised of lawyers, nuclear physicists and engineers, environmentalists, chemists, and economists. The Atomic Energy Commission first established Licensing Boards in 1962 and the Panel in 1967.

Beginning in 1969, the Atomic Energy Commission authorized Atomic Safety and Licensing Appeal Boards to exercise the authority and perform the review functions which would otherwise have been exercised and performed by the Commission in facility licensing proceedings. In 1972, that Commission created an Appeal Panel, from which are drawn the Appeal Boards assigned to each licensing proceeding. The functions performed by both Appeal Boards and Licensing Boards were transferred to the Nuclear Regulatory Commission by the Energy Reorganization Act of 1974. Appeal Boards represent the final level in the administrative adjudicatory process to which parties may appeal. Parties, however, are permitted to seek discretionary Commission review of certain board rulings. The Commission also may decide to review, on its own motion, various decisions or actions of Appeal Boards.

The Commission also has an Administrative Law Judge appointed pursuant to the Administrative Procedure Act, who presides over proceedings as directed by the Commission.

The hardbound edition of the Nuclear Regulatory Commission Issuances is a final compilation of the monthly issuances. It includes all of the legal precedents for the agency within a six-month period. Any opinions, decisions, denials, memoranda and orders of the Commission inadvertently omitted from the monthly softbounds and any corrections submitted by the NRC legal staff to the printed softbound issuances are contained in the hardbound edition. Cross references in the text and indexes are to the NRCI page numbers which are the same as the page numbers in this publication.

Issuances are referred to as follows: Commission--CLI, Atomic Safety and Licensing Appeal Boards--ALAB, Atomic Safety and Licensing Boards--LBP, Administrative Law Judge--ALJ, Directors' Decisions--DD, and Denial of Petitions for Rulemaking--DPRM.

The summaries and headnotes preceding the opinions reported herein are not to be deemed a part of those opinions or to have any independent legal significance.

CONTENTS

Issuances of the Nuclear Regulatory Commission

GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION (Three Mile Island Nuclear Station, Units 1 and 2) Dockets 50-289, 50-320 (Oyster Creek Nuclear Generating Station) Docket 50-219 Memorandum and Order, CLI-85-4, April 4, 1985.....	561
LONG ISLAND LIGHTING COMPANY (Shoreham Nuclear Power Station) Docket 50-322-OL-4 Memorandum and Order, CLI-85-1, February 12, 1985	275
LOUISIANA POWER & LIGHT COMPANY (Waterford Steam Electric Station, Unit 3) Docket 50-382-OL Memorandum and Order, CLI-85-3, March 15, 1985	471
METROPOLITAN EDISON COMPANY, et al. (Three Mile Island Nuclear Station, Unit 1) Docket 50-289-SP Memorandum and Order, CLI-85-2, February 25, 1985	282
Memorandum and Order, CLI-85-5, April 5, 1985.....	566
SOUTHERN CALIFORNIA EDISON COMPANY, et al. (San Onofre Nuclear Generating Station, Unit 1) Docket 50-206 Denial of Request for Hearing and Request for Stay, CLI-85-10, February 19, 1985	A-1

Issuances of the Atomic Safety and Licensing Appeal Boards

CLEVELAND ELECTRIC ILLUMINATING COMPANY, et al. (Perry Nuclear Power Plant, Units 1 and 2) Dockets 50-440-OL, 50-441-OL Decision, ALAB-802, March 26, 1985.....	490
Memorandum and Order, ALAB-805, April 10, 1985	596
CONSUMERS POWER COMPANY (Big Rock Point Plant) Docket 50-155-OLA Memorandum and Order, ALAB-795, January 9, 1985	1

HOUSTON LIGHTING & POWER COMPANY, <i>et al.</i>	
(South Texas Project, Units 1 and 2)	
Dockets 50-498-OL, 50-499-OL	
Decision, ALAB-799, February 6, 1985.....	360
KANSAS GAS & ELECTRIC COMPANY, <i>et al.</i>	
(Wolf Creek Generating Station, Unit 1)	
Docket 50-482-OL	
Decision, ALAB-798, February 5, 1985.....	357
LONG ISLAND LIGHTING COMPANY	
(Shoreham Nuclear Power Station, Unit 1)	
Docket 50-322-OL-4	
Decision, ALAB-800, February 21, 1985.....	386
LOUISIANA POWER & LIGHT COMPANY	
(Waterford Steam Electric Station, Unit 3)	
Docket 50-382-OL	
Memorandum and Order, ALAB-797, January 17, 1985.....	6
Memorandum and Order, ALAB-801, March 22, 1985.....	479
Decision, ALAB-803, April 4, 1985.....	575
PHILADELPHIA ELECTRIC COMPANY	
(Limerick Generating Station, Units 1 and 2)	
Dockets 50-352-OL, 50-353-OL	
Decision, ALAB-804, April 10, 1985.....	587
PORTLAND GENERAL ELECTRIC COMPANY, <i>et al.</i>	
(Trojan Nuclear Plant)	
Docket 50-344-OLA	
Memorandum and Order, ALAB-796, January 10, 1985.....	4

Issuances of the Atomic Safety and Licensing Boards

CAROLINA POWER & LIGHT COMPANY and NORTH CAROLINA EASTERN MUNICIPAL POWER AGENCY	
(Shearon Harris Nuclear Power Plant)	
Docket 50-400-OL (ASLBP No. 82-472-03-OL)	
Partial Initial Decision on Environmental Contentions, LBP-85-5, February 20, 1985.....	410
COMMONWEALTH EDISON COMPANY	
(Braidwood Nuclear Power Station, Units 1 and 2)	
Dockets 50-456, 50-457	
Special Prehearing Conference Order, LBP-85-11, April 17, 1985.....	609

CONSUMERS POWER COMPANY	
(Midland Plant, Units 1 and 2)	
Dockets 50-329-OL&OM, 50-330-OL&OM	
(ASLBP Nos. 78-389-03-OL, 80-429-02-SP)	
Partial Initial Decision, LBP-85-2, January 23, 1985	24
GENERAL ELECTRIC COMPANY	
(GETR Vallecitos)	
Docket 50-70-OLR (ASLBP No. 83-481-01-OLR)	
Memorandum and Order, LBP-85-4, February 13, 1985	399
Docket 50-70-OLR (ASLBP No. 85-407-01-LR)	
Memorandum and Order, LBP-85-13, April 23, 1985	1031
HOUSTON LIGHTING AND POWER COMPANY, et al.	
(South Texas Project, Units 1 and 2)	
Dockets STN 50-498-OL, STN 50-499-OL	
(ASLBP No. 79-421-07-OL)	
Memorandum and Order, LBP-85-6, February 26, 1985	447
Memorandum, LBP-85-8, March 15, 1985	516
Memorandum and Order, LBP-85-9, March 29, 1985	524
KERR-McGEE CHEMICAL CORPORATION	
(West Chicago Rare Earths Facility)	
Docket 40-2061-ML (ASLBP No. 83-495-01-ML)	
Memorandum and Order, LBP-85-1, January 9, 1985	11
Memorandum and Order, LBP-85-3, January 23, 1985	244
LONG ISLAND LIGHTING COMPANY	
(Shoreham Nuclear Power Station, Unit 1)	
Docket 50-322-OL-3	
Partial Initial Decision on Emergency Planning,	
LBP-85-12, April 17, 1985	644
METROPOLITAN EDISON COMPANY, et al.	
(Three Mile Island Nuclear Station, Unit 1)	
Docket 50-289-SP	
Licensing Board Response to CLI-85-2,	
LBP-85-10, April 11, 1985	603
PUBLIC SERVICE ELECTRIC AND GAS COMPANY, et al.	
(Hope Creek Generating Station)	
Docket 50-354-OL	
Order Terminating Proceeding,	
LBP-85-6A, February 28, 1985	468

UNITED STATES DEPARTMENT OF ENERGY
PROJECT MANAGEMENT CORPORATION
TENNESSEE VALLEY AUTHORITY

(Clinch River Breeder Reactor Plant)

Docket 50-537-CP (ASLBP No. 75-291-12-CP)

Memorandum and Order Granting Applicants' Motion

to Dismiss Proceeding, LBP-85-7, March 11, 1985..... 507

Issuances of Denials of Directors' Decisions

BOSTON EDISON COMPANY

(Pilgrim Nuclear Power Station)

Docket 50-293

Director's Decision, DD-85-5, April 5, 1985 1033

COMMONWEALTH EDISON COMPANY

(Zion Station, Unit 1)

Docket 50-295

Director's Decision, DD-85-2, January 23, 1985 270

GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION

(Three Mile Island Nuclear Station, Units 1 and 2)

(Oyster Creek Nuclear Generating Station)

Dockets 50-289, 50-320, 50-219

Director's Decision, DD-85-1, January 15, 1985 263

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al.

(Seabrook Station, Units 1 and 2)

Dockets 50-443, 50-444

Director's Decision, DD-85-3, March 18, 1985 533

THE DETROIT EDISON COMPANY, et al.

(Enrico Fermi Atomic Power Plant, Unit 2)

Docket 50-341

Director's Decision, DD-85-4, March 20, 1985 546

Indexes

Case Name Index	I-1
Legal Citations Index	I-5
Cases	I-5
Regulations	I-27
Statutes	I-41
Others	I-43
Subject Index	I-45
Facility Index	I-71

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

**Thomas S. Moore, Chairman
Dr. W. Reed Johnson
Dr. Reginald L. Gotchy**

In the Matter of

**Docket No. 50-155-OLA
(Spent Fuel Pool
Modification)**

**CONSUMERS POWER COMPANY
(Big Rock Point Plant)**

January 9, 1985

Finding no errors that require corrective action, the Appeal Board affirms on *sua sponte* review a series of Licensing Board decisions that ultimately authorized a license amendment permitting the expansion of the Big Rock Point Nuclear Power Plant spent fuel pool.

APPEAL BOARD: *SUA SPONTE* REVIEW

An appeal board's affirmance on *sua sponte* review of a licensing board's decision does not signify approval of everything said and done by the board below. Thus, an appeal board will not give *stare decisis* effect to licensing board conclusions on legal issues not brought to it by way of an appeal. *Duke Power Co.* (Cherokee Nuclear Station, Units 1, 2, and 3), ALAB-482, 7 NRC 979, 981 n.4 (1978). Such an affirmance only connotes agreement with the ultimate resolution of those issues crucial to the result reached. *See Portland General Electric Co.* (Trojan Nuclear Plant), ALAB-181, 7 AEC 207, 208 n.4 (1974).

MEMORANDUM AND ORDER

We have before us for our customary *sua sponte* review a series of seven "initial" decisions, supplemental initial decisions and addendum to initial decisions, issued over a two-year span by the Licensing Board in this spent fuel pool amendment proceeding.¹ We deferred our review of all decisions until after the Licensing Board issued the last one.² That decision was issued on September 25, 1984 and authorized a license amendment permitting the expansion of the Big Rock Point Nuclear Power Plant spent fuel pool.³ No appeals have been filed from six of the Licensing Board's decisions and the appeal of joint intervenors, Christa-Maria, Mills, and Bier, from a seventh decision apparently was withdrawn.⁴ In any event, that appeal was not perfected.

We have reviewed each of the Licensing Board's decisions on our own initiative and find no errors that demand corrective action. Accordingly, the Licensing Board's decisions are affirmed. We emphasize, however, that our affirmance on *sua sponte* review does not signify approval of everything said and done by a board below. For this reason, "we do not give *stare decisis* effect to licensing board conclusions on legal issues not brought to us by way of an appeal."⁵ Indeed, our affirmance only connotes agreement with the ultimate resolution of those issues crucial to the result reached. In this particular instance, no inference should be drawn that we agree with the reasoning by which the Licensing Board admitted contentions to this proceeding or justified the

¹ See LBP-82-60, 16 NRC 540 (1982); LBP-82-77, 16 NRC 1096 (1982); LBP-82-78, 16 NRC 1107 (1982); LBP-83-44, 18 NRC 201 (1983); LBP-83-44A, 18 NRC 211 (1983); LBP-84-32, 20 NRC 601 (1984); LBP-84-38, 20 NRC 1019 (1984).

An additional "initial" decision was previously before us on directed certification. LBP-82-97, 16 NRC 1439 (1982), *rev'd and remanded*, ALAB-725, 17 NRC 562 (1983).

² See Order of August 31, 1982 (unpublished); Order of October 4, 1982 (unpublished). Because our October 4, 1982 Order was issued after the Board already had handed down its third "initial" decision, we cautioned that "[i]n the future, the Licensing Board should, if possible, confine its issuances to a minimum number of partial initial decisions." Order at 2. Apparently, the Board overlooked our admonition.

³ LBP-84-38, *supra*.

⁴ See Letter of October 2, 1984, from Christa-Maria to all parties. See also Order of October 24, 1984 (unpublished).

⁵ *Duke Power Co.* (Cherokee Nuclear Station, Units 1, 2, and 3), ALAB-482, 7 NRC 979, 981 n.4 (1978).

result reached.⁶ Nor do we necessarily agree with the Board's discussion of matters which do not have a direct bearing on the outcome.⁷

The Licensing Board's decisions are *affirmed*.
It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

⁶ For example, the Licensing Board permitted the litigation of a number of issues pertaining to the Big Rock Point emergency plan. Putting to one side the procedural machinations surrounding the admission of these issues (*see* LBP-82-32, 15 NRC 874 (1982); LBP-80-4, 11 NRC 117 (1980)), it is difficult to see how the expansion of a fuel pool could ever properly implicate the facility emergency plan. Any additional spent fuel placed in the expanded pool would make an entirely negligible contribution to the plant's radioisotopic inventory and to its potential for radiological releases.

⁷ *See Portland General Electric Co. (Trojan Nuclear Plant)*, ALAB-181, 7 AEC 207, 208 n.4 (1974).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Thomas S. Moore, Chairman
Gary J. Edles
Dr. Reginald L. Gotchy

In the Matter of

Docket No. 50-344-OLA

**PORTLAND GENERAL ELECTRIC
COMPANY, et al.**
(Trojan Nuclear Plant)

January 10, 1985

The Appeal Board in this operating license amendment proceeding declines to undertake *sua sponte* review of a Licensing Board's decision that was based on the proposed findings of fact and conclusions of law stipulated by the parties and adopted by the Licensing Board.

MEMORANDUM AND ORDER

On November 28, 1984, the Licensing Board in this spent fuel pool amendment proceeding issued an initial decision permitting Amendment No. 88 to License No. NPF-1 for the Trojan Nuclear Plant to remain in full force and effect without modification. The license amendment had previously been issued by the Director of the Office of Nuclear Reactor Regulation pursuant to 10 C.F.R. 50.92. That provision allows the issuance of an amendment without a prior hearing when the Director finds that the amendment involves no significant hazard to the public health and safety. *See also* 42 U.S.C. 2239(a); 10 C.F.R. 50.91. No appeals from the initial decision were filed.

In the absence of an appeal, our customary practice is to review *sua sponte* the authorization of licensing action. See, e.g., *Consumers Power Co. (Big Rock Point Plant)*, ALAB-795, 21 NRC 1 (1985). In this instance, however, we eschew that practice. After a brief hearing on the admitted contentions, the applicant filed proposed findings of fact and conclusions of law that the intervenor (the State of Oregon) and the NRC staff then adopted. At that point there was, in effect, a stipulated resolution or a settlement of the contested issues and thus no need for the Board below to do anything more than dismiss the proceeding.¹ In an amendment proceeding where the Board has raised no significant safety or environmental issues on its own motion, as in an operating license proceeding, the only issues to be decided by a licensing board are those contested by the parties. See 10 C.F.R. 2.760a. Once those issues are no longer in dispute, whether before or after the hearing, the proceeding should be dismissed. See 10 C.F.R. 2.761. Because we do not review proceedings that are dismissed when the parties settle the issues, we shall not conduct a *sua sponte* appellate review here.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

¹ In fact, all the Licensing Board did was adopt the agreed upon findings of the parties.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Christine N. Kohl, Chairman
Dr. W. Reed Johnson
Howard A. Wilber

In the Matter of

Docket No. 50-382-OL

**LOUISIANA POWER & LIGHT
COMPANY**

**(Waterford Steam Electric
Station, Unit 3)**

January 17, 1985

The Appeal Board grants a motion by the NRC staff for clarification and/or reconsideration of an earlier Appeal Board decision, ALAB-792, 20 NRC 1585 (1984), that held that the Board has jurisdiction to rule on intervenors' motion to reopen the record in this operating license proceeding.

APPEAL BOARD: JURISDICTION

When an appeal board has finally determined some issues in a proceeding and others are still pending before it, the board has jurisdiction over new matters raised by a party if there is a "reasonable nexus" or "a rational and direct link" between the new issues and those pending. A total identity or commonality of issues is not required. *See, e.g., Virginia Electric and Power Co.* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-551, 9 NRC 704, 707 (1979); *Florida Power and Light Co.* (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-579, 11 NRC 223, 226 (1980).

APPEAL BOARD: JURISDICTION

A party cannot properly import wholly unrelated, discrete issues into a closed proceeding by combining them, in a single motion to reopen, with another issue that is related to a matter pending before an appeal board. In such a case the appeal board could sever the unrelated material from the matter over which it had retained jurisdiction.

ADJUDICATORY BOARDS: JURISDICTION

Jurisdictional disputes in NRC proceedings do not have Constitutional dimensions.

ADJUDICATORY BOARDS: JURISDICTION

In determining jurisdictional disputes in NRC proceedings, an adjudicatory board may take into account practical considerations, like efficiency in the disposition of the matter at hand and fairness to the parties. *See Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-726, 17 NRC 755 (1983).*

APPEARANCES

Sherwin E. Turk for the Nuclear Regulatory Commission staff.

Bruce W. Churchill, Washington, D.C., for applicant Louisiana Power & Light Company.

MEMORANDUM AND ORDER

The NRC staff has moved for clarification and/or reconsideration of ALAB-792, 20 NRC 1585 (1984). In that memorandum decision, we determined that we have jurisdiction to rule on Joint Intervenor's November 8, 1984, motion to reopen the record in this operating license proceeding. We concluded that there is a reasonable nexus between that motion and another motion to reopen concerning the adequacy of the concrete basemat on which the Waterford facility rests, filed earlier by Joint Intervenor and still pending before us. The staff essentially agrees with our analysis but asks that we clarify that our jurisdiction

extends to only that *part* of the November 8 motion that specifically relates to matters raised by the basemat motion.¹ We grant the staff's motion and clarify our decision as explained below.²

Joint Intervenors' November 8 motion seeks to raise three new contentions that allege (1) a breakdown in applicant's construction quality assurance program, (2) a lack of integrity and competence on the part of applicant's management, and (3) a lack of confidence in the NRC staff's inspection and investigation efforts at the Waterford facility. The contentions contain numerous, more specific subissues as well. As we stated in ALAB-792, "[a]lthough [this] motion is substantially broader, there is a clear overlap insofar as Joint Intervenors allege [in their earlier motion to reopen] quality assurance deficiencies in connection with the construction of the basemat." 20 NRC at 1589. Acknowledging that it would require "a careful examination," the staff would have us parse through the motion and excise from our consideration any allegations not specifically related to the concrete basemat. NRC Staff's Motion (Dec. 24, 1984) at 7.

The cases on which we relied for guidance in ALAB-792 refer to a "reasonable nexus" and "a rational and direct link" — not a total identity or commonality of issues. *See, e.g., Virginia Electric and Power Co.* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-551, 9 NRC 704, 707 (1979) (emphasis added); *Florida Power and Light Co.* (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-579, 11 NRC 223, 226 (1980) (emphasis added). That is not to say that a party could properly import wholly unrelated, discrete issues into a closed proceeding by combining them, in a single motion to reopen, with another issue that is related to a matter already pending before us. In such a case, we could and would sever the unrelated material from the matter over which we have retained jurisdiction. But contrary to the staff's assertion, the particular issues raised by Joint Intervenors' November 8 motion are not so easily separated. That is, whether many specific matters raised in that motion have a reasonable nexus to the basemat motion will not be ap-

¹ Applicant agrees with the staff and us that we would have jurisdiction if there is a reasonable nexus between the two motions. Applicant argues, however, that there is no such link between any of the matters raised in the motions here. Joint Intervenors did not file a reply to the staff's motion.

² We deny the staff's curious request, in note 3 of its motion, for a stay of ALAB-792. We fail to understand exactly what the staff wants us to stay and why. ALAB-792 "ordered" nothing. It simply expressed the view, in advance of our merits ruling on the motion, that we have jurisdiction over the November 1984 motion and intend to entertain it. Both the staff and applicant have already addressed the entire motion to reopen, on its merits and at considerable length. Further, we have not yet ordered the "litigation" of any matters raised by the motion to reopen, and, indeed, it remains to be seen whether any such litigation will be ordered. Thus, we do not understand the staff's assertion that, without a stay now, irreparable injury may result from the "litigation" of matters unrelated to the basemat.

parent, in our view, until those matters have been considered on the merits.

For example, management integrity — as discussed in Joint Intervenor's motion — cannot be given reasonable or fair *consideration* by reference to only one part of the plant (the basemat) and in isolation from the arguments raised concerning other aspects of plant management. Similarly, inquiry into quality assurance in one area (e.g., basemat inspector certification) *may* necessarily spill over into other areas of quality assurance performance. Perhaps after our merits review of Joint Intervenor's motion is completed, the various issues raised by both motions will appear more distinct and severable. We may then decide to terminate our consideration of matters genuinely unrelated to the basemat motion and possibly refer them to the Director of Nuclear Reactor Regulation for resolution.³ For the sole present purpose of determining whether we should even entertain the motion, however, we cannot now draw such clear distinctions.⁴

We have previously noted, albeit in a somewhat different context, that jurisdictional disputes in NRC proceedings do not have Constitutional dimensions. It is therefore proper to take into account practical considerations, like efficiency in the disposition of the matter at hand and fairness to the parties. *See Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-726, 17 NRC 755 (1983).* With that in mind and subject to the reservation noted above, we again conclude that we have jurisdiction to consider the entirety of Joint Intervenor's November 8 motion to reopen.⁵

³ In this connection, we stress that the comments made here concerning jurisdiction are *not* to be construed as reflecting any judgment whatsoever on the merits of Joint Intervenor's motion.

⁴ Apparently, the staff cannot either. Other than listing some examples of general matters it considers unrelated to the basemat, the staff has not gone through Joint Intervenor's 62-page motion and identified the *specific* pages and arguments that are assertedly beyond our jurisdiction. *See NRC Staff's Motion at 4.*

⁵ The staff suggests that the Commission itself may have jurisdiction to consider the matters raised in Joint Intervenor's motion to reopen that are not related to the basemat, and that, pursuant to a "remand order," the Commission could then direct us to consider such matters anyway. *Id.* at 9 n.7. We previously considered that possibility and concluded that, if this is so, the Commission has already delegated us that authority in the Rules of Practice. *See* 10 C.F.R. § 2.785(b)(1) ("Appeal Board will also exercise the authority and perform the functions which would otherwise have been exercised and performed by the Commission under . . . [10 C.F.R. §] 2.730" (disposing of motions)). Under that view, there is additional cause for us to consider the entirety of Joint Intervenor's motion.

The staff's motion for clarification and/or reconsideration of ALAB-792 is *granted*, and ALAB-792 is *clarified* in accordance with the discussion above.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**John H Frye, III, Chairman
Dr. James H. Carpenter
Dr. Peter A. Morris**

In the Matter of

**Docket No. 40-2061-ML
(ASLBP No. 83-495-01-ML)**

**KERR-McGEE CHEMICAL
CORPORATION
(West Chicago Rare Earths
Facility)**

January 9, 1985

Licensing Board rules that, in permitting document inspection after having screened its files to remove privileged documents, Applicant waived its right to subsequently assert attorney-client or work product privileges. Licensing Board also rules that only parties must respond to requests for documents and that State agencies which are not parties to a proceeding need not so respond. However, such State agencies may be subject to subpoenas seeking documents.

**RULES OF PRACTICE: DISCOVERY (PRIVILEGED
MATTER)**

In determining whether an inadvertent disclosure of a privileged document operates to waive the privilege, Licensing Board considers the precautions taken to prevent disclosure, the effectiveness of those precautions, whether the documents were produced under the compulsion of a

rigorous schedule, and the promptness of the disclosing party's objection on discovering the disclosure.

RULES OF PRACTICE: DISCOVERY

Under 10 C.F.R. § 2.741, only parties must respond to document requests.

RULES OF PRACTICE: DISCOVERY

Subpoenas may be issued to State agencies which are not parties to a proceeding in order to obtain documents.

MEMORANDUM AND ORDER (Ruling on Discovery Disputes)

Discovery disputes currently exist between Kerr-McGee and the People of the State of Illinois.¹ These disputes concern document requests filed by each party on the other and the schedule for further discovery. Briefly, we are now asked to decide whether Kerr-McGee has waived its claim of privilege as to ninety-two documents which counsel for the People has inspected and wishes copies, whether counsel for the People must produce relevant documents for inspection by Kerr-McGee's counsel from any State agency possessing them or whether counsel's search for such documents may be limited to counsel's client agencies, and whether further discovery in this proceeding should be stayed pending our ruling on the above two matters and the pending motions for reconsideration of our Memorandum and Order ruling on contentions (LBP-84-42, 20 NRC 1296 (1984)).

WAIVER OF PRIVILEGE

In our Prehearing Conference Order of February 24, 1984 (unpublished), we established a schedule for discovery. This schedule was extended twice at the request of the parties.² On August 3, 1984, Kerr-

¹ The People of the State of Illinois and the Illinois Department of Nuclear Safety are intervening parties in this proceeding. They are collectively referred to as "the People."

² Motions for extensions of time were granted on April 3 and July 6, 1984. No party objected to these requests.

McGee requested an extension of time to September 15 for responses to requests for admissions and documents, interrogatories, and for objections to the same. No party objected and this request was granted on August 6.

Pursuant to this schedule and to agreements between counsel for Kerr-McGee and the People, counsel for the People inspected some one million pages of documents and marked approximately 30,000 pages for copying at Kerr-McGee's headquarters in Oklahoma City on September 18 through 21. At a subsequent inspection held on October 9 and 10 in West Chicago, counsel for the People reviewed about half the number of documents produced in Oklahoma City and marked about 4000 for copying. At both inspections, documents which Kerr-McGee deemed privileged had been removed and replaced with an indicator card.

Counsel for the People expected that documents which she had marked would be copied and forwarded to her. The first indication that counsel for Kerr-McGee did not intend to follow this course was communicated to her on Friday, September 21, the last day of her inspection of the Oklahoma City documents. We quote from the affidavit of Peter J. Nickles, counsel for Kerr-McGee, which accompanied Kerr-McGee's November 30 motion:

On September 21, 1984, I met with Ms. Anne Rapkin from the Office of the Attorney General of the State of Illinois (the "State") in the offices of Kerr-McGee in Oklahoma City. Ms. Rapkin was present in the Kerr-McGee offices in order to inspect Kerr-McGee's files in connection with discovery in the above-captioned matter. I explained that Kerr-McGee had assembled all of its files relating to West Chicago for inspection by the State and had undertaken efforts to remove privileged documents from the files. Because the files were voluminous and the time available for review was short, I was not confident that all privileged materials had been removed. I therefore informed Ms. Rapkin that copies of the documents marked by the State for production would be forwarded to Covington & Burling's offices in Washington for further examination to identify privileged documents that should not be produced. Covington & Burling would then forward the copies that were determined not to be privileged to the State. Ms. Rapkin expressed no disagreement with this procedure.

Although she did not respond to Mr. Nickles' statement at the time, on Monday, September 24, Ms. Rapkin wrote Mr. Nickles stating in part:

Before Jim and I came to Oklahoma, Mead [Mead Hedglon, in-house attorney for Kerr-McGee] reviewed the documents to be produced and withdrew a number of them on grounds of privilege. Last Friday you informed me that before the company xeroxes and mails us those documents we marked for copying, you personally will re-review them to determine whether any are privileged. It is the People's position

that whether or not any of the documents you produced might have been privileged, any privilege was waived when you produced them last week. Therefore I expect a xerox of each and every document which Jim and I marked for copying, together with any notes which may be affixed there.

The documents marked by Ms. Rapkin in Oklahoma City and in West Chicago were copied and forwarded to Mr. Nickles' office. In a November 9 letter to Ms. Rapkin, Mr. Nickles stated in part:

As you know, while you were in Oklahoma City and in West Chicago you were given unrestricted access to every file in any way related to the West Chicago matter. This included memoranda which reflected the development of Kerr-McGee's approach to the matter from the beginning right up to the time that you were making your inspection. Many of the documents put forth proposals or set out tentative conclusions that were never adopted or perhaps even given serious consideration by Kerr-McGee. Moreover, many of the documents discuss sensitive matters and some may contain information that may be deemed to be proprietary or to reflect trade secrets.

... [W]e believe that our internal consideration of policies and procedures is entitled to confidential treatment. We have therefore prepared the enclosed Protective Order which will afford the documents confidential treatment without delaying the proceeding. If you will sign and return the Order to us, we will then forward the non-privileged documents that you have identified for copying.

Thus, on further examination, counsel raised not only claims of privilege, but claims of confidentiality as well. The protective order enclosed by Mr. Nickles would have accorded confidential treatment to all the documents in question and prevented their use or disclosure, absent Kerr-McGee's consent, other than for purposes of this proceeding. On November 15, Ms. Rapkin wrote Mr. Nickles rejecting the latter's protective order but offering to consider a protective order for specified documents. Ms. Rapkin noted her expectation of receiving the documents by November 23. When the documents were not furnished on that date, Ms. Rapkin moved to compel production on November 26 asserting that Kerr-McGee had waived any privilege and on November 30 Kerr-McGee moved for an order that its claims of privilege were preserved. Additionally, Kerr-McGee sought an order implementing its proposed protective order or a protective order limited to specifically identified documents. If the latter order were to be adopted, Kerr-McGee sought an additional 30 days to identify documents which contain trade

secrets or other proprietary or confidential information to be protected.³ Thus two issues had crystallized at that point:

First, had Kerr-McGee waived its claim of privilege with respect to the documents inspected by the People; and

Second, was Kerr-McGee entitled to a protective order with respect to trade secrets or other proprietary or confidential information contained in those documents.⁴

On December 10, 11, and 17, respectively, Kerr-McGee, Staff,⁵ and the People replied to the two motions. The People resisted Kerr-McGee's requests for relief and argued that any privileges pertaining to the inspected documents had been waived. Similarly, Kerr-McGee resisted the People's waiver argument.

Also on December 17, the People filed a motion for an emergency ruling on the pending discovery disputes. Reciting the fact that, pending a resolution of these motions, they have voluntarily refrained from publicizing the contents of the Kerr-McGee documents, the People alleged that their constitutional rights were infringed "so long as they are constrained from informing the public about information within their knowledge" The People supported their motion with a confidential submittal summarizing the content of some of the Kerr-McGee documents. This document recites evidence that Kerr-McGee has sought to influence public opinion and elected officials with respect to its West Chicago site.⁶

Noting that early resolution of these disputes would speed the progress of this proceeding, on December 19 we scheduled a prehearing conference for December 26. Then, on December 21, Kerr-McGee responded to the emergency motion by turning over all documents with the exception of ninety-two which it claims to be privileged under the attorney-client or work product doctrines. Kerr-McGee abandoned any claim for

³ During the same time that the above dispute was developing, a second dispute arose concerning the People's obligation to produce documents from various State agencies that are not parties to this proceeding. Kerr-McGee's November 30 motion also sought relief with respect to that dispute. We discuss that dispute *infra*.

⁴ On November 27, the People submitted a third set of interrogatories and requests for documents to Kerr-McGee. This led Kerr-McGee to seek a stay in further discovery. This motion is also dealt with, *infra*.

⁵ Staff supported Kerr-McGee's motion insofar as it seeks a response to its document production request from all State agencies; Staff took no position on the other disputes.

⁶ This document was not filed with the Secretary but was served on counsel under instructions not to disclose its contents. Because we saw nothing in this document which demanded that it be withheld from the public, we indicated on December 24 that, in the absence of objection received by January 4, we would transmit a copy to the Secretary for inclusion in the Commission's public files. No objections having been received, we have taken that action.

protection of trade secret or other proprietary or confidential information. As a result of this development and with the People's agreement, on December 24 we cancelled the prehearing conference. On December 26, the People commented on this dispute, noting that they did not intend to abandon their position that any privilege claims had been waived by Kerr-McGee. On December 27, Kerr-McGee moved for permission to reply to the People's response to its motion, attaching that reply. In that reply, Kerr-McGee maintains that the People acquiesced in its two-stage review procedure and argues that the case law supports the proposition that it did not waive its claim of privilege.

In considering this issue, we assume that the disclosure of the ninety-two documents was inadvertent. Thus, the issue is whether Kerr-McGee's inadvertent disclosure of these documents operated to waive its right to withhold them.

The Federal case law concerning inadvertent disclosure of privileged documents is not uniform. *Suburban Sew'n Sweep Inc. v. Swiss Bernina, Inc.*, 91 F.R.D. 254, 257 (N.D. Ill. 1981). There does not appear to be a basic rule of law concerning waiver which is consistently adhered to by a majority of the Federal courts.

We begin our consideration with the traditional view of waiver recited in the Wigmore treatise on evidence which apparently serves as the foundation for the reasoning in many of the waiver-related decisions.⁷ While Wigmore's text does not directly address inadvertent waiver, an explication may be found under the section on *Indirect Disclosure by the Attorney*. 8 Wigmore, Evidence §§ 2325-2327 (McNaughton 1961). There Wigmore adopts the traditional view that even an involuntary disclosure results in a waiver of the attorney-client or work product privileges.⁸

Under the Wigmore analysis, the privilege is lost when documents are disclosed, even when that disclosure is through loss or theft from the attorney,

⁷ *United States v. Kelsey-Hayes Wheel Co.*, 15 F.R.D. 461 (E.D. Mich. 1954); *United States v. Cole*, 456 F.2d 142, 144 (8th Cir. 1972); *Duplan Corp. v. Deering Milliken, Inc.*, 397 F. Supp. 1146 (D.C.S.C. 1974); *In Re Grand Jury Investigation of Ocean Transportation*, 604 F.2d 672 (D.C. Cir. 1979); *In Re Sealed Case*, 676 F.2d 793, 807 (D.C. Cir. 1982).

⁸ Because of the conclusion which we reach on this subject, we find it unnecessary to consider this issue in terms of the particular privilege which is deemed waived. Further, the section of the Wigmore treatise cited herein has been used by several courts in their analysis of waiver as it applies to both the attorney-client and work product privileges. See *In Re Subpoenas Duces Tecum Fulbright and Jaworski, Vinson and Elkins, Tesoro Petroleum Corp.*, 738 F.2d 1367 (D.C. Cir. 1984), *Permian Corp. and Occidental Petroleum Corp. v. United States*, 665 F.2d 1214, 1219 (D.C. Cir. 1981).

on the principle (§ 2326 *infra*) that, since the law has granted secrecy so far as its own process goes, it leaves to the client and attorney to take measures of caution sufficient to prevent being overheard by third persons. The risk of insufficient precautions is upon the client. This principle applies equally to documents.

Id. at 632.

We first begin with an analysis of the cases which hold that though disclosure was inadvertent or accidental, waiver of the privilege is nonetheless the result. These cases discount the element of intent and instead apply Wigmore's strict responsibility doctrine as enunciated in the often quoted case *Underwater Storage, Inc. v. U.S. Rubber Co.*, 314 F. Supp. 546, 549 (D.D.C. 1970). There the court decided it would not look behind the objective fact that the client turned over documents to his attorney for production to inquire whether the client intended that the documents be produced. The court explained that once the document was produced it was in the public domain, that is, the existence of its contents was within the knowledge of the opposing counsel and the element of confidentiality, so crucial to the privilege, was destroyed. The court in *Underwater Storage, supra*, reasoned that when confidentiality is no longer present, the basis for the privilege has been abrogated.

In *Kelsey-Hayes, supra*, an earlier case relied upon by the court in *Underwater Storage, supra*, one of the defendant corporations permitted attorneys for the Government to review its files consistent with a discovery request by the Government. The files contained twenty-nine documents which may have been subject to work product or attorney-client privilege. The court declined to give credence to the defendant's later claim that the documents' privileged status continued once they were made available to the Government's attorneys. The *Kelsey-Hayes* Court recognized the competing interests at work in the discovery process but concluded that the disclosure by defendant's attorneys negates any argument counsel might later assert as to how or why the documents were shown to opposing counsel.

As a result of the claimant's own acts, the context in which the rule is intended to serve, the protection of confidential communications is no longer present. Since the privilege exists in derogation of the overriding interest in full disclosure of all competent evidence, where the policy underlying the rule can no longer be served, it would amount to no more than mechanical obedience to a formula to continue to recognize it.

* * *

Nor is this result affected by Budd's assertion that the privileged documents were inadvertently handed over to the Government's representatives; that the mass of documents in its files were so voluminous that it did not know nor did it have time to discover that privileged ones were among them. It is difficult to be persuaded that these documents were intended to remain confidential in the light of the fact

that they were indiscriminately mingled with the other routine documents of the corporation and that no special effort to preserve them in segregated files with special protections was made. One measure of their continuing confidentiality is the degree of care exhibited in their keeping, and the risk of insufficient precautions must rest with the party claiming the privilege. Wigmore, 3d Ed., Sec. 2325, p. 629.

Kelsey-Hayes, supra, 15 F.R.D. at 465. Many courts applying the Wigmore standard of strict responsibility cite the above language to support a holding that waiver was effected under circumstances where an opposing party is allowed to review documents in response to a discovery request. *Grand Jury Investigation of Ocean Transportation, supra*; *W.R. Grace v. Pullman Inc.*, 446 F. Supp. 771 (W.D. Okla. 1976).

Cases departing from this view generally acknowledge it, but discredit it primarily for its rigidity and the lack of consideration it accords to the intent of the disclosing party. *Mendenhall v. Barber Greene Co.*, 531 F. Supp. 951, 954 (N.D. Ill. 1982), *Weil v. Investment/Indicators Research & Management*, 647 F.2d 18, 24 (9th Cir. 1981). Other factors considered in these cases are the confidentiality of the document, whether reasonable arrangements were made to protect against disclosure (*Kelsey-Hayes, supra*, 15 F.R.D. at 464), whether disclosure was made under the compulsion of a court-ordered expedited discovery schedule, and whether a court expressly or implicitly reserved the disclosing party's right to protect privileged documents which may have slipped through its initial screening. *Transamerica Computer Co. v. IBM*, 573 F.2d 646 (9th Cir. 1978).

Where courts have not adopted Wigmore's view of the waiver standard, primary emphasis is usually placed on the disclosing party's intent. The intent is pivotal in these cases to determine if disclosure was inadvertent. Inadvertence has come to indicate that the disclosing party did not knowingly relinquish its right to make objections based on privilege because it did not intentionally divulge the information,⁹ but only disclosed it through some accident or error in its own review. Courts are generally sympathetic to the arguments of inadvertence when the party can show not only that there was no intent to disclose, but a tremendous volume of material through which it had to sift, and strict time pressures in which to review the documents, including orders by the court compelling discovery under an expedited schedule. *Connecticut Mutual Life Insurance Co. v. Shields*, 18 F.R.D. 448 (S.D.N.Y. 1955); *Dunn Chemical Co. v. Sybron Corp.*, 1975-2 Trade Cas. (CCH) ¶ 60,561 at 67,463 (S.D.N.Y. 1975); *Control Data Corp. v. IBM Corp.*, 16 Fed. R. Serv. 2d 1233 (D. Minn. 1972); *Transamerica Computer, supra*, 573 F.2d

⁹ *Mendenhall, supra*, 531 F. Supp. at 953 n.9.

at 653. We conclude that the rationale stated in these cases is the better view.

This view has recently been enunciated in *Magnavox Co. v. Bally Midway Manufacturing Co. and Sanders Associates Inc.*, third-party defendant, No. 83C 2357 (N.D. Ill., Nov. 5, 1984) and *Donovan v. Robbins*, Nos. 78C 4075, 82C 7951 (N.D. Ill., Nov. 14, 1983). Both cases follow the intent analysis and both held that a clearly inadvertent disclosure does not waive privilege. As noted above, we need not consider this issue because we have assumed that the waiver was inadvertent. Both cases also carefully recite and amplify the crucial factors which, if combined with inadvertent disclosure, result in preservation of the privilege. Both cases either expressly or implicitly acknowledged that not every claim of inadvertence is entitled to relief. We therefore move to the other factors which are to be weighed to determine if Kerr-McGee has waived its privileges.

The People submitted their discovery request to Kerr-McGee on July 13, 1984. At the August 22, 1984, Prehearing Conference, counsel for Kerr-McGee informed the Board that Kerr-McGee was prepared to submit its objections to discovery requests or provide the parties with the opportunity to review requested files by September 15, 1984,¹⁰ the date which counsel had earlier requested and which had been granted on August 6. Based on this extension, Kerr-McGee's filing of December 27, 1984, seems to imply that it was in some way compelled under a Board-imposed expedited schedule. We do not agree. There have been no schedule disputes presented to us for resolution subsequent to the first prehearing conference. Discovery was proceeding on schedules agreed to by the parties, which we adopted. Counsel undeniably is aware of the right to come to the Board with any difficulties in complying with those schedules. Yet until our receipt of the motions here in question, we were not informed that problems had arisen.

We have assumed that the disclosure was inadvertent, as required by *Magnavox, supra*. However, under that holding the circumstances must be such that adequate precautions were taken initially to prevent disclosure if the privilege is to be preserved. Here an initial review was made and documents were removed from the files inspected by counsel for the People. We are not unsympathetic to the fact that more than a million pages of documents had to be compiled and reviewed by Kerr-McGee. We recognize that this meant the company and/or its law firm was faced with the need to amass substantial manpower to sift through

¹⁰ Prehearing Conference, August 22, 1984, Tr. 236.

the files. But, while the number of documents to be reviewed must be taken into account, we think it is also necessary to juxtapose that with the number of documents which were disclosed. Although only under the pressure of a schedule to which it had agreed, Kerr-McGee allowed ninety-two documents to slip through its review process. This is not an insignificant number and indicates that the precautions taken were inadequate, a fact recognized by Kerr-McGee's counsel when he indicated that a second review was necessary. A cursory review of the documents is not enough to prevent a waiver. The review process must accomplish its intended goal. In the cases relied on by Kerr-McGee, the review process was much more effective; despite the compulsion of schedules, only a few documents slipped through.

The courts also require prompt objection to prevent a waiver of discovery objections. Counsel for Kerr-McGee informed the People on the last day of counsel's review of the Oklahoma documents (September 21, 1984) that a second-stage review was planned by Kerr-McGee. In these circumstances, it was actually the People who timely objected to Kerr-McGee's proposal, allowing only the 2 days of the intervening weekend to pass before submitting a letter of objection to Kerr-McGee. If Kerr-McGee had indicated its intent to re-review the documents before producing them to the People for inspection, it seems likely that counsel for the People would not have engaged in the review until the "ground rules" for discovery had been resolved, either by stipulation or with the Board's assistance. After Kerr-McGee produced the Oklahoma City documents it could not unilaterally bind the People to an unconventional discovery routine by informing counsel at the close of her inspection of its intent to do a second review.

Counsel for Kerr-McGee maintains that counsel for the People acquiesced in the second-stage review. It is true that the West Chicago documents were inspected after the second stage was announced and objected to. In the face of the objection, Kerr-McGee should not have produced documents for inspection prior to a complete review and should have sought relief from the Board if necessary.¹¹

Kerr-McGee also maintains that it asserted its privileges after inspection but before release and that this fact dictates that its privileges were preserved. We find that Kerr-McGee did not take adequate steps to preserve the confidentiality of these documents. In this circumstance, we

¹¹ We note that representatives of the People apparently continued their inspection of the Oklahoma City documents on the same day that counsel wrote objecting to the second-stage review. While we do not condone this practice, we find that it does not alter our conclusion. The other factors clearly outweigh this event.

do not believe that the fact that Kerr-McGee asserted its privileges prior to physically turning over the documents marked by the People is material. In short, we find that Kerr-McGee's claims of privilege for the ninety-two documents here in question have been waived.

SCOPE OF THE PEOPLE'S RESPONSE

Kerr-McGee has filed interrogatories and requests for documents on the Illinois Attorney General, counsel for the People of the State of Illinois and the Illinois Department of Nuclear Safety (collectively referred to as the "People"). The interrogatories and requests were directed to the State, and defined "State" to be:

the State of Illinois and any departments or agencies of the State, as well as any employees, agents, consultants, contractors, or subcontractors of the State or any departments or agencies of the State.¹²

In response, counsel for the People produced documents of the Illinois Department of Nuclear Safety (IDNS) and Illinois Environmental Protection Agency (IEPA). Counsel took the position that

the Attorney General, when representing particular agencies in litigation, produces the documents of only those agencies. The Attorney General's client agencies, i.e. those which have requested representation in either this or the related state court proceedings, are the [IDNS] and [IEPA]. Therefore only their documents were produced.¹³

Subsequently, counsel also produced documents from the Illinois State Geological and Water Surveys.

Kerr-McGee has moved for an order requiring counsel to respond to its requests with respect to all State agencies.¹⁴ Staff supports this position.¹⁵ The People continue to adhere to their position that only client agencies need respond.¹⁶

Section 2.741 of the Rules of Practice permits requests for production of documents to be filed only on parties. The Rules do not authorize requests to be filed on nonparties.

¹² Kerr-McGee's Motion of November 30, 1984, at 2.

¹³ People's Response of December 17, 1984, at 1-2.

¹⁴ See note 3, *supra*.

¹⁵ Staff's "Response to Kerr-McGee's and Illinois' Discovery Motions" of December 11, 1984.

¹⁶ People's Response of December 17, 1984, at 1-2.

The People's petition to intervene in this proceeding was "filed on Petitioner's behalf by the Attorney General at the request of the [IDNS] and on his own motion."¹⁷ Therefore, the IDNS is the only State agency which is a party to this proceeding, and consequently IDNS is the only State agency which must respond to requests for documents pursuant to § 2.741.¹⁸ In this respect, the Rules of Practice are in accord with Federal practice. See *Trane Co. v. Klutznick*, 87 F.R.D. 473 (W.D. Wisc. 1980). Kerr-McGee's motion is denied.

This is not to say that document production may not be obtained from nonparties. Subpoenas issued pursuant to 10 C.F.R. § 2.720 may be used for this purpose.¹⁹ See *Pacific Gas and Electric Co.* (Stanislaus Nuclear Project, Unit 1), ALAB-550, 9 NRC 683 (1979). Upon satisfactory application pursuant to § 2.720, the Board will issue subpoenas directing the production of documents by State agencies which have not responded to Kerr-McGee's requests.

STAY OF DISCOVERY

On December 7, Kerr-McGee moved for a stay of further discovery in this proceeding pending our rulings on the above discovery disputes and our rulings on motions for reconsideration of LBP-84-42, *supra*, filed by Staff and the People. The People oppose this motion; Staff has no objection to it.

Insofar as the motion sought to defer further discovery pending resolution of the above discovery disputes, it is now moot. And we see no reason to defer further discovery pending resolution of the motions for reconsideration.²⁰ Consequently Kerr-McGee's motion is denied.

In consideration of the foregoing, it is, this 9th day of January 1985,
ORDERED:

1. Kerr-McGee's motion for an order instructing the People to produce all relevant documents in the possession or control of the executive branch of the State is denied;

2. Kerr-McGee's motion for an order making clear that its privilege claims have been preserved with respect to ninety-two documents identified in Attachment A to its December 21, 1984 response to the People's motion for an emergency ruling is denied;

¹⁷ Petition to Intervene filed July 7, 1983, as amended February 29, 1984.

¹⁸ Because counsel has never sought to add IEPA as a party to this proceeding, we assume that that agency is a party to the related State court proceeding.

¹⁹ The Board has a supply of blank subpoenas which are available to the parties on request.

²⁰ We anticipate that our rulings on these motions will be issued shortly.

3. Kerr-McGee's motion for a protective order to protect confidential documents is denied as moot;
4. Kerr-McGee's motion for a stay of discovery is denied;
5. Kerr-McGee's motion for leave to file a reply to the People's response to its November 30, 1984 discovery motion is granted;
6. The People's motion for an order compelling Kerr-McGee to provide copies of the documents which counsel for the People inspected and marked for copying in Oklahoma City and West Chicago is granted;
7. The People's motion for an emergency ruling on the above discovery disputes is denied as moot; and
8. The People's motion for leave to file instanter a response to Kerr-McGee's motion for a stay in discovery is granted.

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

**John H Frye, III, Chairman
ADMINISTRATIVE JUDGE**

Bethesda, Maryland
January 9, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Charles Bechhoefer, Chairman
Dr. Frederick P. Cowan
Dr. Jerry Harbour**

In the Matter of

**Docket Nos. 50-329-OL&OM
50-330-OL&OM
(ASLBP Nos. 78-389-03-OL
80-429-02-SP)**

**CONSUMERS POWER COMPANY
(Midland Plant, Units 1 and 2)**

January 23, 1985

The Licensing Board issues a Partial Initial Decision in a consolidated operating license/enforcement proceeding involving a facility as to which construction has been halted (but as to which the operating license application has not been withdrawn). The Decision resolves, subject to specified conditions or technical specifications, various technical issues arising out of the excessive settlement of soils upon which safety structures are founded. The Board also denies the Applicant's motion for reconsideration of an earlier order concerning the procedural steps which the NRC must follow when seeking to impose new seismic criteria on a facility at the operating license stage of review.

RULES OF PRACTICE: PARTIAL INITIAL DECISION

Although the conformance of a structure with applicable safety standards may depend both on the adequacy of design of the structure and on the manner in which the design is implemented, the adequacy of design

is conceptually different from the sufficiency of design implementation and need not necessarily be considered in the same decision.

ATOMIC ENERGY ACT: LICENSING STANDARDS

The circumstance that construction is in progress (or has even been completed) cannot legally have any effect on a Licensing Board's evaluation of the adequacy of a structure's design. However, should problems with a design being followed be uncovered during construction, those problems may be taken into account in assessing the technical adequacy of the design. *Cf. Power Reactor Development Co. v. International Union of Electrical, Radio & Machine Workers*, 367 U.S. 396, 415 (1961).

SEISMIC AND GEOLOGIC CRITERIA: SCOPE OF INQUIRY

At the operating license stage of review, an applicant must provide, and the NRC Staff reviews, "current information . . . which has been developed since issuance of the construction permit, relating to site evaluation factors," including the geologic and seismic matters comprehended by 10 C.F.R. Part 100. 10 C.F.R. § 50.34(b)(1).

RULES OF PRACTICE: BACKFITTING

Where the NRC Staff seeks to apply new seismic criteria during its operating license review from those applied at the construction permit stage of review, and where there has been a progression in seismological review techniques in the intervening period, the Staff need not follow the backfitting procedures set forth in 10 C.F.R. § 50.109.

RULES OF PRACTICE: BACKFITTING

A progression in seismological review techniques may constitute "current information . . . which has been developed since issuance of the construction permit," within the meaning of 10 C.F.R. § 50.34(b)(1), thus calling for a reevaluation at the operating license stage of review without need to resort to the backfit standards of 10 C.F.R. § 50.109.

RULES OF PRACTICE: OPERATING LICENSE/SHOW CAUSE HEARINGS

Where an operating license and a show cause proceeding are being carried on simultaneously and are consolidated, and where the proceedings

would utilize different procedural rules, the rules governing the operating license proceeding would apply in consolidated hearings on joint issues.

SEISMIC AND GEOLOGIC CRITERIA: GROUND MOTION

Use of site-specific response spectra to define the vibratory ground motion at a site of the safe shutdown earthquake is consistent with 10 C.F.R. Part 100, Appendix A, §§ IV(a), V(a)(1) and VI(a).

SEISMIC AND GEOLOGIC CRITERIA: SCOPE OF INQUIRY

The terms "important to safety" and "safety-related," when applied to seismic design requirements, are used interchangeably in 10 C.F.R. Part 100, Appendix A.

SEISMIC AND GEOLOGIC CRITERIA: SAFE SHUTDOWN EARTHQUAKE

An inadequacy in seismological data may warrant requiring, pursuant to 10 C.F.R. Part 100, Appendix A, § V(a)(1)(iv), that the controlling earthquake be larger than the maximum earthquake that has occurred historically within the tectonic province.

TECHNICAL ISSUES DISCUSSED

- Dewatering
- Differential settlement of structures
- Ground acceleration value resulting from safe shutdown earthquake
- Quality assurance
- Safe shutdown earthquake (intensity; resulting vibratory ground motion)
- Seismic design criteria
- Seismic shakedown
- Site-specific response spectra (SSRS)
- Soil compaction
- Soil density
- Soil liquefaction
- Structural design — cantilever designs
- Structural design — evaluation of cracks

Tectonic provinces
 Underground piping — corrosion
 Underpinning of safety structures.

APPEARANCES

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TABLE OF CONTENTS

	Page
I. INTRODUCTION	30
A. Nature of the Proceedings	30
B. Identification of the Parties	32
C. Procedural Posture of the Case	33
D. Summary of Decision	36
II. SEISMIC MATTERS	41
A. Legal Standards	41
(1) Procedures for Applying the SSE in OL Review (Applicant’s Motion for Reconsideration)	44

	Page
II.A. Legal Standards (<i>Continued</i>)	
(2) Compatibility of SSRS Approach with 10 C.F.R. Part 100, Appendix A	46
B. Maximum Earthquake and Associated Ground Motion at the Midland Site	51
(1) Tectonic Province	53
(2) Controlling Earthquake (SSE)	60
(3) Construction of the SSRS	63
(4) Seismic Models and Soil Spring Constants	69
C. Soil Liquefaction and Dewatering	71
III. DIESEL GENERATOR BUILDING	81
IV. AUXILIARY BUILDING AND FEEDWATER ISOLATION VALVE PITS	86
V. SERVICE WATER PUMP STRUCTURE	96
VI. BORATED WATER STORAGE TANKS	98
VII. DIESEL FUEL OIL TANKS	102
VIII. UNDERGROUND PIPING	104
IX. ELECTRICAL DUCT BANKS AND CONDUITS	108
X. SLOPE STABILITY OF BAFFLE AND PERIMETER DIKES	108
XI. CONCLUSION	110
A. Technical Issues	110
B. General Observations	110
 FINDINGS OF FACT AND CONCLUSIONS OF LAW	
FINDINGS OF FACT	114
I. BACKGROUND, JURISDICTION AND PARTIES	114
II. SEISMIC MATTERS	122
A. Introduction	122
B. Tectonic Province and Controlling Earthquake (SSE)	127
C. Construction of the SSRS	136
D. Seismic Models and Soil Spring Constants	142
E. Soil Liquefaction Potential	147

	Page
II. SEISMIC MATTERS <i>(Continued)</i>	
F. Dewatering of Plant Soils	151
(1) Sufficiency of Permanent Dewatering System (Stamiris Contention 4.D(3))	152
(2) Effects of Dewatering on Soils (Stamiris Contentions 4.D(1) and 4.D(2))	157
III. AUXILIARY BUILDING AND FEEDWATER ISOLATION VALVE PITS	160
IV. SERVICE WATER PUMP STRUCTURE	172
V. BORATED WATER STORAGE TANKS	180
VI. DIESEL FUEL OIL TANKS	190
VII. UNDERGROUND PIPING	194
A. Introduction	194
B. Seismic Category I Underground Piping	195
(1) General	195
(2) Assurance of Serviceability	198
(a) Criteria	199
(i) Stress Analyses and Design Criteria	199
(ii) Strength Criteria	199
(iii) Buckling Criteria	201
(iv) Minimum Rattlespace Criteria	202
(b) Remedial Actions	203
(i) Service Water Piping	203
(ii) Diesel Fuel Oil Lines	206
(iii) Borated Water Piping	207
(iv) Control Room Pressurization Lines ...	208
(v) Penetration Pressurization Lines	208
(vi) The Monitoring Program	209
Strain Gage Monitoring	209
Vertical Settlement Monitoring	211
Strain and Settlement Monitoring Frequency	212

	Page
VII.B(2)(b)(vi) The Monitoring Program <i>(Continued)</i>	
Proposed Technical Specification Acceptance	
Criteria and Actions	212
Rattlespace Monitoring	213
(vii) Laydown Loads and Safety-Grade Utilities	214
(viii) Freezeway Concerns	214
(c) Corrosion	215
C. Nonseismic Category I Piping	220
D. Conclusions with Respect to Underground Piping	222
VIII. ELECTRICAL DUCT BANKS AND CONDUITS	223
IX. SLOPE STABILITY OF BAFFLE AND PERIMETER DIKES	229
CONCLUSIONS OF LAW	236
ORDER	236
APPENDICES	
Appendix A: Soils-Related Contentions	238
Appendix B: List of Exhibits (unpublished)	
Appendix C: List of Witnesses Who Presented Prefiled Testimony (unpublished)	

**PARTIAL INITIAL DECISION
(Remedial Soils Issues)**

Opinion

I. INTRODUCTION

A. Nature of the Proceedings (Findings 1-3, 12)

This Decision represents the culmination of proceedings initiated more than 6 years ago. It involves a project which was novel — indeed unique — but which most likely will never come to fruition: namely, the proposed construction and operation by Consumers Power Company

(CPC or Applicant) of the Midland Nuclear Plant, Units 1 and 2. It reflects the difficulties (both monetary and technical) which were engendered by various quality assurance/quality control (QA/QC) deficiencies which have plagued the project from its inception. And it reflects the suspension of work on the partially completed project because of CPC's inability to finance its completion.

The issues before us arise from two consolidated proceedings: (1) the application of CPC for licenses to operate the Midland Plant, Units 1 and 2 (OL proceeding) and (2) the Order under 10 C.F.R. § 2.204 for modification of licenses, dated December 6, 1979 (OM proceeding).¹ The facility in question consists of two pressurized water nuclear reactors designed by Babcock & Wilcox Co. (B&W), located on a site on the south shore of the Tittabawassee River in Midland County, Michigan, adjacent to the Dow Chemical Company's main industrial complex in the city of Midland.

The facility's uniqueness stems from the once-planned usage of a large percentage of the capacity of Unit 1 (which had been scheduled to be the second unit completed) to produce process steam for the nearby Dow plant. Thus, as designed, Unit 2 would have produced 852 MWe whereas Unit 1 would have produced 504 MWe in addition to the process steam. However, reflecting delays and cost increases in the project, there developed a contractual dispute and litigation between Dow and CPC, and Dow gave up its plans to use the process steam. Thereafter, because of its inability to finance the project, CPC halted construction, first of Unit 1 and later the entire project.

The OL proceeding involves CPC's application for licenses to operate these two units. At present, the application has not been formally withdrawn, notwithstanding the halt of construction. The OM proceeding is a show-cause-type proceeding which eventuated from the discovery in July 1978 of excessive settlement of soils and structures (particularly the diesel generator building (DGB)). The two proceedings were consolidated (at the request of the Applicant) because of an overlap of certain issues raised in each of them.

The adjudication before us has produced an extensive record on many issues. The shutdown of construction on the project might arguably dictate our awaiting a motion to dismiss the OL application, without a ruling on the merits of any of the issues. This result in our view would not be in the public interest: among other things, it would render for

¹ With respect to the OM proceeding, CPC is a "licensee." Nonetheless, to avoid confusion, we shall refer to Consumers as CPC or Applicant, irrespective of the particular proceeding or proceedings to which the reference is applicable.

naught the extensive efforts devoted to these issues by the parties, their witnesses, and this Board. Moreover, absent withdrawal of the application for operating licenses, the proceeding is technically alive. Indeed, post-shutdown communications to the NRC have referred to the project in terms of "current deactivation." Letter, CPC to J.G. Keppler, NRC, dated July 27, 1984, file 0.4.9, serial 31797. Furthermore, CPC has advised us that, although "it is unlikely that the Midland project will be revived in the near future," the Company wishes to "preserve its options" and has no plans to withdraw its operating license application or to surrender its construction permits. Letter, CPC counsel to Board and parties, dated September 10, 1984. Accordingly, despite the potential mootness of the various issues before us, we nevertheless are issuing a decision on some of the technical issues which have been extensively litigated and which, if the project should ever be revived, might have some continuing applicability. We hope that our resolution of these issues will preclude the necessity for relitigation of the same issues if work on the project should ever be resumed.

On the other hand, the issues involving quality assurance/quality control (QA/QC) and management attitude, which have occupied the greatest amount of hearing time to date, focus in large part on the implementation of certain procedures and the performance and attitude of certain personnel. As such, they would appear to be of uncertain materiality, even if work on the project were ever to be resumed. Materiality would depend on the form and nature of the organization and the identity of the persons directing the resumed project. Given the announced indefinite suspension of the project, we do not intend to resolve those issues at this time. (In the Conclusions section of this Opinion, we offer a few observations on some of them.) Nothing herein should be taken as indicating that the project would be licensable absent resolution of any of those issues which remained pertinent to a revived project.

B. Identification of the Parties (Findings 6-7, 12)

Ms. Mary Sinclair, Mr. Wendell H. Marshall, and Ms. Barbara Stamiris were admitted as Intervenors in the OL proceeding. The Attorney General of the State of Michigan was admitted as an interested State (but has not actively participated in the proceeding to date). Ms. Stamiris and Ms. Sharon Warren were admitted as Intervenors in the OM proceeding (with Ms. Warren subsequently withdrawing). Reflecting both the overlap of certain issues between proceedings and the Commission policy to permit intervenors to conduct cross-examination and file proposed findings on issues raised by others, we permitted all of the Inter-

venors to participate in the development of the record and in the filing of proposed findings on any of the issues, whether nominally denominated as OL or OM issues. (Ms. Stamiris was the only Intervenor who filed proposed findings on the particular issues covered by this Decision.)

C. Procedural Posture of the Case (Findings 4, 7-17)

The OL adjudicatory proceeding commenced in May 1978, with the publication of a notice of opportunity for hearing. By a Special Prehearing Conference Order dated February 23, 1979 (unpublished), we accepted a number of Ms. Sinclair's proposed contentions, including one which raised safety questions concerning the excessive settlement of the diesel generator building (DGB).² We also accepted a similar contention of Mr. Marshall.

The OM proceeding was initiated on December 6, 1979, by the issuance by the Staff of an Order Modifying Construction Permits ("Modification Order"), a type of show-cause order. The Modification Order was based on the excessive settlement of the DGB (initially discovered in July 1978) caused by poor compaction of soils on which it was constructed, the QA/QC practices which permitted such poor soils compaction to have occurred, and the potential that similar inadequate compaction practices may have been utilized with respect to other safety structures founded in whole or in part on fill materials. The Modification Order would have suspended all soils-related and remedial work on the Midland facility until the related safety issues were resolved and construction permit amendments for the soils remedial work were submitted by CPC and approved by the Staff. Through its December 26, 1979 request for a hearing, CPC stayed the effectiveness of the Modification Order pending conclusion of the OM proceeding.

Under the Modification Order, the broad issues (which were put into contest by virtue of CPC's request for a hearing) are (1) whether the facts set forth in Part II of the Order (setting forth the factual basis for the Order) are correct, and (2) whether the Order should be sustained (i.e., the specific relief put into effect). In addition, in response to an Amended Notice of Hearing published in May 1980, two Intervenor (Ms. Stamiris and Ms. Warren) were admitted to the OM proceeding. We accepted a number of contentions sponsored by each of them in our Prehearing Conference Order of October 24, 1980 (unpublished). Because of the overlap of Ms. Sinclair's and Mr. Marshall's OL contentions

² All soils-related contentions, whether or not dealt with or resolved in this Decision, are set forth *infra* in Appendix A.

relating to the DGB settlement and the issues that had been subsequently raised by the Modification Order (including certain contentions of Ms. Stamiris and Ms. Warren), we also granted CPC's request that we consolidate the two proceedings. Ms. Warren subsequently withdrew from the proceeding (although she made a limited appearance statement). Since her issues were encompassed within the broader OM issues, we asked the parties to address the substance of her contentions, and they have done so. *See infra* note 41. Later, we accepted several additional late-filed OM contentions sponsored by Ms. Stamiris, engendered by the litigation between Dow and CPC. LBP-84-20, 19 NRC 1285 (1984).

Hearings on soils-related OM-OL issues commenced in July 1981, and extended intermittently through December 3, 1983, utilizing 96 hearing days. (In addition, 9 days of hearings on strictly OL issues were held in March and April 1983.) Limited appearance statements from members of the public were accepted at several of the hearing sessions.

Two general types of soils issues are involved in the OM-OL consolidated proceeding: those which question the QA/QC performance and managerial attitude of CPC or its contractor, Bechtel (most of Ms. Stamiris' contentions) and issues involving the technical aspects of remedial soils activities (the remainder of Ms. Stamiris' and all of the other Intervenor's soils-related contentions). The Applicant and NRC Staff have often been in disagreement on both types of issues, although currently they generally agree with respect to most of the technical aspects of the remedial soils activities.

Early in this proceeding, prior to the close of the record on the technical aspects of remedial soils activities, we had planned to issue a Partial Initial Decision on QA/management attitude issues, followed by another decision covering the technical adequacy of the remedial soils activities (or "fixes"). Notwithstanding that plan, we found it necessary to reopen the record twice on QA/management attitude issues — the first time at the instance of Ms. Stamiris, and the second time at the request of the NRC Staff. Prior to the most recent closing of the record on QA/management attitude issues, we completed hearings on the technical aspects of the remedial "fixes." Proposed findings and conclusions on those technical issues were submitted by CPC, Ms. Stamiris, and the NRC Staff.³ Although we could possibly have issued an Initial Decision cover-

³ Applicant's Proposed Findings of Fact and Conclusions of Law (FOF) on Remedial Soils Issues, dated August 5, 1983 (hereinafter App. FOF); NRC Staff Responsive Findings, dated November 15, 1983 (Staff FOF); Intervenor [Stamiris] Proposed FOF, dated December 16, 1983 (Stamiris FOF); Applicant's Replies to Staff and Stamiris FOF, each dated January 3, 1984 (App. Reply to Staff (Stamiris)) (Continued)

ing both QA/management attitude and the technical aspects of the remedial "fixes," considerations of timing and length, as well as the recently announced suspension of work on the facility, have caused us to adhere to our earlier plan of separating the decisions on QA/management attitude and on the technical aspects of remedial soils activities.

After the record on QA/management attitude issues had been closed for the second time (i.e., before the most recent reopening of the record), and during the course of our preparation of a decision on that subject, we determined it to be necessary to issue an order imposing interim conditions on further soils-related construction activities, pending completion of our decision. In our Order of April 30, 1982, we required, *inter alia*, that the Applicant obtain explicit prior approval from the NRC Staff (with limited exceptions) before proceeding with further soils-related construction activities (as defined therein). Memorandum and Order (Imposing Certain Interim Conditions Pending Issuance of Partial Initial Decision), LBP-82-35, 15 NRC 1060. In other words, soils-related construction activities were halted in the absence of authorization by the NRC Staff. Thus, the effect of that Order in substance was to sustain, on an interim basis, the requirements of the Modification Order, except with respect to the submission and approval of amendments to the construction permits, a procedural step which in our opinion was not necessary to attain the safety goals which we believed should be achieved. In order to comply with the requirements of LBP-82-35, CPC put into effect, *inter alia*, its "Work Authorization Procedure."

The conditions imposed on the Applicant by LBP-82-35 were motivated by QA (including QC) considerations. As a result of the subsequent reopening of the record on QA/management attitude matters, and more recently the project shutdown, we have not issued the decision which would supersede those interim conditions. Accordingly, to the extent that any soils-related construction were to be resumed, they continue in effect. This Partial Initial Decision does not generally treat QA or management attitude issues and has no effect on those interim conditions.

FOF). Unless otherwise specifically pointed out, references to various parties' proposed findings will be to those on remedial soils issues, as catalogued in this footnote.

References to all parties' proposed findings (FOF) will be to the paragraph numbers and/or pages. Since Ms. Stamiris' FOF did not include numbered paragraphs, we have numbered each paragraph of her findings consecutively (¶ "1-27"), for ease of reference. Thus, the first paragraph under "Introduction" is ¶ "2"; the first paragraph under "The Soils Remedial Fixes" is ¶ "6."

D. Summary of Decision (Findings 17-18)

This Partial Initial Decision deals with the technical adequacy of the remedial soils activities which have been proposed by CPC. The subjects covered are seismic matters (including the appropriate safe shutdown earthquake, standards for the proposed seismic margin review, soil liquefaction and dewatering), the designs and plans for assuring the structural adequacy of the auxiliary building (except with respect to differential settlement of the control tower relative to the main building), the service water pump structure (SWPS), the borated water storage tanks (BWSTs), the diesel fuel oil tanks (except with respect to liquefaction and soils stability), underground piping, underground electrical duct banks and conduits, and baffle and perimeter dikes. For reasons stated below (*see infra* p. 37), we are not making any findings with respect to the DGB; we are, however, including a general description of the problems and corrective actions associated with that structure.

In her proposed findings on remedial soils issues, Ms. Stamiris takes the position that the Applicant's remedial program is only a "paper" program and that CPC's problems have always been "not with their conceptual programs, but with the implementation of those programs" (Stamiris FOF, ¶ "6," at 2, citation omitted). She asserts that technical findings should be considered only along with findings concerning implementation and that our decisions on these subjects should be combined (*id.* ¶ "9," at 3-4). She also implies that the status of ongoing plant construction must of necessity influence our rulings on the adequacy of the various remedial fixes.

It is obvious, of course, that CPC has suffered through numerous serious QA/QC implementation problems in the past. The issuance of LBP-82-35 is but one reflection of those problems. Indeed, it is apparent that the soils settlement problems stem in large part from a QA deficiency: the failure of the Applicant or its contractor to have had available a qualified geotechnical engineer with authority to control soils placement during the time when the fill soils were being compacted — despite a previous commitment to the NRC to utilize a geotechnical engineer for such purposes (*see infra* p. 111). Both theoretically and practically, therefore, the question of the conformance of the facility with applicable safety standards depends not only on the adequacy of design but also on the implementation of those designs. No party to this proceeding contends otherwise.

That does not mean, however, that design and implementation must necessarily be considered in the same decision. The adequacy of design is conceptually different from the sufficiency of design implementation.

If the design turns out to be consistent with applicable requirements, the adequacy of implementation still remains an open question. (If the design is inadequate, however, the sufficiency of implementation becomes irrelevant.) Moreover, contrary to Ms. Stamiris' apparent claim, the circumstance that construction was in progress (or had even been completed) could not legally, and did not, have any effect on our evaluation of the adequacy of design in this Decision. There is but one exception to this general approach: if, during construction, problems with the design being followed were uncovered, those problems were factored into our decision on the technical adequacy of the remedial soils measures. *Cf. Power Reactor Development Co. v. International Union of Electrical, Radio & Machine Workers*, 367 U.S. 396, 415 (1961).

We have factored problems revealed during the course of construction into our consideration of two of the technical subjects on which CPC has submitted proposed findings: the structural adequacy of the DGB and the effects of differential settlement of the control tower relative to the main auxiliary building. As a result of greater-than-expected cracking in the DGB, the Staff undertook further studies and evaluations of the DGB's structural adequacy and also moved to reopen the record on that question (Tr. 22,678-83). Although we had not yet determined prior to the halt in construction whether to reopen the record on the DGB, and were awaiting a further Staff report before we made that determination, we permitted Ms. Stamiris and the Staff to defer filing proposed findings and conclusions on the DGB remedial measures (Tr. 22,687). We are accordingly excluding from this Decision any consideration of the adequacy of the remedial soils activities associated with the DGB. (Since this Decision may turn out to be our last major decision in these proceedings dealing with substantive issues, we are including a general description of the problems and corrective actions associated with the DGB. *See infra* pp. 81-86.)

Similarly, Ms. Stamiris has pointed to Board Notification BN 83-174, dealing with the corrective actions utilized for the auxiliary building, particularly the effects of differential settlement between the control tower and the main auxiliary building; she sought to reopen the record, *inter alia*, on open items in the Board Notification (Tr. 22,672; Stamiris FOF, ¶ "13," at 5). Although we denied Ms. Stamiris' motion as premature (Tr. 22,675-76), we agree that, in the absence of further information on the questions raised in BN 83-174, the record is not complete enough to cause us to rule on whether the proposed remedial measures for the auxiliary building adequately take these aspects of differential settlement into account. For that reason, we are also excluding from this Decision any evaluation of that subject.

In addition, we have taken into account incomplete or erroneous information discovered during the pendency of the soils hearings in our evaluation of two other technical subjects: the soil spring constants proposed to be used in a seismic reevaluation of various structures, and the assessment of soil liquefaction potential and soils stability under the diesel fuel oil tanks. Through Board Notification BN 84-115, dated June 18, 1984, we were advised by the Staff of the Applicant's discovery, during a design review, of a deficiency in the original seismic design of certain Seismic Category I structures. This deficiency in particular would affect the analysis of the auxiliary building and the SWPS. With respect to those structures, our findings and conclusions reflect this outstanding open question. *See* discussion, *infra* pp. 70-71, 90-91, 94-95, 98 and Findings 88-89, 141, 151, 164, 166.

Finally, on November 21, 1984, CPC submitted a report to the Staff (with copies to the Board and parties) advising that certain logs of borings assertedly taken in the area of the Midland diesel fuel oil tanks were in fact logs of borings taken elsewhere in the Midland area. By letter dated December 6, 1984, the Applicant advised that the only technical issue potentially affected was that of liquefaction of soils below the diesel fuel oil tanks. The Applicant regarded the record on this question to be "inconclusive." In its response dated December 21, 1984, which included the affidavit of Mr. Joseph Kane, a geotechnical witness, the Staff agreed that its analysis of liquefaction beneath the diesel fuel oil tanks would be affected but added that other technical issues might also be affected (*see infra* pp. 103-04). In her December 24, 1984 response, Ms. Stamiris took the position that the erroneous boring logs, which had been discovered during the Dow-CPC litigation, represented only one example of erroneous information uncovered in that litigation. She cited other examples bearing upon several of her QA/management attitude issues. She requested that we order an investigation by the NRC Office of Investigations (OI) and that, before issuing any decision depending in whole or in part on information provided or sponsored by CPC, we hold a further evidentiary hearing on facts surrounding the disclosure of the erroneous soil boring data. The Staff did not mention further hearings but indicated that further inquiry on this subject might be warranted.

Based on the state of the record, we are at this time making no findings concerning liquefaction or soils stability relative to the diesel fuel oil tanks, nor are we reaching any "reasonable assurance" conclusions concerning the tanks. We regard the matters as to which Ms. Stamiris seeks further hearings (i.e., "Dow" issues) as essentially QA/management attitude matters, on which we are not now ruling. As set forth

infra p. 40, we are leaving open the possibility (following submission of a status report by CPC and responses of other parties) of further hearings. In the Board's view, the circumstances underlying the NRC Staff's "extreme difficulty" in understanding how the "mix-up" in boring logs occurred suggests that new hearings may very well be warranted, at least in the event a restart of construction is proposed. Kane Affidavit, dated December 21, 1984, ¶ 3, at 4.

We have no authority to order an OI investigation (Stamiris Exh. 135, Policy 4); the Staff, of course, could — and perhaps should — do so. In any event, to permit us to consider newly discovered information derived from the Dow-CPC litigation bearing upon issues covered by this Decision, we are retaining jurisdiction to reopen the record to modify any of our determinations which may be significantly affected thereby.

With respect to the matters we are considering, and for reasons hereinafter set forth, we conclude that the remedial soils measures proposed by CPC and accepted by the Staff are generally satisfactory, subject in certain instances to the imposition of appropriate technical conditions or specifications. Assuming that the remedial soils activities would have been correctly carried out, and that open technical questions would have been satisfactorily resolved, we would have had reasonable assurance that the structures on which we are ruling in this Decision would pose no undue risk to the public health and safety. If the project is ever revived, the manner in which the structures and soils remedial activities have been or would be implemented, as well as the design aspects of the DGB, auxiliary building, SWPS and diesel fuel oil tanks on which we are not now ruling, would remain as open questions, subject to further decision or litigation or relitigation, as appropriate.

In the body of this Decision we discuss our concerns regarding the deficiency inherent in the stepped-foundation design of portions of the auxiliary building, the SWPS and the borated water storage tanks. *See infra* pp. 93-94, 102. It is apparent that the differential settlement of these structures was the result of the overall settlement of the soil. However, there is evidence that stepped-foundation designs have the potential for developing problems even when built on properly compacted backfilled soil, because of cantilever and bending moment stresses that could result from greater-than-anticipated soil settlement. We are recommending that the NRC Staff study, generically, the acceptability of the future use of such stepped-foundation designs in safety-related structures.

As for the status of these proceedings, the Applicant, through its letter of September 10, 1984, has proposed that no further hearings be held at this time, that its current obligation to forward audit and nonconformance reports to the Board and parties be discontinued, and that it

file an additional report on the status of the project in 6 months. In a document dated October 24, 1984, which we are treating as a response to the request concerning documents, Ms. Sinclair raised certain questions concerning the propriety of discontinuing reporting requirements as long as the construction permits and OL application remain active. See Memorandum and Order dated November 2, 1984 (unpublished). In its October 26, 1984 response, the Staff agreed that hearings at this time would not be productive but suggested that the Applicant include a recommendation as to future hearings in its status report. The Staff also suggested a conference call with respect to the discontinuance of reporting requirements. The call was held on November 7, 1984, and it was agreed that the Applicant and Staff would consult on the reporting question (as well as the related question of the types of data which should continue to be collected while construction is suspended) and report back to us early in 1985. For the interim, we reduced the number of copies of audit and nonconformance reports which need to be supplied to the Board. See Memorandum dated November 8, 1984 (unpublished).

We agree that no further hearings should be held in the near future and that the Applicant should file a 6-month status report. Such report should include recommendations as to future hearings. In particular, it should outline information discovered in the Dow-CPC litigation which would affect these proceedings, as to which Ms. Stamiris seeks further hearings. Such report should be filed on or before April 1, 1985. Parties may respond within 10 days of service (15 days for the Staff). Notwithstanding this schedule, the Applicant should notify us promptly of any significant developments, including but not limited to plans or proposals for the restart of construction. Pending our receipt of a report during early 1985 on the questions outlined in our November 8, 1984 Memorandum, we take no action on CPC's request to eliminate certain reporting, except to reduce the number of copies of audit and nonconformance reports which must be furnished to the Board.

In the future, following receipt of CPC's status report, and responses thereto, we expect to confer with (or otherwise seek the views of) the parties as to whether, and if so when and how, these proceedings should be continued or terminated. In particular, we will consider whether we should issue a further decision (or conduct further hearings) on any issues remaining unresolved after this Decision (including the various QA/management attitude issues). We invite the suggestions of the parties on the potential resolution of such open issues.

II. SEISMIC MATTERS

A. Legal Standards (Findings 19-36)

Several regulations specify the seismic and geologic criteria to which the design of nuclear power plants must adhere. In general, “[s]tructures, systems, and components important to safety” are required to be “designed to withstand the effects of natural phenomena such as earthquakes . . . without loss of capability to perform their safety functions.” 10 C.F.R. Part 50, Appendix A, GDC 2. The specific design criteria are set forth in 10 C.F.R. Part 100, Appendix A (Seismic and Geologic Siting Criteria for Nuclear Power Plants). The Final Safety Analysis Report (FSAR) submitted in support of the operating license application must include, *inter alia*, “current information . . . which has been developed since issuance of the construction permit, relating to site evaluation factors identified in Part 100” 10 C.F.R. § 50.34(b) (1).

The construction permits for the Midland Plant were issued by the Atomic Energy Commission on December 15, 1972.⁴ That date followed the publication of the proposed Appendix A to 10 C.F.R. Part 100 (36 Fed. Reg. 22,601 (Nov. 25, 1971) but preceded the issuance of the final rule, which was published on November 13, 1973 (38 Fed. Reg. 31,279) and became effective on December 13, 1973. When it published its proposed rule, the Commission (AEC) set forth its expectation that “the proposed amendments will be useful as interim guidance until such time as the Commission takes further action on them.” 36 Fed. Reg. at 22,601.

At the construction permit stage, the Staff’s review of the applications, as set forth in the Staff’s “Safety Evaluation” dated November 12, 1970 (CP “SER”), preceded the issuance of the proposed as well as the final versions of 10 C.F.R. Part 100, Appendix A. As a result, the Staff in its review did not utilize certain of the criteria which were adopted through issuance of Appendix A (e.g., delineation of a tectonic province);⁵ nor did the Licensing Board which authorized the issuance of construction permits, even though its decision followed the promulgation of the proposed Appendix A.⁶

⁴ Pursuant to the Energy Reorganization Act of 1974, as amended, 42 U.S.C. § 5801, *et seq.*, the Atomic Energy Commission (AEC) was abolished, and the Nuclear Regulatory Commission (NRC) assumed the AEC’s licensing and related regulatory functions.

⁵ See further description of the Staff’s CP review criteria, *infra* p. 51 and Finding 21.

⁶ During the CP hearings, no issue was raised about the seismic or geologic analyses which had been undertaken. In its normal CP review, the Licensing Board probably did not use the proposed Appendix A as guidance, inasmuch as it merely approved the Staff’s seismic and geologic conclusions as reflected in the CP “SER.” LBP-72-34, 5 AEC 214, 219-20 (1973), *aff’d*, ALAB-123, 6 AEC 331 (1973).

The OL application, as represented by the FSAR, was filed in 1977, after the effective date of Part 100, Appendix A. It incorporated a seismic analysis which followed the procedures of Appendix A, including a proposed tectonic province for the Midland site. The analysis resulted in the same maximum earthquake as had been approved at the CP stage, with terminology changed to reflect that utilized in Appendix A — e.g., the design basis earthquake (DBE) at the CP stage became the safe shutdown earthquake (SSE)⁷ described in the FSAR (FSAR SSE). The FSAR proposed design response spectrum (modified Housner) was the same as the DBE response spectrum at the CP stage.

During the course of its OL review, however, the Staff began to doubt whether the CP earthquake (DBE or proposed FSAR SSE) was adequate and consistent with the requirements of Appendix A. The Staff's concerns in this regard were set forth in a letter dated October 14, 1980 from Robert L. Tedesco, Assistant Director for Licensing, to Mr. J.W. Cook, CPC Vice President, re: *Seismological Input for the Midland Site* (Holt Exh. 3; hereinafter "Tedesco letter").⁸ That letter offered CPC two alternatives for characterizing the SSE, both of which, according to the Staff, are consistent with the Staff's Standard Review Plan (SRP, NUREG-0800, not introduced into evidence):

1. The largest historic earthquake in the Central Stable Region tectonic province, assumed to occur "near the site," with ground acceleration based upon the standardized response spectra of Regulatory Guide 1.60 anchored at 0.19g.
2. The "site-specific response spectra" (SSRS) approach using the magnitude of the same highest earthquake with epicentral distances assumed to occur less than 25 km from the site, and using the 84th percentile of the response spectra as derived directly from real time histories.

⁷ "Safe Shutdown Earthquake" is defined as

that earthquake which is based upon an evaluation of the maximum earthquake potential considering the regional and local geology and seismology and specific characteristics of local subsurface material. It is that earthquake which produces the maximum vibratory ground motion for which certain structures, systems, and components are designed to remain functional. These structures, systems, and components are those necessary to assure:

- (1) The integrity of the reactor coolant pressure boundary,
- (2) The capability to shut down the reactor and maintain it in a safe shutdown condition, or
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of this part.

10 C.F.R. Part 100, Appendix A, § III(c).

⁸ Mr. Richard J. Holt, one of the Applicant's witnesses, submitted 11 exhibits which the Board accepted into evidence in connection with his prepared testimony. These exhibits ranged from single-page figures to multi-page reports with their own figures and tables. The Holt exhibits were not bound into the transcript, but are part of the evidentiary record. Tr. 4538-40, 4550-51, 5117-18. These exhibits are hereinafter referred to as "Holt Exh. ___"

The Applicant elected the SSRS approach. It further agreed to design remedial structures to this standard (or what it viewed as the equivalently conservative 1.5 x FSAR SSE standard) and to conduct a seismic re-evaluation or "seismic margin review" to determine whether various Seismic Category I structures which had already been constructed could conform to the newly ascertained SSE. This study had commenced but, insofar as we are aware, had not been completed (or reviewed by the Staff) prior to the shutdown of construction.

Early in this proceeding, shortly following its receipt of the "Tedesco letter," the Applicant moved that we defer consideration of all seismic issues until the later, OL, portions of the hearing. The Board believed that to have done so would have required us to evaluate the planned construction of structures, such as underpinnings and new foundations, on the basis of potentially invalid criteria, i.e., essentially the same seismic criteria as those approved during the CP stage (which were not materially changed by the Applicant's proposed FSAR SSE). The Applicant and Staff reached an agreement, which we had encouraged and thereafter accepted, for a schedule under which (1) the establishment of seismic criteria, including determination of the SSE, ground motions and associated response spectra, and (2) the analysis model for each structure as modified by the remedial actions would be heard during the early hearings on soils-related (OM) issues. This would have left for the later stages of this consolidated OL-OM proceeding the question of whether the safety-related structures as built (including those with and those without modifications necessitated by the soils remedial actions) conformed to the newly determined seismic criteria. *See* Applicant's Motion to Defer Consideration of Seismic Issues Until the Operating License Proceeding, dated March 18, 1981; Stamiris' Response, dated April 6, 1981; Staff's Response, dated April 7, 1981; Prehearing Conference Order (Ruling upon Applicant's Motion to Defer Consideration of Seismic Issues Until the Operating Licensing Proceeding and upon Other Matters), dated May 5, 1981 (unpublished). For these reasons, we are not ruling in this Decision on whether various safety structures built under DBE or FSAR SSE standards in fact conform to the standards required by the new SSE.

Two significant legal questions have surfaced by virtue of the Applicant's election to utilize the SSRS approach — namely, the procedures which the Staff must follow to require structural changes based on that approach, and the consistency of the SSRS approach with the requirements of Part 100, Appendix A. We turn now to these questions.

(1) Procedures for Applying the SSE in OL Review (Applicant's Motion for Reconsideration)

In its March 18, 1981 scheduling motion mentioned above, the Applicant took the position that the application of new seismic criteria to the Midland facility is and should be governed by the backfit requirements of 10 C.F.R. § 50.109.⁹ Although the major thrust of the motion concerned the scheduling of seismic issues, the Applicant's view of the difficulty of resolving the seismic issues in a timely fashion was based in large part on its position that, because a DBE had been formally established at the CP stage, a change in the applicable seismic criteria would be a "backfit" decision which, pursuant to 10 C.F.R. § 50.109, would require a cost-benefit type of finding to the effect that such action will provide "substantial, additional protection which is required for the public health and safety"

Both the NRC Staff and Ms. Stamiris opposed that motion. At a pre-hearing conference on April 27, 1981, we resolved the scheduling aspects of the motion by accepting the Applicant-Staff agreement described *supra* p. 43. In doing so, however, we specifically rejected the Applicant's proposal to consider changes in seismic design only under the backfitting criteria of 10 C.F.R. § 50.109. Our ruling appears in our Pre-hearing Conference Order dated May 5, 1981 (unpublished), at 2-12.

The Applicant now seeks reconsideration of our ruling insofar as it holds that the backfitting criteria need not be utilized (App. FOF, ¶ 498). Other parties did not respond to this motion, although the Staff commented that it would not respond unless the Board specifically requested it to do so (Staff FOF at 53 n.12). (We made no request.)

In our view, the Applicant's motion for reconsideration presents no information which we had not already considered, and provides no persuasive reason for us to change the basis or result of our earlier ruling. We are therefore declining to do so.

However, we wish to reiterate our view that Commission regulations and practices contemplate a separate review at the OL stage of site

⁹ That section reads, in relevant part

§ 50.109 Backfitting

(a) The Commission may, in accordance with the procedures specified in this chapter, require the backfitting of a facility if it finds that such action will provide substantial, additional protection which is required for the public health and safety or the common defense and security. As used in this section, "backfitting" of a production or utilization facility means the addition, elimination or modification of structures, systems or components of the facility after the construction permit has been issued.

(b) Nothing in this section shall be deemed to relieve a holder of a construction permit or a license from compliance with the rules, regulations, or orders of the Commission.

factors, including geology and seismicity, particularly where new information has developed since the CP stage of review. The FSAR must include all "current information . . . which has been developed since issuance of the construction permit, relating to site evaluation factors identified in Part 100 . . ." 10 C.F.R. § 50.34(b)(1). Those factors include the geologic and seismic matters comprehended by Part 100 (particularly Appendix A).

As we pointed out in our May 5, 1981 Prehearing Conference Order, the Staff attributed its reasons for the DBE reevaluation to "a progression during the last ten years in the state-of-the-art with respect to seismology (Tr. 867-869)" (Order at 5). Elsewhere in this Decision, we describe some of the substantial differences in the criteria utilized at the CP stage and those which the Staff is currently following. Among other matters, no tectonic province was ever developed at the CP stage. By including it in its FSAR, the Applicant has implicitly recognized the developing nature of the Staff's seismic criteria and the necessity for incorporating such criteria into the OL review. Further, the Staff regards the design response spectrum utilized during the CP review for ascertaining ground motion (modified Housner) as insufficiently conservative; and, for reasons expressed later in this Decision (*infra* pp. 67-68, Finding 71), we agree. We conclude that the progression in seismological review techniques constitutes "current information . . . which has been developed since issuance of the construction permit," within the meaning of 10 C.F.R. § 50.34(b)(1), thus calling for a reevaluation at the OL stage without need to resort to the backfit standards of 10 C.F.R. § 50.109.

We note that, in our Prehearing Conference Order, we pointed to the use of the backfit criteria as a type of enforcement activity. The Applicant now states (App. FOF, ¶ 498, at 313) that this case is in part an enforcement matter and that the seismic issue was raised in that context as well as in the OL context. If the new seismic criteria were sought to be applied only in an enforcement context, then the procedures required by 10 C.F.R. § 50.109 might well have to be applied. But where, as here, the OL review provisions of 10 C.F.R. § 50.34(b)(1) come into play, they supersede the procedures applicable only in enforcement situations.¹⁰

Finally, we would agree with the Applicant that, despite its agreement with the Staff to perform the seismic margin review using an SSRS SSE,

¹⁰ The OL provisions would apply in any enforcement proceeding carried on during the pendency of an OL application. *Cf. Consumers Power Co. (Midland Plant, Units 1 and 2)*, ALAB-283, 2 NRC 11, 17-18 (1975), *clarified*, ALAB-315, 3 NRC 101 (1976) (burden of proof). Thus, our view has not been influenced by the consolidation here of the OM and OL proceedings.

the procedures to be employed in applying the results of the new seismic review to this facility make a difference: in the words of the Applicant, "the Seismic Margin Review results may lead the Staff to require modifications which Applicant is unwilling to make" (App. FOF, ¶ 498, at 312 n.827). If that situation were to occur, the Applicant could still challenge the Staff's determination. But the decisional criteria would be the normal OL review criteria, not the backfit standards of 10 C.F.R. § 50.109.

(2) *Compatibility of SSRS Approach with 10 C.F.R. Part 100, Appendix A (Finding 34)*

Prior to the hearings concerning seismic issues relating to the choice of an SSE and related ground motion, and as a result of the option afforded by the Tedesco letter (and later accepted by the Applicant) to utilize the SSRS approach, we asked the Applicant and Staff (and permitted other parties) to file briefs addressing the compatibility of the SSRS approach with the requirements of 10 C.F.R. Part 100, Appendix A (in particular, ¶¶ V(a)(1)(ii) and (iv) of the Appendix). See Memorandum dated August 18, 1981 (unpublished). The Applicant and Staff each filed responses on September 29, 1981 (hereinafter App. Brief or Staff Brief); and each asserted that, as used at Midland, the SSRS approach was consistent with the requirements of Appendix A. The Applicant and Staff, respectively, reiterated that position in their proposed findings (App. FOF, ¶¶ 8-16; Staff FOF, ¶¶ 8-16). For the reasons which follow, we agree with that conclusion.

Appendix A to 10 C.F.R. Part 100

describes the nature of investigations [currently] required to obtain the geologic and seismic data necessary to determine site suitability and to provide reasonable assurance that a nuclear power plant can be constructed and operated at a proposed site without undue risk to the health and safety of the public. It describes procedures for determining the quantitative vibratory ground motion design basis at a site due to earthquakes

10 C.F.R. § 100.10(c)(1); see also 10 C.F.R. Part 100, Appendix A, § II. In general, the Appendix A criteria and procedures provide for determination of the appropriate SSE and of the ground motion which that earthquake would generate at the site. General elements of investigation contained in Appendix A for determining the SSE and its representative ground motions where (as here) no capable faults (or similar tectonic structures with which historical earthquake activity can be reasonably correlated) exist within the vicinity of the site, are (1) determi-

nation of the tectonic province in which the site is located, (2) determination of the size and ground motions of the controlling earthquake within that tectonic province, (3) determination of the size and ground motions, at the plant site, of earthquakes associated with distant tectonic structures and those associated with adjacent tectonic provinces, and (4) definition of the response spectra corresponding to the maximum vibratory ground accelerations at the various foundation levels of safety-related structures on the plant site, as derived from the determinations in steps (2) and (3).

Because the data upon which the Appendix A investigations are founded are historical and geologic in nature, the procedures of Appendix A have been characterized as "deterministic" rather than "probabilistic." At the time of our August 18, 1981 Memorandum, there was controversy over the extent to which the use of probabilistic methodology was permissible under Appendix A. See *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-80-33, 12 NRC 295, 298 (1980); cf. *id.*, ALAB-667, 15 NRC 421, 426-42 (1982). For that reason, we specifically inquired whether the Applicant's methodology for determining the SSE and its ground motions satisfied certain of Appendix A's requirements. Although not explicitly stated in our Memorandum, the aspects of the cited Appendix A criteria that we perceived to have the greatest potential incompatibility with probabilistic determinations, depending upon how those determinations were made, were:

- (1) how the requirement that the determinations be carried out in a conservative manner would be treated;
- (2) how probabilistic or statistical *averages* of ground motions would be reconciled with the often-used requirement that *maximum* vibratory ground motions be determined and applied; and
- (3) how both the requirements that the controlling earthquake in the site's tectonic province be assumed to occur *at the site* and that effects of *more distant* earthquakes would be accounted for; and the related question,
- (4) what data or techniques would be applied to assure that the maximum vibratory acceleration at the site *throughout the frequency range of interest* is included.

It is in the definition of the vibratory ground motion associated with the SSE (i.e., defining a response spectrum) where the SSRS methodology is being used at Midland. Appendix A requires that the "vibratory ground motion produced by the Safe Shutdown Earthquake shall be defined by response spectra corresponding to the maximum vibratory accelerations at the elevations of the foundations of the nuclear power plant structures . . ." (10 C.F.R. Part 100, Appendix A, § VI(a)). A re-

sponse spectrum (defined in Appendix A, § III(1)) is “a plot of the maximum responses (acceleration, velocity or displacement) of a family of idealized single-degree-of-freedom damped oscillators against natural frequencies (or periods) of the oscillators to a specified vibratory motion input at their supports.” (See note 59, *infra* p. 137, for additional explanation of response spectra.) The regulations further require that the spectra represent an appropriately conservative description of motions associated with the SSE throughout the frequency range relevant to the design of a nuclear facility (Appendix A, § V(a)(1)(iv)), but they do not specify the methodology for deriving the required spectra. They do require that seismology, geology, and seismic and geologic history of the site and surrounding region, and the characteristics of the underlying soil material in transmitting earthquake-induced motions, be taken into account (Appendix A, § V(a)).

The Staff currently regards at least two different methodologies for representing vibratory ground motion as acceptable — the standardized response spectrum, as defined in Regulatory Guide 1.60 (*see infra* note 49), and the SSRS. As described by the Staff, the Reg. Guide 1.60 approach is a standardized spectrum derived from strong motion records of a large number of earthquakes of various magnitudes, recorded at various distances and on varying site conditions. The ground motion values of these records were normalized to the same acceleration, a spectral shape was derived representing the mean plus one standard deviation, and, after some smoothing, the response spectrum became the standardized Reg. Guide 1.60 spectrum. Although it can be used at a wide range of sites to define the vibratory ground motion of a large variety of earthquake intensities, it does not depend on the characteristics of any one site to which it is applied. When used, the Reg. Guide 1.60 spectrum is scaled to the ground acceleration level associated with the intensity of the site’s SSE. Staff Brief at 10-11.

On the other hand, according to the Staff, the SSRS methodology takes into account more closely the seismology and geology of the site and surrounding region and the engineering properties of the soil. As described by the Staff:

The principle underlying the use of a site-specific response spectrum is straightforward. Because earthquakes of similar magnitudes have been found to have similar ground motion characteristics when recorded at similar distances from the epicenter and in similar soil conditions, an accurate representation of possible ground motion for an earthquake of a postulated magnitude can be derived from analyzing an adequate set of recordings for similar magnitude earthquakes at similar sites elsewhere. To make this comparison, the data base for strong motion records is searched for all recordings of historical earthquakes of similar magnitude to the chosen safe shutdown earthquake recorded close to the epicenter of the event and

recorded in similar geologic conditions. If the ensemble of recordings fitting these parameters is of sufficient size then the ground motion data for each of the records are plotted, and an idealized spectrum is drawn representing a mean-plus-one-standard-deviation. This idealized spectrum is the response spectrum specific to the site.

(Staff Brief at 12-13, citation omitted.)

The Applicant, in both its brief and witness' testimony, offers that the approach used in determining the SSRS for the Midland site primarily is deterministic but goes on to explain the limited use made of probabilistic techniques in determining the SSRS. App. Brief at 1-2, 4, 12-13; Holt, ff. Tr. 4539, at 14; Holt, Exh. 10, at 5-10 and Figs. 1-8. In its brief, the Staff points out (at 12-13) that the SSRS method recommended in the Tedesco letter is a straightforward empirical approach to design a response spectrum that is specific to a site (and to its SSE, based on earthquake magnitude) and which complies more closely than the alternative standardized-spectra approach with the mandate of Appendix A to account for specific site conditions. It is not a probabilistic methodology as used here; it does employ certain statistical treatment of a sufficiently large population of earthquakes, matched as to their size and similarity of applicable site conditions, which are reviewed for appropriateness on a case-by-case basis. The Staff points out that the design of a site-specific response spectrum is no more than the adjusting or tailoring of a standardized response spectrum for the particular seismic and geologic characteristics of the selected site. *Id.* at 11-14. The Applicant agrees that use of SSRS is no more probabilistic than use of the Regulatory Guide 1.60 spectral shape. App. FOF, ¶ 14.

The Staff, also in response to our Memorandum, provided information in its brief on past applications of the SSRS approach, referencing the licensing of Sequoyah, Units 1 and 2, and San Onofre, Units 2 and 3. The Commission has approved licenses for both of those facilities. At the time of the submission of its brief, the Staff was also in the final stages of approving site-specific spectra, designed using methodology similar to that employed at Midland, for the Enrico Fermi Unit 2, Watts Bar, and Bellefonte plants. Safety Evaluation Report, Sequoyah Nuclear Power Plant, Units 1 and 2, Tennessee Valley Authority, Docket Nos. 50-327 and 50-328, March 1979, NUREG-0011, § 2.5.3; Safety Evaluation Report (Geology and Seismology), San Onofre Nuclear Generating Station, Units 2 and 3, Southern California Edison Co., *et al.*, December 1980, NUREG-0712, § 2.5.2; Safety Evaluation Report, Enrico Fermi, Unit 2, Detroit Edison Co., NUREG-0798, July 1981, § 2.5.2; Staff Brief at 15-17.

The Staff's application of the SSRS methodology at Sequoyah resulted from a situation quite similar to that at Midland; i.e., during its OL review the Staff had questioned both the spectrum and the ground acceleration value originally chosen at the CP stage. In all material respects the procedure used at Sequoyah was identical to that employed for designing the Midland SSRS, and the procedure was reviewed in depth and endorsed by the Advisory Committee on Reactor Safeguards (ACRS). Staff Brief at 15 and Attachment I (Letter from ACRS Chairman M. Carbon to NRC Chairman J. Ahearne, "Interim Low Power Operation of Sequoyah Nuclear Power Plant, Unit 1," dated December 11, 1979).

The Staff disagreed with the Applicant's Proposed Finding 10 (that seismicity is a "probabilistic consideration") and with the Applicant's Proposed Finding 14 (that the statistical process of combining earthquake records in the construction of response spectra is probabilistic). Both of these views of the Applicant on the "probabilistic aspects" of establishing the SSE and constructing the SSRS also occur in the Applicant's Brief (at 6-7, 12), in the testimony of the Applicant's witness (Holt, ff. Tr. 4539, at 17), and are viewed by the Board as unnecessary, and incorrect, arguments to justify use of the SSRS methodology.

In sum, we view the SSRS methodology as employed at Midland as no more than a specific site application of the technology used to develop the standardized spectra contained in Reg. Guide 1.60. Only historical records made in substantially similar soil conditions are chosen for designing the SSRS. It takes into account the expected maximum vibratory acceleration at the site throughout the frequency range of interest, as required by §§ V(a)(1)(iv) and VI(a)(1) of Appendix A. The design of the spectrum is based on an objective analysis of empirical historical records of earthquake ground motion, analytically related to the SSE, as required by Appendix A, §§ IV(a) and V(a)(1). Finally, the SSRS takes account of seismology, geology and underlying soil characteristics of the site, as required by § V(a) of Appendix A. Accordingly, we agree with the Applicant and Staff that the SSRS methodology, as employed at Midland, satisfies the governing requirements of 10 C.F.R. Part 100, Appendix A.¹¹

¹¹ We are informed that the NRC Staff has developed SSRS using a different methodology than that described above for use in its Systematic Evaluation Program or "SEP" (which includes the La Crosse Boiling Water Reactor). The SEP SSRS are based on a complex synthesis of deterministic judgments and probabilistic modeling, which do not, at least explicitly, follow the deterministic procedures outlined in Appendix A. This SEP methodology is not involved in this case, and we express no opinion as to its validity. See App. Brief at 6 n.3; Staff Brief at 14; see also *Datryland Power Cooperative* (La Crosse Boiling Water Reactor), LBP-83-23, 17 NRC 655, *aff'd* (*sua sponte*), ALAB-733, 18 NRC 9 (1983).

B. Maximum Earthquake and Associated Ground Motion at the Midland Site (Findings 19-79)

The Design Basis Earthquake (DBE) approved for the Midland site at the CP stage was based on a Modified Mercalli Intensity (MMI) of VI, the size of the largest earthquake within about 150 miles of the plant site. CP "SER," at 13, 114, 116. The DBE was not associated with any tectonic province, since the CP review was performed before promulgation of either the proposed or final version of 10 C.F.R. Part 100, Appendix A, which required such determinations. (*But see supra* note 6.) The ground motions associated with the DBE were represented by a modified Housner design response spectrum anchored at 0.12g (where g = acceleration due to gravity at the earth's surface). The Housner spectrum was modified by increasing its levels of response motions by an additional 50% in the frequency range between about 1.6 Hz and 5 Hz (or 0.6- and 0.2-seconds-period range). CP "SER," at 13; Finding 21, *infra*.

Because the seismic design basis for the Midland Plant followed procedures and regulations in existence before promulgation of Appendix A, the Staff, during its review of the OL application, questioned whether the plant safety systems were designed to withstand the effects of an earthquake as would be determined by current standards. It raised questions as to the adequacy of both the ground acceleration value (0.12g) and the design response spectra (modified Housner) used to represent the earthquake motions.

The Board has found remarkably little disagreement, in the end, between the technical positions of the Applicant and the Staff; but the route to this conclusion has not always appeared so clear. The final result, with which we agree, was a commitment by the Applicant to use site-specific response spectra (SSRS) to represent Safe Shutdown Earthquake motions that differ from the original modified Housner design spectra mainly in shape. *See* Figures 2 and 3, *infra* pp. 66-67. While site-specific response spectra, by their method of construction, are not "anchored" at a peak acceleration value, those derived by the Applicant are very close at most frequencies to what would be obtained by current standardized (Regulatory Guide 1.60) response spectra anchored at 0.12g, the original (DBE) peak acceleration value determined for the Midland site. These site-specific response spectra were to be used by the Applicant in the seismic reevaluation of structures, systems, and compo-

nents important to safety¹² and as minimum input values in the seismic design¹³ of certain remedial structures (underpinnings and new foundations) required to be built as a result of improper compaction of soil fill on which some of the safety-related¹⁴ buildings were partly or completely founded. Thus, the earthquake represented by these site-specific response spectra and determined by this Board to meet the requirements of Appendix A (*see* discussion, *infra* pp. 63-69), is properly termed the Safe Shutdown Earthquake (SSE). The original DBE was the seismic design basis for the bulk of the structures, systems, and components important to safety at the Midland Plant, at the time they were initially designed.

In its 1977 FSAR, the Applicant proposed an SSE that was based upon a newly proposed Michigan Basin tectonic province. That SSE, which was never accepted by the Staff, came to be called the "FSAR SSE" in these proceedings. Its size and ground motion characteristics are identical to those of the original DBE, and are at issue in these proceedings. The terms "FSAR SSE" and "FSAR spectra" as used in these proceedings should be read as "DBE" and "DBE spectra," respectively. Because there can be only one SSE for the Midland site, and if the project were to be continued or resurrected, a future revision of the FSAR would need to reflect the SSE and its ground motion characteristics, as determined by the outcome of these proceedings.¹⁵

While the December 6, 1979 Modification Order did not specifically address seismic issues, one of its major concerns was "the unresolved safety issue concerning the adequacy of the remedial action to correct the deficiencies in the soil construction under and around safety-related structures and systems . . ." (Modification Order at 4). Seismic design bases (the SSE and representation of its motions) for the underpinning

¹² This Board does not distinguish a difference between the terms "important to safety" and "safety-related" when applied to seismic design requirements. It seems clear to us that 10 C.F.R. Part 100, Appendix A, uses the terms quite interchangeably. Staff practice in this regard is reflected in Regulatory Guide 1.29 which designates as "Seismic Category I" those structures, systems and components which shall be designed to remain functional if the safe shutdown earthquake (SSE) occurs. The Regulatory Guide includes, *inter alia*, as Seismic Category I "[t]hose portions of structures, systems, or components whose continued function is not required but whose failure could reduce the functioning of any plant features [whose function is required] to an unacceptable safety level . . ." (at C.2). *See also* note 94, *infra* p. 195.

¹³ Those remedial structures already designed were designed to 1.5 times the original DBE response spectrum which was found to be higher than the SSRS for this particular purpose. Tr. 6003 (Kennedy).

¹⁴ *See* note 12, *supra*.

¹⁵ This Board is ignoring another term introduced by the Applicant (App. FOF, ¶ 5), the "Seismic Margin Earthquake" or SME, said to represent the earthquake corresponding to the site-specific response spectrum ground motions. It is synonymous with the SSE as used here.

work clearly are included under the required acceptance criteria necessary for the Staff to evaluate the technical adequacy and proper implementation of the proposed remedial actions (*id.* at 3).

The operating basis earthquake (OBE) proposed in the FSAR, represented by modified Housner response spectra anchored at 0.06g (also as accepted at the CP stage), has not been at issue in these proceedings. We accordingly are making no findings with respect to the adequacy of the OBE. We note, however, that it has been accepted as sufficiently conservative by the Staff in light of the definition, in part, of the OBE as the earthquake expected at the plant site during the operating life of the plant. SER, § 2.5.2.5, at p. 2-39; 10 C.F.R. Part 100, Appendix A, § III(d).

(1) Tectonic Province

In its 1980 "Tedesco letter," the Staff had offered the Applicant two alternative approaches to resolve the Staff's concerns about the adequacy of the DBE and its corresponding response spectra. The first would have been to use the standardized response spectra of Regulatory Guide 1.60, a design practice regarded by the Staff as acceptable since December 1973 (the date of issuance of the current version of the Guide). The other would be to develop SSRS based on actual site-and-magnitude-matched accelerograms recorded at distances within 25 km of an earthquake, an approach made possible by the increased number of close-in earthquake recordings that have become available since derivation of the earlier standardized response spectra. The Staff further specified that either of these approaches should be based upon an SSE similar to the Anna, Ohio earthquake, with a magnitude of 5.3 or intensity of MMI = VII-VIII which the Staff had come to recognize as the controlling earthquake in the Central Stable Region tectonic province that included the Midland site.

The Applicant elected to use, and submitted reports on, the SSRS approach but maintained (1) that the low seismic hazard at the Midland plant site did not warrant use of an SSE as large as the Anna, Ohio earthquake; and (2) that the Michigan Basin, with a magnitude 4.5 controlling earthquake, satisfied the requirements of Appendix A to Part 100. The Applicant also maintained, in our view incorrectly (*see infra* Finding 58), that the assigned magnitude of the Anna, Ohio earthquake should be 5.0, not 5.3. Additionally, results of comparative probabilistic seismic hazard studies performed for five sites, as specified by the Staff, in other parts of the Central Stable Region were submitted in 1981 to show the relatively lower seismic hazard at the Midland site.

Based almost entirely on its evaluation of these seismic-hazard study results, the Staff changed its position, agreeing that the Midland site lies in a region of lower seismicity that could be subdivided from the Central Stable Region, but whose boundaries extend westward from the Michigan Basin to include the upper peninsula of Michigan, northern Wisconsin and all of Minnesota, and perhaps other areas, as well. This larger area included a magnitude 5.0 historic earthquake that occurred in Minnesota in 1860 and which would be the controlling earthquake for the proposed tectonic (or seismotectonic)¹⁶ province.

The Staff's changed position on the smaller SSE and appropriate tectonic province came late in the proceeding, after the Applicant's expert witness, Mr. Richard J. Holt, had written his prepared testimony, and only shortly before the Staff's expert witness, Mr. Jeffrey K. Kimball, prepared his own testimony. A result of this late development was that the Staff had insufficient time to develop fully its justification for the definition of its proposed tectonic province or indeed its extent. Another effect was that much of the Applicant's testimony that was directed against the now-abandoned magnitude 5.3 SSE became moot or appeared immoderately overstated in light of the Applicant's general endorsement of the new Staff position. As a result, we heard some testimony on "nonissues" and some to correct inconsistencies which were a source of confusion at the time and in the record as it stands. While not specifically abandoning the Michigan Basin as a proposed tectonic province to include Midland, Mr. Holt agreed that the choice of a magnitude 5.0 SSE would be appropriate and would correspond to the largest historical earthquake which should be associated with the tectonic province in which the Midland site resides.

On the basis of the record, five choices became available to the Board for determining the appropriate tectonic province for the Midland site and the size of the controlling earthquake to be designated therein. Because the evidence indicated (a) that there are no capable faults or other tectonic structures with which earthquakes may reasonably be correlated within 200 miles of the site, and (b) that earthquakes in adjacent tectonic provinces would not govern maximum ground motions at the site, the controlling earthquake within the tectonic province in which the site is located would become the SSE, subject in this case to additional limited effects from a postulated recurrence of the more distant (about 500 miles), but very large, New Madrid earthquake. The five possible choices are:

¹⁶ The Staff consistently used the term "seismotectonic province" but explained that it equated that term with tectonic province as used in Appendix A. Tr. 4698-99, 4757-58 (Kimball).

- (1) Undivided Central Stable Region, with a magnitude 5.3 or intensity VII-VIII controlling earthquake.
- (2) The Staff's ill-defined proposed tectonic province, with a magnitude 5.0 or intensity VII controlling earthquake.
- (3) The Applicant's proposed Michigan Basin tectonic province, with the originally proposed magnitude 4.5 or intensity VI controlling earthquake.
- (4) The Applicant's proposed Michigan Basin tectonic province, with the agreed-upon magnitude 5.0 or intensity VII earthquake.
- (5) Indefinite tectonic province (i.e., no resolution of the different tectonic provinces proposed by the Applicant and by the Staff), with the agreed-upon magnitude 5.0 or intensity VII controlling earthquake, but limited to this proceeding only.

By reducing two of the Applicant's map portrayals to a common scale and overlaying them, the Board has provided a single map here (Figure 1, *infra* p. 56) for convenience to show the proposed tectonic province boundaries, major tectonic structures, seismic source zones, and Central Stable Region sites used in the relative seismic hazard studies. To this map the Board has added the delineation of what we understand from the verbal descriptions to be the boundaries of the Staff's proposed westward extension and an area in southeastern Michigan that we would exclude based on the Staff's reservations about its inclusion, as well as a few place names from the testimony.

In regard to determination of the appropriate tectonic province, the Board notes first of all that the total range of sizes of controlling earthquakes that we are to consider here is not very great — magnitude 4.5 to 5.3 and intensity VI to VII-VIII. Because of the testimony we heard that accuracy of assignment of magnitude to an individual earthquake is, at best, about 0.2 magnitude units (we heard estimates for the Parkfield earthquake ranging from 5.5 to 6.2), and because intensity is even more subjectively assigned than magnitude, we believe that determination of a controlling earthquake, or SSE, to within about one-fourth magnitude unit or one-half intensity unit is about as fine a discrimination as can be made. The choices between magnitude 5.0 and 5.3 or between intensity VII and VII-VIII involve what we believe to be the minimum practical limit for distinguishing controlling earthquakes in different tectonic provinces. In this same regard, the seismic hazard calculations which we heard that carried both magnitude and intensity differences out to two decimal places strained our credulity. They imply a degree of accuracy which is not now attainable.

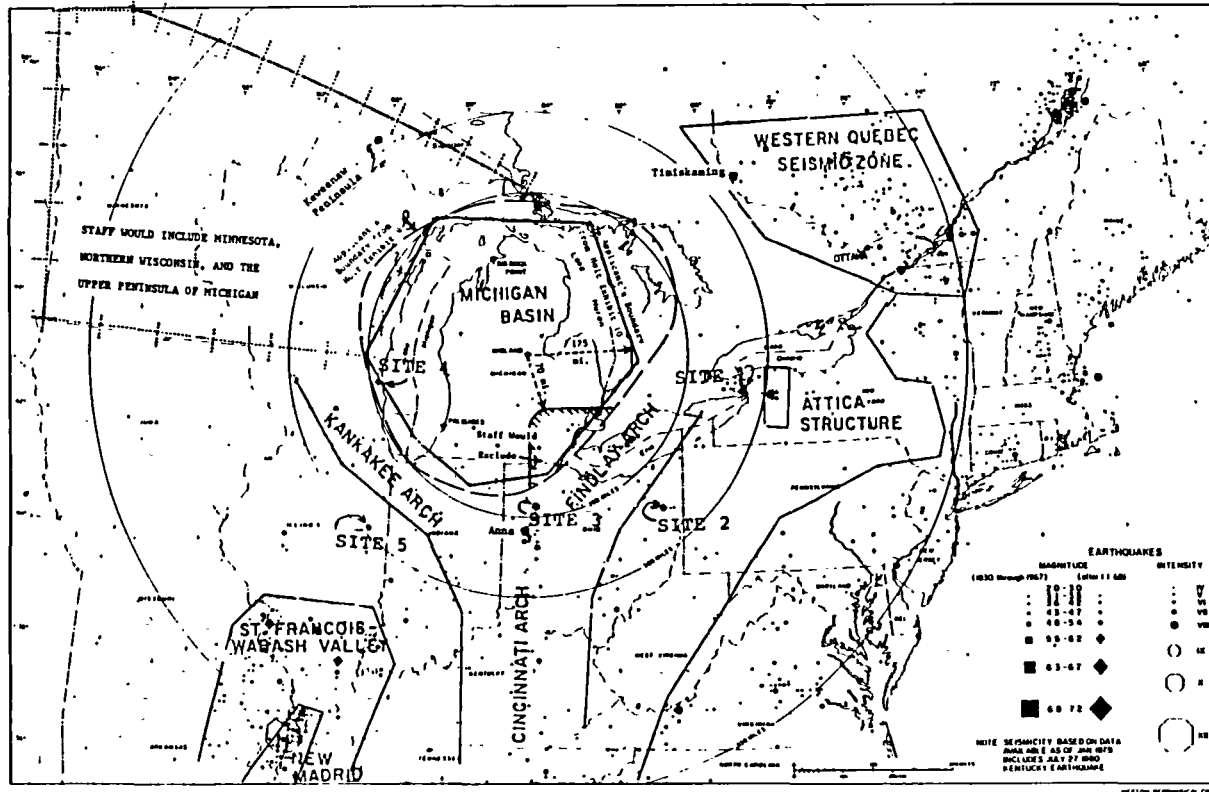


FIGURE 1. Map showing boundaries of Tectonic Provinces proposed by Applicant and Staff. Sites 1-5 are those utilized in comparative seismic hazard analyses. (Compiled from Holt Exhs. 9 and 10, Fig. 5; and from verbal descriptions by Staff witness Kimball.)

Both the Applicant and Staff presented sound testimony to the effect that the Central Stable Region can be subdivided, and that the Midland site lies in a region having a lower seismic hazard than other parts of the Central Stable Region. The evidence indicated that the controlling earthquake for the region surrounding the Midland site can be smaller than the magnitude 5.3 Anna, Ohio earthquake.

The maximum historical earthquake that has been recorded in the Applicant's proposed Michigan Basin province is 4.5. However, the time interval of record (since about 1850) is short when compared to the estimated statistical recurrence interval that Staff practice deems acceptable for an SSE, 1,000 to 10,000 years. Also, the total number of historic earthquakes is small, between about nine and seventeen, which may be an insufficient sample, statistically, to overcome the uncertainty that the maximum historical earthquake is a sufficient basis for the SSE. Furthermore, acceptance by the Applicant of a magnitude 5.0 controlling earthquake for the tectonic province in which the Midland site resides (derived by the Staff from the Applicant's own seismic hazard studies) indicates abandonment of the originally proposed magnitude 4.5 controlling earthquake. Findings 42, 52-54, 56.

As set forth in our findings, we find that the Staff failed to provide adequate tectonic and geologic bases to support its proposed tectonic province, or even to define its boundaries. On this latter point, the Staff witness (Mr. Jeffrey Kimball) testified that given the opportunity and ample studies he would be able to define the boundaries concisely, but that he had not done so. It was clear that he perceived a uniformity of low seismic hazard across the entire region, which included all of the Michigan Basin, except for the southeastern corner, as well as the proposed westward extension. This perception was borne out by the seismicity, there having been about fourteen historic earthquakes in the proposed westward extension, which extension alone had about twice the area of the Michigan Basin. However, the Board finds the Staff's theory linking seismicity and, *ipso facto*, undefined tectonic structure too weak upon which appropriately to base definition of a tectonic province. We also find that the Staff should have addressed differences in orientation of tectonic structures in the westward extension, that we noted on Staff Exhibit 5, and those cited by the Applicant as indicating relative uniformity of tectonic structure in the Michigan Basin. We believe the Staff also should have addressed the possible tectonic significance of small earthquakes with anomalously high intensities (presumably resulting from shallow depth of occurrence) that have occurred in the Keweenaw Peninsula of Michigan, an area where the tectonic structures are appar-

ently orthogonal to those in the Michigan Basin. Findings 43, 45-50, 55, 57.

For purposes of this Decision, and taking into account the degree of agreement between the Applicant and Staff on the appropriate SSE and the representation of its ground motions by the SSRS, this Board was urged to avoid choosing between the Staff's or Applicant's proposed tectonic provinces, because either province would have a controlling earthquake of magnitude 5.0. App. FOF, ¶ 30; not contested by the Staff (Staff FOF, ¶ 30). See option (5), set forth *supra* p. 55. However, we reject this option to leave the tectonic province indeterminate for four main reasons. First, we read Appendix A as requiring such a determination for each license application — particularly where, as here, the ascertainment of the tectonic province is an issue in a proceeding (see *infra* Findings 35-36, 38, 42-43, 49-51, 52, 54-55). Second, since either of the proposed tectonic provinces would be subdivided from the larger Central Stable Region, the boundaries between the new and the “parent” province must be sustainable under the provisions of Appendix A to Part 100; otherwise the already-established controlling earthquake of the Central Stable Region should apply. We have already commented on why we found the boundaries of the Staff's proposed tectonic province not to be sustainable, and in fact they were not drawn.

Third, we heard, and agree, that the Central Stable Region can be subdivided because of its inherent nonuniformity of seismic hazard. To reach a decision here that would be applicable only to the Midland site will not further the longer-term objective of accomplishing that subdivision. Regulatory stability would not be enhanced.

Finally, we have found the Applicant's proposed tectonic province, and its boundaries as modified here, sufficient to meet the requirements for definition under the provisions of Appendix A to Part 100. Thus there is no reason to consider an indeterminate tectonic province as a basis for our decision.

The Applicant maintains that the Michigan Basin meets the requirements in Appendix A for definition as a tectonic province. We agree. It is a very large tectonic structure itself (nearly 400 miles across), a structural depression of the earth's crust containing ancient sedimentary rocks of Paleozoic age about 3.5 km thick near the center of the basin, but thinner near its margins. It is distinguishable from the tectonic arches around its southern perimeter on the bases of structural relief, parallel and cross structures on the arches, and seismicity differences. It has a relative consistency of tectonic features within it, namely the northwest-southeast trending anticlines, monoclines, and possible related faults, known mainly in the deep subsurface from petroleum explora-

tion in the State. The largest historic earthquakes that have occurred in the basin were two events in the southern part of the basin, both of which had an intensity $MMI = VI$, or an equivalent magnitude $m_{blg} = 4.5$.

Two maps introduced by the Applicant show somewhat different boundaries for the Michigan Basin tectonic province, but the differences between them appear to fall within the degree of acceptable uncertainty ascribed to them in the testimony. The Board would accept either of the sets of boundaries provided by the Applicant (but prefers the smaller), except that we would exclude the southeastern corner of the State of Michigan about which the Staff expressed reservation. *See supra* Figure 1. We base our exclusion on the assumption that the structures shown as occurring near Detroit and Ann Arbor on Staff Exhibit 5 were thought by the Staff witness to be representative of those on the Findlay Arch, rather than of those in the Michigan Basin, and possibly related to similarly aligned structures that exist in the vicinity of Anna, Ohio, located just to the south. Findings 37, 38, 40, 53.

The Staff's objections to subdividing just the Michigan Basin from the Central Stable Region, as the Applicant had proposed, were partly based on the same problem as perceived with retaining the Central Stable Region as a tectonic province, i.e., both would be based on features present in the "surficial Paleozoic geology" which both the Staff and Applicant asserted bore little or no relationship to the underlying tectonic features causative of earthquakes. However, the Staff as well as the Applicant relied on those very features, the arches along the southern margin of the Michigan Basin, in proposing the position of portions of the boundary of their respective tectonic provinces. The Staff's witness stated that, in the past, the Staff has relied upon the Central Stable Region as a tectonic province (Tr. 4786 (Kimball)); hence it must be regarded as meeting the requirements of Appendix A to Part 100, at least in the Staff's view. He also stated that there are some experts who would consider that portion of the Kankakee Arch that has experienced essentially no earthquakes in historic times to have a potential for seismic activity (Tr. 4760 (Kimball)). The Board sees no reason to accept the argument against using features in the "surficial Paleozoic geology" to reject either the Michigan Basin or the remaining parts of the Central Stable Region as valid tectonic provinces. While Appendix A may implicitly require some correlation of tectonic features with levels of earthquake activity in defining a tectonic province, it does not require a full understanding of the causal relationships.

The Staff's witness also proffered that it would be inconsistent to establish one structural basin in the Central Stable Region as an area of

relatively low seismic activity when another, the Illinois Basin, exhibits a much higher level of seismic activity (Tr. 4837 (Kimball)). Again, we can assign little probative value to this argument against basing a tectonic province on the Michigan Basin since we do not know the causes of earthquakes in either basin and do not assume that the causative tectonic mechanisms of earthquakes should be the same in all basins. Also we note that the Illinois Basin (*see* Staff Exhibit 5) is adjacent to the very active New Madrid seismic zone where tectonic stresses are obviously high.

(2) Controlling Earthquake (SSE)

While the Board finds that the total number of historic earthquakes that have occurred in the Michigan Basin tectonic province (between nine and seventeen by our count) does indicate a low seismic hazard, we also find that this very paucity of data casts doubt on the appropriateness, or conservatism, of relying on the size of the largest historic earthquakes (two events of intensity VI with a corresponding magnitude of 4.5) to represent the controlling earthquake in the tectonic province. We believe this perceived inadequacy of seismological data warrants requiring that the controlling earthquake, hence the SSE, be larger than the maximum earthquake that has occurred historically within the tectonic province.

We base this conclusion on the fact that inadequacy of the seismological data is essentially the same condition as that described by the original version of ¶ V(a)(1)(iv) of Appendix A to Part 100 as the reason for requiring that the procedures used in determination of the SSE be applied in a conservative manner. Prior to clarification by the Commission's amendment in 1977, sentence four of ¶ V(a)(1)(iv) of Appendix A of the Siting Criteria read:

In order to compensate for the limited data, the procedures in paragraphs (a)(1)(i) through (a)(1)(iii) of this section shall be applied in a conservative manner.

10 C.F.R. Part 100, Appendix A, ¶ V(a)(1)(iv), final rule published at 38 Fed. Reg. 31,279 (Nov. 13, 1973) (emphasis supplied to words replaced in the 1977 clarifying amendment).

This requirement appeared in both the proposed rule issued in 1971 (36 Fed. Reg. 22,601 (Nov. 25, 1971)) and the final rule promulgated in 1973. Paragraph V(a)(1)(i) of Appendix A specifically states that "[t]he magnitude or intensity of earthquakes based on geologic evidence [that are used in the determination of the SSE] may be larger than that

of the maximum earthquakes historically recorded," albeit in connection with earthquakes associated with tectonic structures (which would include capable faults). The clarifying amendment issued in 1977 (42 Fed. Reg. 2051 (Jan. 10, 1977)) made it quite clear that this conservatism is to be applied to earthquakes associated with tectonic provinces as well, in the event that geological and seismological data warrant. This was accomplished by replacing the introductory phrase with specific subsequent wording, viz:

The procedures in paragraphs (a)(1)(i) through (a)(1)(iii) of this section shall be applied in a conservative manner. The determinations carried out in accordance with paragraphs (a)(1)(ii) and (a)(1)(iii) shall assure that the safe shutdown earthquake intensity is, as a minimum, equal to the maximum historic earthquake intensity experienced within the tectonic province in which the site is located. In the event that geological and seismological data warrant, the Safe Shutdown Earthquake shall be larger than that derived by use of the procedures set forth in Sections IV and V of the Appendix.

In its Statement of Considerations accompanying the 1977 clarifying amendment, the Commission emphasized that the provisions of Appendix A are minimum requirements and that they have consistently been interpreted as such in licensing decisions. It further stated that the amendment related solely to minor matters of a clarifying nature. By this we interpret the Commission's intent as not to change the underlying basis of the requirement, as reflected in the replaced words. We also note that in at least the second and third examples given by the Commission to illustrate conditions where a larger-than-historic earthquake in a tectonic province might be warranted, limited geological or seismological data might be considered to be an underlying cause for the warrant.

We find that the magnitude $m_{blg} = 5.0$ SSE proposed by the Staff and agreed to by the Applicant is appropriate for Midland. We do not, however, base this finding upon the historical earthquake that occurred in Minnesota within the Staff's proposed westward extension of the tectonic province containing the Midland site, but upon the results of the Applicant's probabilistic seismic hazard studies which compared five sites in the Central Stable Region with the Midland site, and upon the Staff's analyses of those studies. While we could not find that it was permissible to define a tectonic province on the basis of comparative seismicity studies alone, as the Staff seemingly had proposed, we do accept the Staff's evaluation of the Applicant's seismic studies, and the results of the studies themselves, as appropriate methods for use in determining the size of the tectonic province's controlling earthquake and, hence, the SSE.

We agree with the prudence of the Staff's precautions about using probabilistic results only in a comparative manner and at several sites, rather than relying on any calculated "absolute" probability at any specific site (cf. Kimball, ff. Tr. 4690, at 16). We would further repeat that we regard as significant only those differences that exceed about one-half of an intensity unit or about one-quarter of a magnitude unit. Also, we could not have accepted the results had they indicated a smaller SSE than the maximum historic earthquake in the tectonic province, since such acceptance would be contrary to the mandate of Appendix A to Part 100.

The probabilistic seismic hazard study methodology compared the estimated earthquake intensities that would be assigned to the Midland site and five other sites in the Central Stable Region at different probability levels dependent upon the size and number of earthquakes that have occurred in the regions surrounding each site, assuming different zonation models, or boundaries for earthquake zones, each earthquake zone having an *assumed* upper-bound cutoff for its respective controlling earthquake. The Applicant's witness (Holt Exh. 10, at 4) explained the principle of seismic hazard simply as "the closer a site is to an earthquake zone, the higher the hazard." The probabilistic methodology inexactly quantifies that principle.

The results of the Staff's analyses showed that at a 10^{-4} annual probability-of-exceedance the calculated intensity level for all study sites is essentially the same (about "7.5" or VII-VIII)¹⁷ when the undivided Central Stable Region zonation model is used. This result is to be expected since each site was assumed to experience the controlling earthquake for that source zone. At the same probability level, the other zonation models, including the Michigan Basin-and-arches Model, show the Midland site to have a calculated intensity level of about VII (expressed as "6.9"), well below the average intensity calculated for the other sites, which ranges from "6.9" to a high of "8.75." The highest intensity, using these zonation models at the 10^{-4} probability level, was predicted at Site 3, located near Anna, Ohio. Kimball, ff. Tr. 4690, Table 1.

In the Board's view the Applicant and Staff over-elaborated the numerical calculations and comparisons, and implied greater accuracy of the results than attained. We believe that the most considered conclusion to be drawn from the relative seismic hazard studies is that the intensity at the Midland site, calculated at a probability-of-exceedance of

¹⁷ The Board has some difficulty in understanding the significance of decimal values applied to the Modified Mercalli Intensity Scale which properly uses Roman numerals for its descriptively based, non-uniform divisions. See Holt Exh. 4.

10⁻⁴ per year, is about one-half intensity unit (or about one-quarter magnitude unit) lower than that at most of the other sites studied in the Central Stable Region. The values obtained in the Staff's analysis were "0.50" to "0.70" intensity units corresponding to 0.25 to 0.35 magnitude units. *Id.* at 20. The sites studied were selected to be representative of areas both where significant earthquakes have occurred and have not occurred within the Central Stable Region (Tr. 4761 (Kimball)).

In determining the SSE ground motions, it was also necessary to consider the effects at the Midland site which might result from occurrence of the controlling earthquakes in adjacent tectonic provinces, assuming that each occurred at a point on the tectonic province boundary closest to the site. The first earthquake to be considered would be similar to the Anna, Ohio event, which occurred in 1937, and is the controlling earthquake within the Central Stable Region. It occurred at a location about 205 miles south of Midland. Even with the Board's exclusion of the southeastern corner of the Michigan Basin, the nearest approach of the tectonic province boundary to the site would be no closer than about 70 miles. *See* Figure 1, *supra* p. 56. The Staff's calculations indicated that a magnitude 5.3 Anna-type event would have to occur much closer than 70 miles, something like 25 miles, from the site before its motions would exceed those of a magnitude 5.0 event occurring at the site.

The Board questioned the Staff's witness about another, larger, earthquake which had occurred in Canada at a location about 340 miles north-east of Midland. This was the magnitude 6.2 Timiskaming event which occurred within the Applicant's "Western Quebec Seismic Zone." *See* Figure 1, *supra*. Because of the indefiniteness of the boundaries of the Staff's proposed tectonic province the Board wanted to be reassured that the Timiskaming earthquake had not been overlooked because of its occurrence outside the United States. While the Staff's witness allowed that the Staff's proposed tectonic province *might* extend northeastward to abut the province containing the Timiskaming earthquake, he estimated that the Canadian earthquake would have to occur within 100 miles of the site before its motions would exceed the ground motion spectrum accepted for the SSE at the site, and in no case would the tectonic province boundary in that direction be closer than 100 miles from the site.

(3) Construction of the SSRS

The Staff evaluated the SSRS that were submitted by the Applicant to meet the Staff's criteria for a magnitude 5.3 SSE. The Staff concluded that as submitted, without the inclusion of any spectra from the magnitude 5.65 Parkfield earthquake, the SSRS were appropriately conserva-

tive to be used to represent a magnitude 5.0 SSE at the Midland site. The Staff's already-stated criteria were that the SSRS would be derived from enveloping, at the 84th percentile statistical level, response spectra calculated from an ensemble of actual site-and-magnitude-matched earthquake records taken from within 25 km of the recorded earthquakes. Site matching was to be based on similarity of the soils beneath the recording site, in terms of thickness, layering and shear moduli, to soils beneath the Midland site. Different spectra were to be constructed to correspond to the top of the natural soils (glacial till and lacustrine clays) and to the top of the approximately 30-foot-thick softer soil fill, on each of which some of the safety-related structures were founded. The effect of the softer fill layer would be to further amplify seismic ground motions at certain frequencies, mainly those in the range of 1-4 Hz. Magnitude matching was specified as the SSE magnitude ± 0.5 magnitude units. The magnitude range of the "without-Parkfield" ensemble of earthquakes used in construction of the SSRS submitted by the Applicant was 4.9 to 5.5, thus falling within the Staff's magnitude-matching criterion for a magnitude 5.0 SSE. Recording-distance and foundation-materials-properties criteria were also deemed by the Staff to be satisfactorily matched. We agree.

The Applicant used forty-four component records taken at twenty-two instruments during ten earthquakes to construct the top-of-natural-soils ("original ground surface") SSRS. Records from thirty-six components taken from eighteen sets of records at ten sites during twelve earthquakes were used to construct the top-of-fill SSRS. While all the earthquakes from which records were used occurred either in California or Italy, they were selected to include all those available worldwide taken from within the 25-km range, and meeting the specified site-and-magnitude-matching criteria. The 25-km range specified meets the requirement of Appendix A to Part 100 that the SSE within the tectonic province in which the site occurs be assumed to occur at the site; it is also the range within which the Staff considers that no significant source-to-site attenuation differences need be considered, irrespective of whether the earthquakes occurred in Michigan, California or Italy, so long as the materials properties are similar at all the sites.

Given a sufficient number of records from different earthquakes, as used here, the diversity of spectral data in the individual spectra should account for uncertainties of what ground motions might result from the postulated future occurrence of an earthquake the size of the SSE near the site. In this regard, statistical combination of the spectra at the 84th percentile level was judged to be appropriate for design purposes to account for unknown variables, other than magnitude, in earthquake

source properties such as stress drop, fault rupture velocity, rock properties along the fault, and style of faulting. Combination at the median level would tend to average out the effects of those unknowns, which conservatism requires to be included. On the other hand, enveloping all the records at the 100th percentile level would overemphasize every anomalous peak that might be present in any record spectrum. Combination at the 84th percentile, while somewhat arbitrary, has been tested through past application of the Regulatory Guide 1.60 standardized spectrum, in which combination of its component spectra was at this statistical level, and which is deemed conservative.

In the low-frequency, or long-period,¹⁸ portion of the spectrum, the SSRS constructed from the records meeting the criteria described above fell off more rapidly than did the original DBE spectrum. See Figure 2, *infra* p. 66, which is reproduced here for convenience from Figure 2.7 of the SER, and Figure 3, *infra* p. 67, which combines two of Applicant's representations (Holt Exhs. 1 and 2), and can be used for visual comparison of the two SSRS, the original DBE spectrum and a Regulatory Guide 1.60 spectrum anchored at 0.12g. Both the "top-of-natural-soils" and "top-of-fill" SSRS were constrained so as not to fall below the original DBE spectrum at frequencies below about 1 Hz (Holt Exh. 11). This SSRS modification was said to assure protection in design against the effects of very large earthquakes, such as a recurrence of the New Madrid events, at great distances. This is reasonable, considering the greater attenuation with distance of high-frequency seismic motions than of low-frequency motions, but there are few data on which to establish the proper level.

These SSRS, which represent the input seismic design motions of the SSE accepted here, generally exceed the original DBE spectrum. The SSRS and original DBE spectra are closest at frequencies where the original DBE spectrum had been modified by raising the Housner spectrum by 50%. The greatest exceedance of the DBE spectrum occurs at frequencies above 5 Hz; the two SSRS are higher than the DBE spectrum by a factor of about 2 between 5 Hz and 15 Hz, above which frequency they all tend to converge. Thus the DBE spectrum is significantly less conservative (except at the low frequencies discussed above) than either of the two SSRS.

The relationship between the SSRS and the Regulatory Guide 1.60 generalized response spectrum anchored at 0.12g (*see* Figure 2, *infra*)

¹⁸ Frequency of vibratory motion, in hertz, abbreviated Hz, or in cycles per second, is the inverse of the period of that motion, in seconds. Thus, high frequencies correspond to short periods, and low frequencies to long periods of motions.

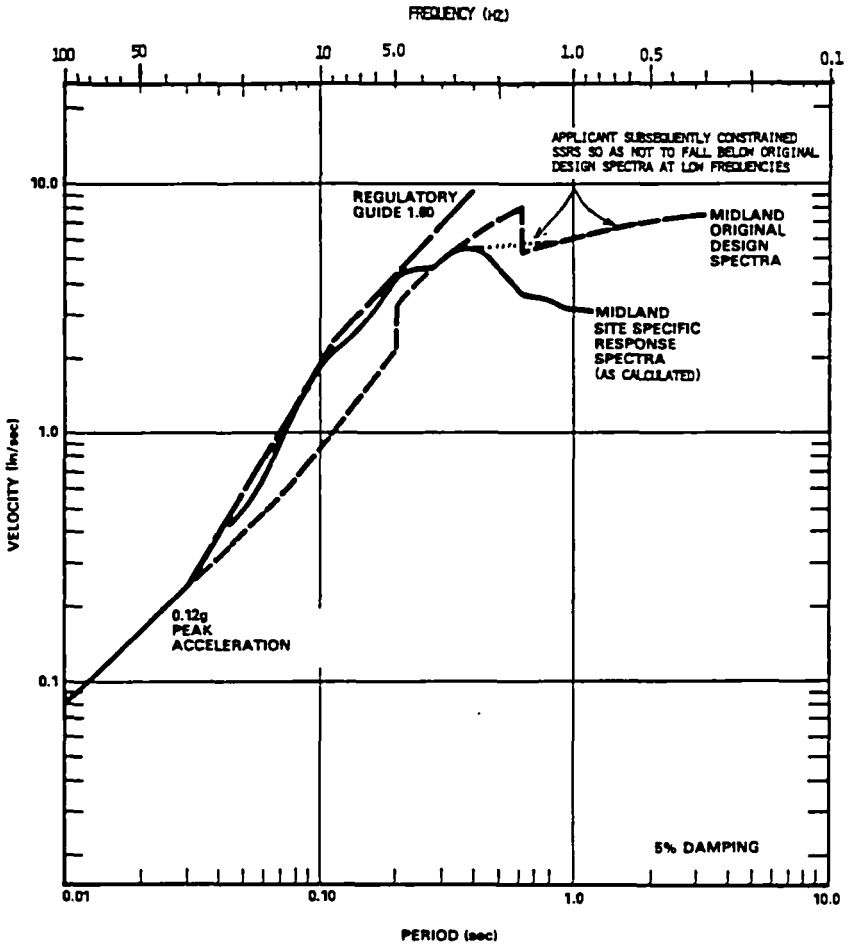


FIGURE 2. Comparison of Midland original design spectrum; site-specific spectrum (at top of natural soils), and Regulatory Guide 1.60 spectrum anchored at 0.12g. [From Midland SER Fig. 2.7]

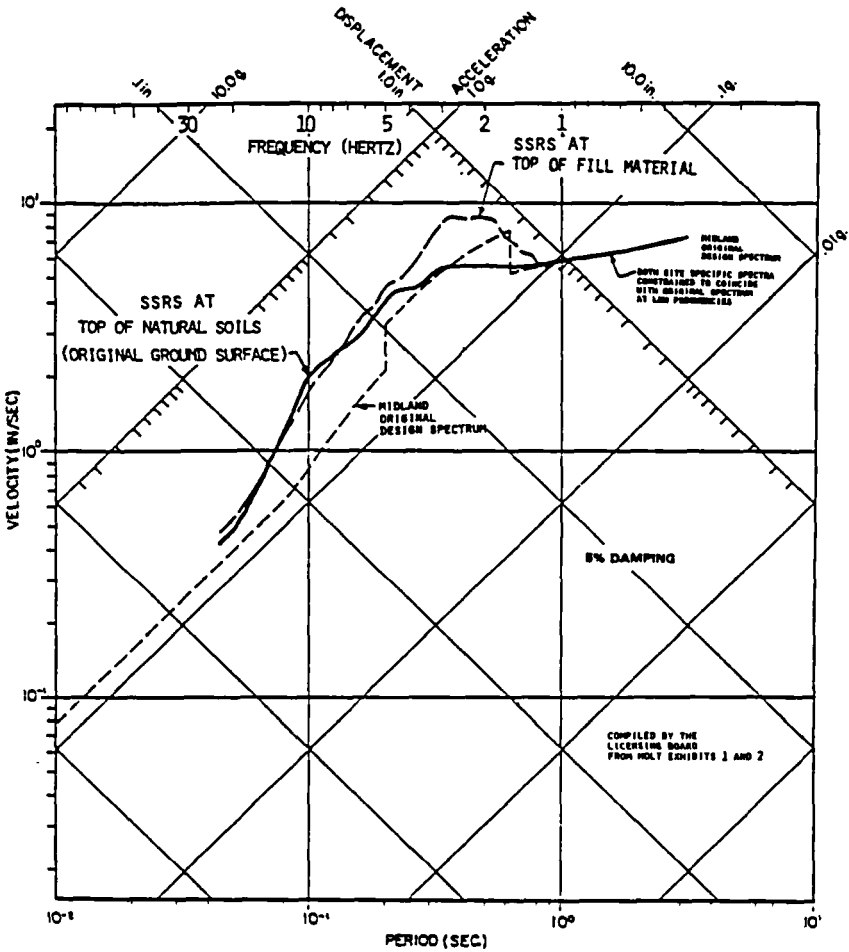


FIGURE 3. Comparison between site-specific response spectra at top-of-natural-soils and top-of-plant-fill and original (Modified Housner) design response spectrum.

is useful only for general comparison purposes. The comparison shows, as might be expected from the testimony, that the SSRS is only slightly lower than the Regulatory Guide spectrum. The Board is not certain that the comparison shown is a completely fair one, because of the differences in maximum or cutoff frequencies used, i.e., 33 Hz for the Regulatory Guide spectrum and 25 Hz for the SSRS. However, we heard no testimony on details of this comparison, and we need not rely on comparisons to the Regulatory Guide 1.60 response spectrum in this Decision.

The Board also notes that Figure 2, *supra*, portrays the significant differences between the now-accepted Regulatory Guide 1.60 spectrum and the older, modified Housner spectrum, used for the original (DBE) seismic design at the Midland site, when both are "anchored" at similar cutoff frequencies. We recognize that these differences in spectra, older (and less conservative) versus more recent, were part of the Staff's early concern in the OL review about adequacy of the seismic design. We agree, however, with the Staff's and Applicant's positions that the SSRS employed here conform to current seismic design practices and are appropriately conservative for the purposes intended.

An alternative approach to determining the SSRS at the top of the plant fill layer would be to multiply the spectral motions of the top-of-natural-soils SSRS by analytically determined amplification factors. The one-dimensional wave propagation computer code (SHAKE) applied by the Applicant utilized the materials properties and layer thicknesses to calculate the amplification of motions at different frequencies to produce an amplification spectrum. To account for the heterogeneous nature and spatial variation of the plant fill, four different soil profiles were used in the calculations. Because the calculated spectra were lower than the spectra calculated directly from the site-and-magnitude-matched earthquake records for the top of the plant fill, the calculations were offered to show the conservatism inherent in the SSRS method. The Staff verified this conservatism using the same computer code but with more realistic (and even more conservative) material properties and earthquakes as input. Thus we find that the top-of-fill SSRS are suitable for seismic reevaluation of those structures founded entirely on plant fill, such as the diesel generator building, the railroad bay of the auxiliary building, and the borated water storage tanks.

At the time when the Applicant undertook design of the underpinning structures for parts of the auxiliary building and service water pump structure foundations, and the new ring-beam-foundation addition to the borated water storage tanks, no agreement existed on the seismic

design bases for those structures. In order to proceed, the Applicant incorporated what it believed to be a reasonable margin over the original DBE into the design of those structures. The Applicant directed its contractors to use 1.5 times the DBE (or "FSAR SSE") response spectra as the seismic design basis for those remedial structures. Subsequently, the Applicant committed to use of the SSRS, as accepted here, as a seismic design basis for the remedial structures, but it continued to use the 1.5 times the DBE ("FSAR SSE") spectra in the actual remedial design work (App. FOF, ¶ 70). The Applicant also had dynamic analyses performed which demonstrated that for purposes of design of the remedial structures, the seismic design basis used exceeded the responses derived from the SSRS.

In answers to questions about the adequacy of 1.5 times the DBE as a design basis, the Applicant's witness testified that in parts of at least one structure or substructure not founded on plant fill (the missile shield in the main portion of the auxiliary building) the SSRS responses were 1.7 times the DBE spectral responses, but that the SSRS responses will be used in the seismic reevaluation of the missile shield. That reevaluation, as part of the seismic margin review, would have been considered in the later-scheduled OL portion of this proceeding, but is not material to this Decision.

Accordingly, the Board finds that the Applicant's use of the SSRS for seismic reevaluation of safety-related structures, systems and components of the plant, and its substitute use of 1.5 times the DBE ("FSAR SSE") response spectra in seismic design of the remedial structures is reasonable and conservative.

(4) Seismic Models and Soil Spring Constants (Findings 80-89)

In our May 5, 1981 Prehearing Conference Order, *supra*, we approved an agreement between the Applicant and Staff under which the mathematical models to be used for dynamic analyses of structures as modified by the remedial soil settlement measures, including the bases for the derivation of the spring constants, would be considered in the soils hearings. Consideration of the results of the seismic margin review (i.e., whether various structures conformed to appropriate seismic standards) was postponed until subsequent stages of the OL proceeding, although several witnesses at the soils hearings advanced preliminary views with respect to certain structures.

The Applicant presented testimony on the dynamic seismic models through its consultant, Dr. Robert P. Kennedy of Structural Mechanics Associates, Inc. (SMA). Dr. Kennedy addressed the models being used

to perform the seismic evaluation of structures in conjunction with the foundation remedial work — i.e., models for (1) the auxiliary building-control tower-electrical penetration area (“auxiliary building”), an interconnected foundation system; (2) the SWPS; and (3) the BWSTs. The auxiliary building and SWPS models were developed by Bechtel Corporation and reviewed by Dr. Kennedy and SMA. The BWST model was developed by Dr. Kennedy and SMA; it superseded an earlier model developed by Bechtel. The NRC Staff reviewed these dynamic models. The details of these models are set forth in the testimony of Dr. Kennedy (ff. Tr. 5995) as well as in the testimony of the Staff reviewers (Mr. Frank Rinaldi, NRC; Dr. Paul Hadala, of the Corps of Engineers; and Mr. John Matra, of the Naval Surface Weapons Laboratory) (Finding 80).

Dr. Kennedy concluded that the dynamic models for the auxiliary building, SWPS and BWSTs are adequate for establishing the conservative seismic forces to be used in the design of the remedial work and in the seismic margin review. The Staff found the methodology used by the Applicant and its consultant in determining soil spring constants and damping parameters to be sound, and the methodologies used to develop and review other aspects of the dynamic mathematical models to be within the state of the art. The Staff concluded that the auxiliary building and SWPS models adequately represent those structures within the state of the art, and that the dynamic analysis of the BWSTs was satisfactory. The Applicant submitted extensive proposed findings to this effect (App. FOF, ¶¶ 59-76) and the Staff offered no disagreement (Staff FOF, ¶¶ 59-76, at 12). Ms. Stamiris’ proposed findings do not cover the seismic models; we treat her claims bearing on other aspects of the analyses of the auxiliary building in our opinion on that structure, *infra* pp. 92-93.

Several months following the presentation of testimony concerning the seismic models, the Applicant conducted a design review which discovered that, in the original seismic design, Category I structures were analyzed using only the nominal soil dynamic modulus value without considering the $\pm 50\%$ variation of that value as required by the FSAR. This design deficiency, along with others uncovered by the Applicant’s design review, was made known to this Board and the parties through Board Notification BN 84-115, “Seismic and Structural Design Departures from Licensing and Design Criteria — Midland Plant,” issued June 18, 1984, by the Staff. BN 84-115 was provided to the Board following submission of proposed findings concerning the issues on which we are now ruling. Thereafter, on August 2, 1984, the Staff advised the Board and parties of testimony and evidence which would be affected by

the reported deficiencies (including Staff testimony by Messrs. Rinaldi, Matra and Hadala).

While the impact of this design deficiency potentially is applicable to all Seismic Category I structures at the facility, its applicability to the structures considered in this Decision is mainly to the seismic design of the underpinning structures — i.e., the auxiliary building and SWPS — and to the criteria to be established for subsequent seismic margin reviews of plant safety structures — i.e., the soil spring constants. The deficiency does not affect the BWST model developed by Dr. Kennedy, who took into account the $\pm 50\%$ variation in that model. With respect to the auxiliary building and SWPS models, the testimony presented by the Staff and Applicant gives this Board reasonable assurance that the *nominal* values of the soil spring constants were adequately established. The record further establishes some measure of conservatism in the seismic design by virtue of the exceedance of the SSRS by 1.5 x the DBE (FSAR SSE) response spectra actually used in the design of the underpinning. However, the record is not sufficient to permit a determination of whether the conservatism in calculation of seismic loads provided by use of the 1.5 x DBE (FSAR SSE) response spectra is sufficient to include the range of seismic loads that would result from the required variation of soil spring constants in those calculations. Our conclusions with respect to the seismic models for the auxiliary building and SWPS — but not the BWSTs — are therefore qualified to the extent they may be affected by the design deficiencies.

In BN 84-115 (which preceded the shutdown in construction), the Staff indicated that it would be conducting further analyses of the design deficiencies. Should construction be restarted, these open questions would have to be resolved.

C. Soil Liquefaction and Dewatering (Findings 90-117)

Following the discovery of excessive settlement of the partly built DGB in July of 1978, the Applicant undertook an extensive underground soils investigation program at the Midland site. The general results of the soils investigation revealed that there were, in certain locations, improperly compacted clayey (cohesive) soils, and improperly compacted sands (noncohesive soils) in the plant fill, but that the natural soils (hard clay and sandy clay) beneath the plant fill were competent to provide foundation support for plant structures, providing the foundations were properly designed and constructed without disturbance of the natural soils.

The improperly consolidated clay fill caused settlement through a change in volume as pore water was squeezed out by the weight of overlying soils and buildings ("primary consolidation"). Sand layers in the fill, even where they were low in density and cohesion, presented enough resistance to retard excessive settlement under the static overburden and structural loads. However, certain of the sand bodies were sufficiently loose and low in cohesion that, if saturated by ground water, they would present a potential for soil liquefaction in the event of occurrence of a strong earthquake.

Liquefaction is a phenomenon by which loose, cohesionless, saturated sandy soil loses shearing strength during strong ground shaking, and develops a degree of mobility sufficient to permit large permanent displacements or liquid-like flow behavior. (For a further explanation of soil liquefaction, see note 69, *infra* p. 147.) Soil liquefaction below building footings can cause rapid settlement, tilting, or other damage to the structure. Evaluations of the potential for soil liquefaction and differential soil consolidation associated with the SSE ground motions, as well as evaluation of ground-water-induced loads (e.g., uplift of the structure or hydrostatic pressure on underground walls) on safety-related structures are prescribed by NRC regulations. See 10 C.F.R. Part 100, Appendix A, §§ IV(a)(1), IV(a)(4), V(d)(1), VI(a)(1), and 10 C.F.R. Part 50, Appendix A, GDC 2.

Potentially liquefiable sands in the plant fill were identified as occurring mostly above elevation 610 feet, but beneath certain safety-related structures and utilities at the Midland facility; these included the DGB, the electrical penetration areas (EPAs) and railroad bay area (RBA) portions of the auxiliary building, the overhanging portion of the SWPS, and a portion of the service water system piping (and duct banks) near the SWPS. Potential soil liquefaction was determined by both the Applicant and the Staff not to be a problem beneath other safety-related structures. However, for reasons set forth *supra* p. 38, and *infra* p. 103, both the Applicant and Staff now regard the evidence on liquefaction under the diesel fuel oil tanks to be inconclusive and the issue to be unresolved.

The Applicant proposed the following corrective measures to reduce or eliminate concerns for soil liquefaction potential: permanent dewatering to maintain the ground water level below elevation 610 feet beneath the DGB and the RBA portion of the auxiliary building; underpinning the present foundations of the EPAs and the overhanging portion of the SWPS so that those structures would be supported entirely

by the underlying natural soils;¹⁹ and replacement of poorly compacted fill by competent backfill below the service water piping (and below safety-related electrical duct banks) in the area north of the SWPS.

In order to provide relatively dry working conditions during underground excavation and construction for underpinning the southern portions of the auxiliary building and FIVPs, the Applicant temporarily dewatered that part of the site to an elevation of about 565 feet. Also, a freeze wall, or freeze-curtain dam, was emplaced from elevation 610 feet down to the underlying natural clay. The freeze wall was put in place by circulating a coolant through pipes in lines of closely spaced boreholes, which froze existing ground water near each hole (or would freeze any ground water seeping into the area of low temperature) to form an impermeable barrier in the soil. *See infra* Findings 135-136. If construction of the underpinnings were to resume, construction dewatering, and presumably the freeze wall, would again need to be implemented in the vicinity of the underground work.

Contentions directly challenging the effectiveness of the proposed site dewatering plans are Stamiris Contention 4.D and Warren Contention 2 (one of those which we requested the parties to address following withdrawal of Ms. Warren from the OM proceeding).²⁰ Stamiris Contention 4.D specifically addresses permanent dewatering concerns. Contention 4.D(1) asserts that the soils remedial actions proposed and performed are inadequate because permanent dewatering would change water table, soil, and seismic characteristics of the site, on which evaluations of the safety and integrity of the plant were based. Contention 4.D(2) asserts that the same inadequacy exists because dewatering may cause an unacceptable degree of further settlement of safety-related structures. Failure or degradation of the permanent dewatering (system) is asserted in Contention 4.D(3) as leading to a situation where there would be inadequate time in which to initiate plant shutdown (before ground water conditions recurred which, in the event of an earthquake, could potentially result in soil liquefaction). These assertions in regard to the evaluation of permanent dewatering of parts of the plant site are considered in this part of our Opinion.

¹⁹ The applicant also proposed to underpin the foundation of the control tower portion of the auxiliary building and to replace the soil beneath the feedwater isolation valve pits (FIVPs), but as a result of consideration of soil characteristics other than liquefaction potential (*see infra* Findings 126, 144). Also, underpinning of the northern portion of the turbine building, a nonsafety-related building, was to be accomplished as incidental to excavation and access requirements for underpinning the adjacent portions of the auxiliary building and FIVPs, and to ensure that settlement of the turbine building did not adversely impact Seismic Category I structures.

²⁰ *See infra* note 41. For the full text of these contentions, *see infra* Findings 90 and 98, and Appendix A to this Decision.

Part of Ms. Stamiris' Contention 4.C essentially overlaps her Contention 4.D(1), in that it questions the adequacy of evaluations of dewatering effects, differential soil settlement and seismic effects on specific groups of safety-related structures and systems. The effects of temporary dewatering on the auxiliary building, which was part of the underground construction process, are discussed here. Also, to the extent that soil liquefaction and seismic shakedown are seismic effects, this part of Stamiris Contention 4.C. is treated below.

Warren Contention 2 (in two parts) is very similar to Stamiris Contention 4.D(3). Ms. Warren's contention cites events such as increased seepage from the cooling pond, flooding, failure of pumping systems, and power outages as specific threats to the proposed dewatering procedures. The contention specified liquefaction of site soils and its adverse effects on Class I structures, as potential consequences of inadequate dewatering procedures. Warren Contention 2 is, accordingly, also addressed in this part of our Opinion.

Independent evaluations of loose sands found in the plant fill were conducted by the Applicant and the Staff. The U.S. Army Corps of Engineers, acting as a consultant to the Staff, performed a study of both the liquefaction potential of the soils and the permanent dewatering system that was proposed by the Applicant to reduce or eliminate liquefaction potential in the loose sands beneath the DGB and RBA. Both the Applicant and the Corps of Engineers assumed a magnitude 6.0 earthquake and a peak acceleration of 0.19g in their liquefaction analyses. Both the earthquake magnitude (which is used to assign the number of stress-reversal cycles) and the acceleration used are higher than the corresponding magnitude (5.0) and acceleration (0.12g-0.13g) of the SSE associated with the Midland site. This use of higher values of earthquake magnitude and peak acceleration imparts a measure of conservatism to the empirically derived determinations of liquefaction potential.

In addition to the duration and strength of postulated earthquake motions, three main properties of a sand body determine its susceptibility to liquefaction. First, the sand must be loosely compacted, i.e., relatively low in density. Second, it must be low in cohesion, or cohesionless, i.e., it does not have a high proportion of clay or other binders. Third, it must be saturated; this occurs when the sand is below the water table and the pore spaces between grains are full of water. Other factors, such as confining pressure, ease of escape of pore water and lateral extent of the sand body, may influence susceptibility to liquefaction.

Where feasible, dewatering loose, cohesionless sands will eliminate one of the main conditions that would cause liquefaction. If partial compaction of the dewatered loose sands were to occur during a strong earth-

quake, any overlying materials and structures might settle ("seismic shakedown"), but without sufficient pore water to take up the overburden load, liquefaction (the concomitant transient loss of shear strength) would not occur.

Separate calculations of the amount of settlement that might result from future seismic shakedown of loose sands beneath safety-related structures were performed by the Applicant. Seismic shakedown is a partial consolidation of low-density sands during earthquake shaking and might occur whether the sand is saturated or not. It is governed generally by the same characteristics of the loose sand that caused concern for liquefaction, except that the removal of pore water, in order to reduce liquefaction potential, removes the buoyant effect of the water on the individual grains, and increases the load on the sand. This increases the potential for seismic shakedown. The amount of predicted settlement from this cause was determined for each layer of loose sand beneath each safety-related structure and summed to determine the total settlement potentially attributable to seismic shakedown at each location. The amounts of predicted seismic shakedown generally were quite small (e.g., 0.25 ± 0.15 inch for the DGB, and about $\frac{1}{4}$ inch or less for the other affected structures). The Staff evaluated the Applicant's method of calculating seismic shakedown and agreed that the amounts predicted were reasonable and acceptable for use in design.

The Applicant's soils exploration program identified and located potentially liquefiable sands in the plant fill. Identification was accomplished by the standard penetration tests (SPT) made during drilling, in conjunction with analyses of recovered samples. The SPT involves driving a standard sampling tube into soil in a borehole by dropping a hammer of standard weight a specified distance onto the drill stem to which the sampling tube is attached. The number of blows needed to drive the samples 1 foot is counted and recorded, and correlated with the material recovered from the samples. In general, a low "blowcount" from the SPT, in sand soil, would indicate low density and a high liquefaction potential.

Testimony during the hearings indicated that some of the low-blowcount sands, e.g., near the diesel fuel oil tanks, were not encountered in nearby borings and were surrounded above and below by nonliquefiable soils. Subsequently, however, we were advised that the logs of borings near the diesel fuel oil tanks were erroneous (*see supra* p. 38, and *infra* pp. 103-04). In general, small, isolated sand bodies, especially where deeply buried and under a relatively high confining pressure, were not considered by the Applicant's or Staff's experts as presenting significant liquefaction problems. In the case of the diesel fuel oil tanks,

the passive resistance of nonliquefiable soil which confines the foundation of the tanks as well as the sand pocket, would have been sufficient to prevent tank failure, even if the sand pocket were assumed to liquefy. Although we agree with the general conclusions of the Applicant and Staff on this point, and further that the small amount of seismic shakedown which had been predicted for the diesel fuel oil tanks (0.1 inch) presented no significant hazard to their safety, as a result of the erroneous boring logs we are making no findings concerning liquefaction or soils stability under the diesel fuel oil tanks.

Potentially liquefiable sands beneath the service water piping and electrical duct banks in the area just north of the SWPS presented a special problem. Because most of the recharge of ground water in the plant fill would come from the cooling pond through natural sands occurring in this area and hydraulically connected to the sands in the fill, failure of the dewatering system would cause the water table near the SWPS to rise rapidly. The rapid rise of ground water and resultant saturation of the loose sands in the plant fill near the SWPS might not allow sufficient time for plant shutdown. While this would not cause liquefaction to occur, it would have caused the potential for soil liquefaction to exist beneath the safety-related utilities in this locality during plant operation. Accordingly, the Applicant committed to removal of the loose sands above 610-foot elevation and beneath the safety-related utilities in this area and replacement with nonliquefiable materials. This remedy would eliminate concern for both liquefaction and seismic shakedown potential.

Elsewhere at the plant site, the bodies of loose sand in the plant fill occurred mainly above elevation 610 feet. The few pockets that lie below that elevation are of such limited extent and under such high confining pressure that they would not present a significant liquefaction problem, even if saturated. The Applicant and Staff, based on their independent evaluations and reviews, both agreed that lowering the ground water table and maintaining it at a level below 610 feet beneath the RBA and DGB would ensure that there would be no potential for liquefaction of soils to affect the integrity of either structure. However, where these bodies occurred beneath safety structures, effects of seismic shakedown were evaluated.

Removal of the buoyancy effect by dewatering and the increase in the load on plant fill layers at depth would have the beneficial effect of increasing the bearing capacity of those dewatered layers. Dewatering of the plant fill would also reduce uplift and hydrostatic pressure loads on embedded structures. In these respects, as in its reduction or elimination of soil liquefaction potential, dewatering would produce effects advantageous to the safety of plant structures. For these reasons, we disagree

with a portion of Ms. Stamiris' proposed Findings of Fact (¶ "13," at 5), where she asserts that there has been a "discovery that the bearing capacity of the base soils for the underpinning is 1/2 that used in the original analysis (BN 83-174)." Ms. Stamiris has apparently confused the term "bearing capacity" with "elastic modulus," another soil parameter. For an explanation of the Applicant's change in elastic modulus value, *see infra* Finding 140.

The effect of dewatering on the clay soils was to increase the amount of compression and the rate of consolidation of the clays, particularly those in the plant fill that were not properly consolidated during their placement. Part of the compression from the dewatering load was recoverable as shown by small amounts of rebound measured when the ground water level was allowed to rise during a recharge test. The part not recoverable on removal of the load is termed consolidation. The effect on the clay soils was expected and predictable on the basis of the settlement observations made. For each of the safety-related structures and underground utilities at the Midland site, the Applicant assessed the additional settlements that would be caused by dewatering, and the Staff was satisfied that they are adequately included in the predicted settlements that were to be used in the structural analyses. While we repeat that we are reaching no conclusions concerning the acceptability of the DGB or its foundation soils, nor on the prediction of differential settlement between the main portion of the auxiliary building and the control tower, no unresolved controversy over dewatering effects at those (or any other) structures exists between the Applicant and the Staff. Intervenor Stamiris did not submit proposed findings on the technical adequacy of the dewatering system, nor upon the effects of dewatering on soils, except for the conclusory denial that the Applicant has adequately and conservatively taken them into account (*see* Stamiris FOF, ¶ "12," at 4-5).

As pointed out above, the threat of possible failure or degradation of the permanent dewatering system was alleged by Stamiris Contention 4.D(3) as resulting in insufficient time for plant shutdown before the ground water level rose to a level causing saturation of the potentially liquefiable sands in the plant fill. Postulated causes of such failure or degradation (as specified in Warren Contention 2) were increased seepage, flooding, failure of pumping systems, and power outages. During the hearings we heard testimony on the design and performance of the permanent dewatering system, the flow patterns and rates of water-level rise in the absence of any pumping, isolation of the ground water in the power-block area from laterally and vertically proximate regional ground water aquifers, and the proposed water-level monitoring system. We

also heard testimony on the ability of the permanent dewatering system to detect and remove water from potential breaks in underground pipes and from infiltration resulting from the 100-year maximum precipitation.

Because the potentially liquefiable plant fill sands lie above 610-foot elevation, a principal design objective of the permanent dewatering system was to lower and maintain the ground water level beneath the RBA and DGB below that 610-foot level. In order to do this, it was planned to lower the ground water level beneath those structures to elevation 595 feet. At that level, even if total failure of the system occurred, there would be adequate time to repair or replace equipment in the dewatering system, or to shut down the plant before the ground water level beneath the RBA and DGB rose to the 610-foot elevation. Based on results of a recharge test, in which the water level was drawn down to below 595 feet and all pumps were then turned off, a minimum of 40 days would be required for the water level to rise to the 610-foot elevation beneath either of the two potentially affected structures.

Redundancy was to be provided to ensure effectiveness and reliability of the pumping system. Twenty interceptor and twenty backup interceptor wells located in two lines along the primary recharge area (near the SWPS), and twenty-four area wells in the plant area form the main components of the permanent dewatering system. One line of interceptor wells and only two area wells would need to remain in operation to dewater the RBA and DGB areas to the design level. All of the wells, however, would have been kept operational, should the need for any of them have arisen. One complete set of discharge well replacement parts was to be kept on site for quick repair or replacement, if needed. Also, electrical wiring was to be designed so that a temporary outage of one or more wells would have no impact on power to the other wells. In the event of a loss of power to the system, a separate diesel generator was to be provided to power the interceptor wells.

The discharge collectors, or header systems, were to be separate for the two lines of interceptor wells. If failure of one header system occurred it would not affect operability of the other. Also, individual wells could have flexible hoses attached to their outlets, bypassing the header systems entirely, in the event of header rupture underground near one or more dewatering wells. This was to prevent overloading the pumping capacity if water from a ruptured header "flooded" a well in the pumping area. Water from the system was to have been pumped back to the cooling pond.

The discharge wells were each equipped with well screens and filter packs to prevent removal of soil fines from the soils through which the

ground water percolated. Monthly sampling of fines was to have been required to check on continued serviceability of the filter packs during the operating life of the plant. Actual tests to check for possible discharge of soil fines were conducted for each well, and all were indicated to be well below the Staff's acceptance criteria.

Water quality samples were to be taken annually during plant operation to determine concentrations of compounds associated with encrustation. Acid treatment of the wells would have been employed to remove encrusting minerals, if needed.

Six permanent water-level monitoring wells were to have provided continuous recordings of water levels during plant operation, and alarms to warn plant personnel of a significant rise in level at any well. Two of the six monitoring wells were to have been located near the DGB, and two near the RBA. The remaining two were to have been placed between each of those structures and the main recharge area. A technical specification would have required the initiation of plant shutdown if the water level beneath the RBA or DGB rose to 606.5-foot elevation. It was determined during the recharge test that it would take about 8.5 days for the water level to rise from elevation 606.5 feet to 610 feet. To reach cold shutdown would require about 36 hours.

The Applicant and the Staff each analyzed the impact of various pipe breaks on ground water levels and considered the ability of the permanent dewatering system to detect a water-level rise and to maintain water levels below 610-foot elevation at the DGB and RBA. The analyses included postulated breaks of the low-pressure 66-inch-diameter cooling-pond-blowdown line near the SWPS and the 96-inch-diameter Unit 2 circulating-water pipe near the DGB. Also, the effect of a postulated break in the 20-inch-diameter condensate pipe, which runs directly beneath the DGB, was analyzed. The Applicant and Staff agreed that, in all of these analyses, conservative conditions were assumed and that, even if the monitoring wells failed to alarm, the ground water level would not rise significantly above the 610-foot limiting elevation.

Because of the hydraulic isolation of the power block area and the flood protection provided by the plant dikes, the only source of flooding that might challenge the dewatering system would be from precipitation falling within the cooling-pond and power-block areas. Using the predicted 100-year-maximum precipitation, an analysis of the impact of this flood on ground water levels was made. The Applicant's and Staff's experts both concluded that the dewatering system could accommodate the runoff and infiltration from this precipitation and that it would not result in the ground water level rising to 610-foot elevation.

The impervious, widespread natural clay layer, about 135 feet thick, that underlies the plant site area, together with impervious dike cores, cutoff dikes and slurry trenches designed to extend down to the natural clay, provide hydraulic isolation of the cooling-pond and power-block areas from regional ground water systems. The dikes and slurry trenches prevent hydraulic connection with laterally adjacent shallow sediments where ground water occurs under water-table conditions. A confined aquifer of a lower ground water system, located beneath the essentially impervious 135-foot-thick clay layer is under artesian pressure with a hydrostatic head about equal to the water-table level of the upper ground water system. Observation wells drilled to the lower aquifer outside the dike perimeter showed no fluctuations of water level with changes of water level inside the dike and above the clay layer, indicating a lack of hydraulic connection. The casings of these wells drilled through the clay were grouted to prevent a connection whereby ground water could rise from the lower aquifer to the upper system. (Water flow in the other direction would be prevented by the artesian pressure in the lower aquifer.)

This Board concludes that, contrary to Stamiris Contention 4.D (and to Warren Contention 2), while the water table, soil, and seismic characteristics of the site would be changed as a result of dewatering, the Applicant has adequately taken these changed characteristics into account in evaluating and designing safety-related structures, piping and duct banks to resist future soil settlement loads (including those from soil consolidation and seismic shakedown) and other loads attributable to the effects of dewatering. We also conclude that, except with respect to the diesel fuel oil tanks, we have reasonable assurance that soil liquefaction will not affect the integrity of safety-related structures, piping or electrical duct banks during an earthquake as large in magnitude and associated ground acceleration as the SSE determined to be appropriate for this site, providing the permanent dewatering system lowers and maintains the ground water level to below elevation 610 feet beneath the RBA and DGB. (For reasons indicated earlier, we are not now ruling on liquefaction in the diesel fuel oil tank area.)

We also have reasonable assurance that the Applicant has provided adequate redundancy and other features in the design of the permanent dewatering system to reduce the likelihood of, or to obviate, failure or degradation of the system in the event of seepage, flooding, failure of pumping systems and power outages, over the life of the plant, if the plant were to be operated. The Applicant has provided reasonable assurance that, if the plant were completed and operated, its design of the permanent dewatering system (including water-level monitoring) will

maintain the ground water level below elevation 610 feet, even in the event of total failure of the system, and will provide adequate time to repair or replace parts of the system, or to bring the plant to cold shut-down before the ground water rises to the 610-foot level of the potentially liquefiable sands beneath the RBA and DGB.

We also conclude that the Applicant has accounted for the effects of temporary drawdown of ground water levels during construction on the settlement of soils and the safety-related structures founded, or to be founded, on them. We note that Ms. Stamiris, in her proposed findings (Stamiris FOF, ¶ "13," item 9, at 6), refers to "continued water seepage problems in the underpinning excavations" as an unresolved question. However, in a previous Memorandum and Order (Denying Motion to Reopen Record on Containment Cracks), LBP-83-50, 18 NRC 242, 249-51 (1983), we ruled, *inter alia*, that Ms. Stamiris had misinterpreted reports on water seepage and that there was no persuasive connection between cracks in the containment buildings and dewatering, including construction dewatering of the natural clay on which the containment (and auxiliary) buildings are founded, or that settlement due to dewatering has been excessive. We reaffirm those rulings.

III. DIESEL GENERATOR BUILDING

As we previously pointed out (*supra* p. 37), we are not at this time formally making any findings or rulings with respect to the structural adequacy of the diesel generator building (DGB) or the sufficiency of the corrective measures which have been applied thereto as a result of soils settlement problems. Because of its significance with respect to various OM and several OL issues, however, we believe that a brief description of the DGB structure, the problems which have surfaced following its construction, and the corrective actions which have been followed would prove instructive and useful as background for considering the soils-related issues discussed elsewhere in this Decision.

The DGB, which is located directly south of the turbine building, is a rectangular, reinforced concrete, box-like structure which was to house four diesel generators. It is partitioned into four bays, one for each generator. The generators themselves rest on thick concrete pedestals which are structurally independent from the rest of the DGB. Both the DGB and its generators are classified as Seismic Category I items and

hence are subject to the QA requirements of 10 C.F.R. Part 50, Appendix B.²¹

The DGB foundation consists of continuous spread footings around the building and beneath the three interior walls, resting upon approximately 30 feet of plant fill. Fill placement activities took place mainly from October 1975 to October 1977; the footings for the DGB were poured in October 1977, and construction of the building was carried out from that time until the Spring of 1979. During the course of construction, in July 1978, it was discovered that the DGB had settled in excess of that which would have been expected throughout the entire plant life. As of August 23, 1978, when construction on the building was temporarily halted as a result of the settlement problem, 55% of the concrete had been placed, with the walls in place to an elevation of 30 feet above grade, the generator pedestals poured, the mud mat poured inside the building, the electrical duct banks placed under the building with horizontal and vertical runs completed, the underground piping in the area under and adjacent to the building installed, and all backfill placed to grade level. In other words, with approximately half the construction completed and half the static structural load in place, the DGB settled to a greater degree than would have been expected throughout plant life, during which greater loads could be expected.²²

The safety implications of the excessive settlement of the DGB gave rise to an OL contention of Ms. Sinclair (originally designated as Sinclair Contention 24, *see* Special Prehearing Conference Order dated February 23, 1979, at 8), questioning the suitability of the fill soils on which the DGB was founded. Mr. Marshall advanced a similar contention (*id.* at 21). Thereafter, the "unusual settlement" of the DGB formed the basis for the December 6, 1979 Modification Order, which raised questions as to an asserted "breakdown in quality assurance related to soil construction activities," the adequacy of corrective actions which had been followed up to that time or acceptance criteria for such actions which had been submitted, and an alleged material false statement in the FSAR concerning the condition of the plant fill. Finally, following the initiation of the OM proceeding, Ms. Stamiris raised numerous contentions bearing upon the DGB, including the managerial attitude which led to the extensive QA/QC violations, asserted financial and time schedule pressures affecting resolution of the soils settlement issues (including the nature of the corrective measures selected by CPC for the DGB), and

²¹ Wiedner, ff. Tr. 10,790, at vi, 1, and Figs. DGB-1, DGB-2, DGB-3; SSER # 2, § 2.5.4.4.2, at p. 2-24, and § 3.8.3.4, at p. 3-22.

²² Keeley, ff. Tr. 1163, at 6; Tr. 3222-23 (R.B. Peck); Wiedner, ff. Tr. 10,790, at vi.

the asserted technical inadequacy of the DGB corrective actions.²³ In particular, Ms. Stamiris claimed that the proper corrective action for the DGB structure would have been the removal and replacement of the partially completed structure.

The remedial actions which in fact were chosen by CPC for the DGB, upon the advice of consultants who included Dr. Ralph B. Peck, a Professor of Foundation Engineering Emeritus, of the University of Illinois, and Dr. A.J. Hendron, Jr., Professor of Civil Engineering at the University of Illinois, were the severing of duct banks and conduits beneath the structure (to alleviate stresses resulting from differential settlement), the resumption of construction and completion of the DGB structure, and the surcharging or preloading of the structure with about 20 feet of sand over and around the soils under the DGB foundation. Construction was resumed in December 1978. The surcharging was begun in early 1979 and was essentially completed, and the sand removed, by the end of August 1979, prior to the issuance of the Modification Order. The remedial actions for the DGB further called for permanent dewatering of the plant fill in the vicinity of the DGB, to preclude liquefaction developing as a result of seismic stress in the underlying and adjacent sandy fill soils.²⁴

The purpose of surcharging was to cause the soil to settle at an accelerated rate so that, under operating loads, future settlement would be small and within tolerable limits. The procedure was also intended to permit a conservative and reliable estimate of the amount of future settlement.²⁵ During the course of the hearing, however, significant questions were raised concerning such matters as whether the severing of the duct banks was performed in a manner which would keep stresses to the DGB structure as low as possible, whether the surcharge was left in place for a sufficient time to attain secondary, or to complete primary consolidation of the fill,²⁶ and whether sufficient reliable data were recorded to provide an adequate basis for future settlement estimates.²⁷

Furthermore, the Staff recognized that surcharging the essentially completed DGB structure did nothing to avoid the undesirable and large total and differential settlements that had occurred, with the accompany-

²³ Contentions of Ms. Stamiris specifically concerning the DGB are OM Contentions 1, 2(b) and (d), 3(c), 4.A, and 4.C(e). Ms. Warren's three contentions also dealt with the technical adequacy of the DGB corrective actions. See Appendix A to this Decision for a listing of all soils-related contentions.

²⁴ Wiedner, ff. Tr. 10,790, at 2-4; Keeley, ff. Tr. 1163, at 8; SSER # 2, § 2.5.4.4.2, at p. 2-31.

²⁵ R. Peck, ff. Tr. 10,180, at 6.

²⁶ The Applicant regards primary consolidation from the surcharge as that resulting from the dissipation of excess pore pressures and secondary consolidation as settlement that occurs after excess pore pressures have been dissipated. R. Peck, ff. Tr. 10,180, at 8-11.

²⁷ SSER # 2, § 2.5.4.4.2, at 2-24 and 2-31.

ing concern for warping and cracking. The settlement originally predicted for the DGB throughout its projected life had been 2.8 inches. By December 1978, prior to the surcharge, the largest measured settlement, located in the southeast corner of the DGB, had reached 4.25 inches. Following removal of the surcharge, the total settlement for this portion of the DGB had reached 7.45 inches.²⁸ One Staff witness estimated the amount of *differential* settlement between various segments of the DGB to have been about 7.5 inches and to have resulted in structural cracks in the building.²⁹

There developed a difference of opinion among several Staff witnesses, and between the Applicant and the Staff, as to the significance of cracks in the DGB. Those cracks were caused in part by the differential settlement of different portions of the DGB, including that caused by application of the surcharge. The Applicant performed a structural reanalysis of the DGB, using a finite-element model to estimate stresses in the DGB.³⁰ It also presented experts who testified as to the observed condition of the DGB.³¹

The Staff's structural engineers considered the Applicant's approach to be consistent with sound engineering practice.³² However, these structural engineers actually evaluated the structural adequacy of the DGB on the basis of a crack analysis, and they added the residual stresses calculated from crack widths to the stresses calculated in the Applicant's finite-element analysis.³³ The Staff's geotechnical engineers, on the other hand, raised questions as to the sufficiency of the Applicant's approach, and criticized the method of the structural engineers as not being normal engineering practice.³⁴ Moreover, an NRC Staff inspector in April 1983 expressed considerable doubt about the structural adequacy of the DGB, based in part upon similar considerations but also upon the design of the DGB utilizing spread footings founded upon fill.³⁵

Because of the internal Staff differences of opinion with respect to the analyses of the DGB cracks and with regard to the structural adequacy of the DGB, the Staff commissioned Brookhaven National Laboratory to perform a further study. When completed, this study was reviewed by a

²⁸ *Ibid.*

²⁹ Tr. 16,429 (Landsman).

³⁰ Wiedner, ff. Tr. 10,790, at 14-17.

³¹ Sozen/Corley, ff. Tr. 10,950, Attachment 4, at 4.11, 4.34.

³² Rinaldi, *et al.*, ff. Tr. 11,086, at 6, and Tr. 11,121-24 (Rinaldi).

³³ Rinaldi, *et al.*, ff. Tr. 11,086, at 2-5.

³⁴ Tr. 10,521, 11,187-88, 11,196-99 (Kane); Tr. 11,177-81, 11,189-90, 11,202-03 (Singh).

³⁵ Tr. 15,059-60, 16,410-13, 16,816-17 (Landsman). He also expressed these concerns to a congressional oversight committee in June 1983. The Staff testified, however, that there is no regulatory requirement that would preclude the use of spread footings on diesel generator buildings. Tr. 16,424-25 (Hood).

Staff task group, which prepared a report. The study and report were then reanalyzed by Staff witnesses to ascertain whether their earlier testimony would have to be changed.³⁶ Although opinions on the need to reopen the record were not unanimous, reviewers agreed that, at the least, further documentation of calculations which had been performed was needed. This documentation was still in progress at the time we declined to grant (pending completion of the review process) the Staff's motion to reopen the record on the DGB but also permitted the Staff and Intervenors to defer filing their proposed findings and conclusions with respect to that structure. *See supra* p. 37. Any final resolution of questions concerning the structural adequacy of the DGB would, of course, have to include a satisfactory resolution of the crack issues which we have been discussing.

In addition to the soils settlement questions, there have been other QA problems associated with the DGB which have been extensively litigated. In particular, a Staff inspection performed by Region III from October 12 to November 29, 1982 and January 19-21, 1983, primarily of work accomplished in the DGB, indicated (according to the Staff) another "significant breakdown" in the implementation of CPC's QA program. The Staff also proposed substantial civil penalties as a result of the violations which had occurred.³⁷ CPC as a result suspended most non-soils-related work on the DGB (as well as other portions of the project) from early December 1982 to October 1983 (when the Staff approved CPC's Construction Completion Plan), and it paid the civil penalty after its request for mitigation was turned down by the Staff.³⁸ The Construction Completion Plan, under which construction of the DGB was resumed, applied to nonsoils-related construction activities; it included the application to those activities of Staff controls analogous to those which we earlier imposed on soils-related construction activities by LBP-82-35 (*see supra* p. 35). The general implications of the QA deficiencies at the DGB, as well as the potential effectiveness of the Construction Completion Plan, were extensively litigated before us as QA/management attitude issues (on which we are not at this time ruling).

³⁶ The Board and parties have been kept advised of the progress of this review through several Board Notifications from the Staff. *See* BN 83-109 (July 27, 1983); BN 83-142 (September 22, 1983); BN 83-153 (October 11, 1983); BN 83-165 (October 26, 1983); BN 83-185 (December 2, 1983). The BN 83-165 notification includes copies of the Brookhaven report and the report of the NRC task group. BN 83-185 includes recommendations of several witnesses on whether the record should be reopened. Neither these notifications, nor their attachments, have thus far been entered into the evidentiary record of these proceedings.

³⁷ *See* Keppler, ff. Tr. 15,114, at 4-5, Attachments 3, 4, and 7.

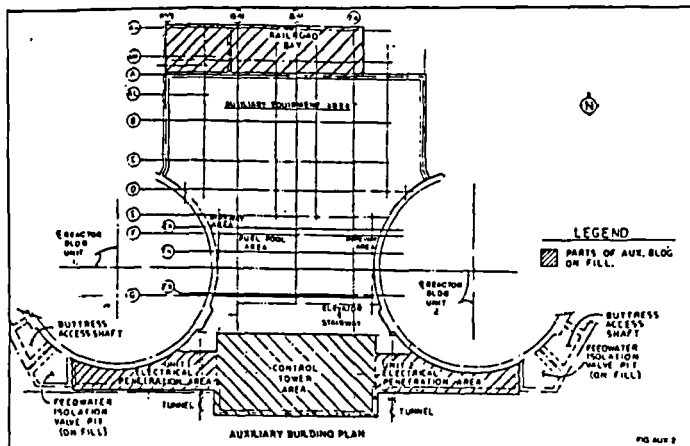
³⁸ Tr. 15,074, 15,086 (Shafer, Gardner); J. Cook, ff. Tr. 18,025, at 5; Letter to Board and parties from Staff, dated December 15, 1983, transmitting Confirmatory Order for Modification of Construction Permits (Effective Immediately), dated October 6, 1983.

IV. AUXILIARY BUILDING AND FEEDWATER ISOLATION VALVE PITS (Findings 118-151)

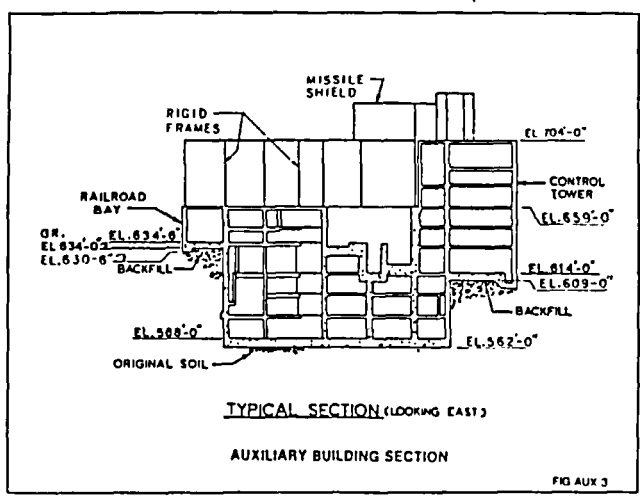
The auxiliary building is made up of several parts. The main portion is founded on the same overconsolidated hard clays of lacustrine origin as are the containment buildings, which lie immediately to the east and west. Other parts of the auxiliary building project to the north (railroad bay area (RBA)) and to the south (control tower and electrical penetration area (EPA) wings) and are founded, at elevations higher than the footings of the main structure, on backfill. See Figure 4, *infra* p. 87, for the identification and arrangement of the several parts of the auxiliary building. Each of the feedwater isolation valve pits (FIVPs) is situated immediately outboard of an EPA wing and slightly beyond the line projecting southward from the center of the respective containment building that each serves. Although the FIVPs are structurally independent of the EPAs, they have been discussed in these proceedings along with the auxiliary building structures. The FIVPs are founded on plant backfill, like the EPAs, control tower, and RBA. All of these structures or sub-structures contain safety-related equipment and are required to be designed to Seismic Category I standards.

Following discovery in 1978 of excessive settlement of the DGB, the Applicant undertook a soils exploration program. At the time, construction of the auxiliary building and FIVPs was essentially complete. This program gave rise to various concerns about the integrity of the RBA, control tower, EPAs and FIVPs. In the Staff's opinion (*see* discussion, *infra* p. 93), the program revealed inadequately compacted backfill supporting these structures, demonstrated by differential settlement of the south end of the control tower, the location of cracks in the auxiliary building, and a 1-foot void between a concrete mudmat and the underlying plant fill. Potentially liquefiable sands in the fill were found above the 610-foot elevation beneath the RBA and EPAs. Clay soils in the fill posed a concern for differential settlement and attendant structural loads in the FIVPs and the EPAs.

Concern for the adequacy of the fill beneath the control tower arose partly from questions about the effect of added foundation loads from the attached EPAs, resulting from an early plan to support the other, or outer, ends of each EPA by caissons. Partial loss of support of the EPA foundations through soil compression would have produced a bridge-like effect, adding loads to the supports at either end. The loads thus added to the control tower from both EPAs might have resulted in an insuffi-



A



B

FIGURE 4. Auxiliary Building: (A) Plan view showing location of portions of structure founded on plant fill, and (B) cross-section showing stepped foundations with projections founded on plant fill. (Compiled from Figs. AUX-2 and AUX-3, Burke, *et al.*, ff. Tr. 5509.)

cient safety margin in the dynamic bearing capacity of its supporting backfill under earthquake loading conditions.

The proposed caisson-support remedy for the EPAs was subsequently abandoned. The approach that was eventually selected to eliminate concerns about the plant fill entailed underground construction of new foundation walls (underpinning) beneath the control tower as well as the EPAs in order to transfer their support directly to the underlying hard lacustrine clay. Also, the plant fill beneath the FIVPs would have been removed by excavation down to the clay and was to be replaced with properly compacted granular fill capped by a concrete jacking pad. The jacking space would finally have been filled with grout. Potential soil liquefaction concerns for the plant fill beneath the RBA (like the DGB) were to have been remedied by lowering and maintaining the ground water level below 610-foot elevation. (Our analysis of dewatering is discussed *supra* p. 71, *et seq.*; also see *infra* Findings 98-116).

The adequacy of the Applicant's proposed remedial measures to resolve questions of safety of the auxiliary building and FIVPs (and of other safety-related structures) stemming from the improperly compacted plant fill was questioned by the Staff in the Modification Order and challenged by Ms. Stamiris in her OM contentions. In her Contention 4.C(a), Ms. Stamiris asserted that the Applicant's remedial actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement effects and seismic effects.

The Applicant considered the effects of dewatering in its most recent design of the remedial measures (e.g., underpinning) for the auxiliary building and FIVPs. In addition to eliminating concern for soil liquefaction, dewatering also removes the effect of buoyancy caused by ground water on individual soil particles, and thus increases the load on the affected foundation soil. As a result, dewatering would increase the bearing capacity of the soil, a beneficial effect, but also would increase the settlement and rate of compression of the soils. The dewatering effect is small and predictable, based on the load added by the loss of buoyancy. Part of the settlement, or soil compression, is recoverable upon removal of the dewatering load when the ground water level is allowed to rise. Subsequent fluctuations of water level cause only minor settlement, if any, from the dewatering load after the initial effect has occurred.

To counter possible structural effects of temporary (construction) dewatering on the FIVPs and EPAs, temporary support systems were installed before underpinning began. A beam-and-tie system provided support for the FIVPs, and post-tensioning ties were installed through the control tower and attached to the upper part of the east-west walls of the

EPAs on either side. (Similar post-tensioning ties were applied to the SWPS north-south walls, as well. *See infra* Finding 156.)

The basic underpinning plan for the control tower and EPAs called for construction of piers beneath the existing walls, extending down to the hard clay. Construction was to be of reinforced concrete, cast in place. The bottoms of the piers were to be belled-out to increase the pier footing support area and to cause the bottom of each pier to touch its neighboring piers. After completion of the piers, walls were to be constructed in the intervening spaces between them, with provision made for tying the underpinning walls of the control tower and EPAs together and for fixing the walls to the supported structures, after jacking pressures between the piers and the supported structures were locked off.

The hydraulic jacking system between each pier and the supported structure was designed to preload the supporting hard clay soil, to ensure that full initial and elastic recompression of the soil was attained, and to provide a period of observation of secondary compression of the soil. The Applicant developed a schedule of jacking pressures at the different piers, to prevent nontolerable movements in the supported structures during construction and the period of soil preloading.

Horizontal and vertical motions of the structures were to be monitored during construction and jacking. Alert and action level limits of structure motions, based on tolerable limits, were to be established, and the movement data were to be checked for trends indicating that an alert level might be reached. Corrections of structure movements were to be made by adjusting jacking pressure on individual piers, and provisions for emergency mechanical support systems were to be made in the event of the possible occurrence of settlements not correctable by the methods planned. Loads in the piers as well as pier deflection were also to be monitored during construction of the underpinning. Cracks in the structures were mapped and were to be monitored as a check against predicted structure deflections. Monitoring of cracks and structure motions would have been continuing requirements if the facility were to be completed and operated.

The jacking procedures were intended to prevent or relieve any structural overstressing. The competency of the hard clay providing foundation support was determined to be adequate to preclude development of structural loads arising from differential settlement that, when combined with other loads, would be unacceptable. *See infra* Finding 138. While the testimony indicated that design changes could be implemented during underpinning construction — e.g., widening the pier bases to increase bearing area — we heard little or nothing about specific circumstances that might warrant such changes, only that the construction se-

quence and procedures could accommodate the option during the time prior to completion of the final design calculations. (*Cf.* our discussion, *infra* p. 91, of the unsuccessful pier W-11 load test.)

The underground construction sequence was planned so as not to weaken the foundation support excessively during removal of soil and installation of the piers and temporary structure supports. The plans also included measures to support walls of the excavations. The underground construction area was dewatered to an elevation about 30 feet lower than the planned permanent dewatering ground water level. To facilitate the construction dewatering, a freezeway was emplaced by circulating refrigerant fluids through boreholes that were closely spaced in lines around part of the work area (*see infra* Findings 135, 136). Construction proceeded from two access shafts dug on the east and west ends of the affected area and then from a tunnel between them located beneath the turbine generator building. The work was to progress in a stepwise fashion, tunneling far enough to construct temporary supports, constructing them, then tunneling far enough to accomplish the next part of the construction, constructing it, and so on.

Prior to the suspension of work activities on the project, a considerable amount of the underpinning construction had been accomplished. We understand that the Applicant intends to leave the underpinning, like other project construction, in a safe layup condition. *See* Board Notification 84-148, dated September 14, 1984, at 2 and Enclosure 3; I&E Report 84-25/26 (attachment to letter from R.F. Warnick to CPC, dated September 21, 1984). While the plans for activities to accomplish this (and including reporting requirement changes) are not now included in the evidentiary record, we regard such activities as subject to Staff approval pursuant to the Work Authorization Procedure adopted as a result of LBP-82-35, *supra*.

In evaluating the design of the remedial measures for the control tower, EPAs and FIVPs, the Applicant took into account the loads that would be imposed by postulated seismic events (as well as flooding events). Because the SSRS were not yet agreed upon when the initial design of the remedial measures was developed, seismic loads equal to 1.5 times the loads which would result from use of the DBE (or FSAR SSE) response spectra were used in the actual design. Subsequently, this design basis was demonstrated to be conservative: analyses performed by the Applicant's consultant, and an audit of the Applicant's design calculations by the Staff, determined that loads equal to 1.5 times the DBE (FSAR SSE) loads are conservative in relation to loads which would result from application of the now-agreed-upon SSRS (Finding 142).

Although we have reasonable assurance that the seismic designs of the auxiliary building and FIVPs are acceptable, this conclusion applies only to the extent that those designs are based on the nominal value of the dynamic soil modulus (or soil spring constant) used in the seismic analyses. This limitation stems from the design deficiency of which we were advised by Board Notification BN 84-115. *See supra* pp. 70-71.

A load test conducted on pier W-11 to evaluate soil parameters and settlement response of the lacustrine clay did not produce the results expected (Finding 140). Carlson stress meters installed on the pier indicated that the load applied at the top by jacking was not reaching the bottom of the pier. The Applicant ascribed the failure of the test to produce the expected results to a deficiency in the anti-friction installation; the Staff did not accept this explanation, but proffered no explanation of its own. Further, we were advised by both the Applicant and Staff that the pier, which was test-loaded initially to 130% of its design pressure, settled more than predicted (but we could not find in the record any testimony as to whether this was during, or subsequent to, the pier load test). Implicit in the indication that the load was not reaching the bottom of the pier, as well as in the Applicant's explanation, is the suggestion that some of the load was being transferred to the surrounding fill soil, and hence the load at the bottom was spread over an area of the supporting clay larger than the area of the pier footing alone. The observation that the pier settled more than was predicted, however, would apparently contradict the notion that the pier footing had not been fully loaded.

As a result of the unsuccessful pier load test, the Applicant reanalyzed the structure for settlement loads using an assumed settlement of $\frac{1}{2}$ inch instead of the originally calculated $\frac{1}{4}$ inch. Such procedure was equivalent to assuming the soil modulus used for calculating settlement to be one-half that employed in the original calculations.

Following a design audit of the Applicant's reanalysis of the auxiliary building differential settlement loads using $\frac{1}{2}$ inch, the Staff issued Board Notification BN 83-174. *See infra* Finding 127. The three open items that the Staff cited as relevant to soils-remedial activities potentially at issue in these proceedings concerned (1) the baseline length over which the $\frac{1}{2}$ -inch differential settlement of the control tower relative to the main auxiliary building, and hence the stresses in the structure, were to be calculated; (2) the permissible limits of vertical deflections of the structures during jacking operations; and (3) how existing settlement stresses in structures will be treated in the final analyses of stresses and combined loads in the structures, i.e., can all existing stresses be removed during final jacking? Because these design issues were not fully

addressed by the testimony of record, we accordingly make no findings at this time as to the adequacy of their treatment by the Applicant. We note, however, that the Applicant's witnesses did address the last two items in their testimony (*see* Burke, *et al.*, ff. Tr. 5509, at 42-43, A9-A15), and we regard these two items as reasonable disagreements between experts that are susceptible to eventual resolution. We regard the final resolution of these items as subject to the Work Authorization Procedure established pursuant to LBP-82-35, *supra*.

In addition to BN 83-174, the absence of agreement among the expert witnesses as to the underlying reasons for failure of the W-11 pier load test to produce expected settlements provides a further reason for our declining to rule at this time, because of prematurity, on the issue of differential settlement between the control tower and the main part of the auxiliary building in the design of the underpinning. While the Staff's and Applicant's expert witnesses attested to the general competency of the hard lacustrine clay, a conclusion which the Board accepts as well-supported and reasonable, the final design of the underpinning was to rely on observations of settlement data. Data from pier W-11 settlements were to comprise part of that data base. In light of our concern, arising from the Modification Order (at 13-14), that acceptance criteria be sufficiently established to assure adequate design of the proposed underpinning prior to its construction, failure of the W-11 pier load test casts doubt on the foundation design or construction procedure. While we might envision several causes for that failure, evidence in the record is insufficient for us to reach a conclusion at this time about the relevance and significance of the unsuccessful load test to the foundation design acceptance criteria.

The Staff and Ms. Stamiris, in their proposed findings, both questioned the absence of any discussion of the unsuccessful pier load test in the Applicant's proposed findings. Staff FOF, ¶ 228; Stamiris FOF, ¶ "11," at 4. The Staff pointed to the test's relationship to the design audit conducted on September 14 and 15, 1983, and to the question of adequacy of the Applicant's treatment of differential settlement between the main portion of the auxiliary building and the control tower consequently raised in BN 83-174.

Ms. Stamiris went further, alleging that there had been a "discovery that the bearing capacity of the base soils for the underpinning is ½ that used in the original analysis" (Stamiris FOF, ¶ "13," item (1), at 5). It appears that Ms. Stamiris has confused bearing capacity with the soil modulus and erroneously concluded that circumstances leading to the Applicant's assumption of ½ inch (rather than ¼ inch) differential settlement necessarily implies a lack of competence of the base soil layer. The

general quality of that clay layer as a foundation support was demonstrated through laboratory tests of the clay, *in situ* Standard Penetration Tests, and agreement between predicted values of settlement of structures founded on the clay with actual settlements measured. The main purpose of the test was to verify the soil parameters. While we must reject Ms. Stamiris' conclusions about the clay that stem from the unsuccessful pier load test, we repeat that the evidentiary record on the pier load test (and on the three items cited by the Staff in BN 83-174) is incomplete.

Ms. Stamiris also registers her dissatisfaction with the Applicant's and Staff's treatment of the cause of cracks in the auxiliary building that began to appear before remedial actions were initiated. Stamiris FOF, ¶ "10," at 4; App. FOF, ¶ 217; Staff FOF, ¶¶ 216-218. As we outline, *infra* Findings 123-125, the Applicant believed the subject cracks were attributable to volume changes in the concrete during curing. The Staff did not accept the explanation that all the cracks in the auxiliary building stemmed from volume changes; nor do we. Importantly, the Staff required the Applicant to evaluate the effect of cracking on all safety-related structures, and the Applicant did so. The Staff opined that the Applicant's crack assessment in the case of the auxiliary building was satisfactory. We agree. Ms. Stamiris' accusations that this treatment indicated evasiveness on the part of the Applicant and that the Staff attempted "to skirt this issue altogether" are unwarranted, particularly since she gave no indication as to why a finding on the cause of the cracking might be significant. Since our findings indicate that the cracks do not significantly affect the strength of the auxiliary building, and since the cracks were to be monitored for changes in size or new crack development, we attach little significance to the fact that some of them may have been caused by differential settlement, except in regard to the allegation that the stepped foundation design of the structure may be deficient. That allegation we address immediately below.

During the hearings an NRC Staff engineer, Dr. Ross Landsman, volunteered that several "design deficiencies" occurred at the Midland facility. One category of these alleged deficiencies included the stepped-foundation configuration present in the RBA, control tower and EPAs of the auxiliary building, and the north projection of the SWPS. In this configuration, where the main part of the structure is founded on hard soil, an extension projects from it so that its foundation is at a higher level and rests on backfill of considerable thickness. Dr. Landsman asserted that this stepped-foundation design had an inherent potential for developing problems as a result of differential settlement, even if satisfactory compaction methods were used on the backfill. The overhanging

portion could act as a cantilever if the backfill supporting it settled more than anticipated in the design.

Since this potential differential settlement is principally what the Midland underpinning was intended to remedy, by transferring the foundation loads to the deeper hard soil, the potential safety problems to which the "cantilevered" design might give rise would be adequately resolved for the Midland structures. While this design was said (by others) to represent an acceptable engineering practice (indeed other examples have been accepted on licensed nuclear power plants), we are making no findings here on the adequacy of the *original* design of the auxiliary building. See *infra* Finding 128.

We recommend, however, that in the interest of conservatism the Staff study and review the practice of using cantilevered designs. That is, should stepped-foundation designs be utilized at all on nuclear power plant safety-related structures and, if so, should the NRC provide specific guidance on composition of backfill materials and their distribution, compaction standards or possible methods for assuring attainment of secondary consolidation of the backfill to control differential settlement when this design is utilized? While the record is not sufficiently detailed to permit this Board to specify its concern in clearer detail, and while we recognize that the potential problems of differential settlement in this case arose mainly from inadequate control of placement, moisture content, and compaction of the fill materials, the stepped-foundation design on certain structures, particularly those underlain by clay fill, appears to have contributed to the structural aspects of the potential differential settlement problem. Included in our concern is the practice of using concrete as fill material unless its use is specifically planned and the location of such materials in the fill is recorded and utilized in settlement predictions.

In summary, this Board concludes that the Applicant has adequately taken into account, in its design of remedial actions for the different parts of the auxiliary building and FIVPs, the effects of dewatering, seismic shaking (including potential soil liquefaction and seismic shake-down) and, except for open items specified in Board Notification BN 83-174 on which we express no opinion, differential settlement. As regards the seismic effects, we have reasonable assurance that the Applicant's use of the site-specific response spectra (SSRS) determined for the Midland site is appropriately conservative for assuring the seismic safety of the design of the underpinning of the auxiliary building structure and FIVPs, and that the response spectra used by the Applicant in the design of those underpinnings, based on a 1.5 multiple of the original DBE (or FSAR SSE) response spectra, adequately envelope (are higher

than) the Midland SSRS. See our conclusions on seismic effects, *supra* pp. 68-69, and *infra* Findings 77-79. In regard to the seismic reevaluation of these structures, we have reasonable assurance that the general analysis methodology proposed by the Applicant, the seismic design basis (1.5 x DBE (or FSAR SSE) response spectra), and the *nominal* values for the soil spring constant (or dynamic soil modulus) to be used are appropriately conservative input for the planned seismic evaluations of the completed structures, should construction ever be resumed. Our conclusion on the soil spring constant is subject to resolution of the Applicant's failure to meet its commitment given in the FSAR, and relied upon in testimony (including the SER), to perform additional structural evaluations for the seismic margin review using $\pm 50\%$ values of the nominal soil spring constant, as discussed *supra* pp. 70-71.

In the record on which we rely to come to our conclusions concerning adequacy of the Applicant's consideration of effects of dewatering, soil compression, and seismic shaking in the design of the remedial actions, we have attached considerable weight to evidence of the properties and predicted performance of the supporting soils under different loading conditions. Also, assurance that adequate consideration has been given to tolerable limits of structural response, or behavior, is inherent in our conclusion that the designs, if properly executed, will lead to structures posing no unreasonable threat to the health and safety of the public, or to the environment, if project construction were resumed. In other words, our conclusions here would be altered if greater differential settlement values or limits of structure deflection occur, or are proposed.

Our conclusions, also, are conditional upon satisfactory performance to be demonstrated by results of the structure-movement and crack-monitoring programs that have been, or were to be, initiated by the Applicant. (This conditional acceptance applies equally to other structures, pipes, and duct banks where monitoring programs were to be initiated.) We attach special significance to the results, as well as to the proper and continuous conduct, of the monitoring programs. Not only are they the "proof of the pudding" on predictions of soil performance and acceptable limits of structural deflection, but also their time-dependent data will be essential to a full understanding of the condition of structures if construction is ever resumed. The time-dependent nature of the soil responses — e.g., settlements ascribable to primary and secondary compression rates, or correlation of settlements with changes in ground water levels — was important evidence in our deliberations.

V. SERVICE WATER PUMP STRUCTURE (Findings 152-167)

The service water pump structure (SWPS) is a rectangular, reinforced concrete building with upper and lower sections of the same width but different lengths. The larger upper section results in an overhang at the north end of the structure, supported by underlying soil. See Figure 5, *infra* p. 97. Excavation for the SWPS left areas under the overhang to be backfilled; borings taken later revealed that some localized areas of backfill underneath and adjacent to the overhang portion of the SWPS had not been sufficiently compacted.

Although no unusual settlement has thus far developed, the Applicant undertook an extensive program of monitoring, analysis, crack mapping, and underpinning. The underpinning was to consist of a continuous perimeter reinforced concrete wall beneath the north end of the SWPS, which would form a box structure beneath the overhang, connected to the sides of the lower portion of the structure, and extending from the upper foundation slab to undisturbed glacial till. Construction of the underpinning made it necessary to lower the ground water table temporarily, through dewatering.

Stamiris Contention 4.C(b) claimed that there had been inadequate evaluation of dewatering effects, differential soil settlement and seismic effects for the SWPS. All aspects of this contention were extensively addressed before this Board. Although borings had shown the presence of some inadequately compacted fill under the overhang portion of this building, measurement of differential settlement indicated that the building was initially stable. However, a survey of cracks led to a disagreement between the Staff and the Applicant as to whether the cracks were incidental to normal shrinkage of concrete or indicative of unacceptable stresses. CPC's decision to install underpinning resting on the underlying glacial till made this disagreement immaterial: the Staff agreed that, with technically acceptable design and construction of the underpinning, together with the proposed crack monitoring and repair program, the cause of the cracking need not be definitively established.

Our findings of fact discuss all aspects of the testimonial record, including a description of the SWPS, the results of borings and surveys of cracks, the CPC-Staff disagreement about crack interpretation, design of the underpinning, effects of ground water levels as affected by dewatering, monitoring arrangements (including acceptance criteria, alert and action levels, and actions to be taken at each level) and the status of a nearby retaining wall. Although the underpinning was designed to meet conditions equal to or exceeding the SSE as determined by the SSRS

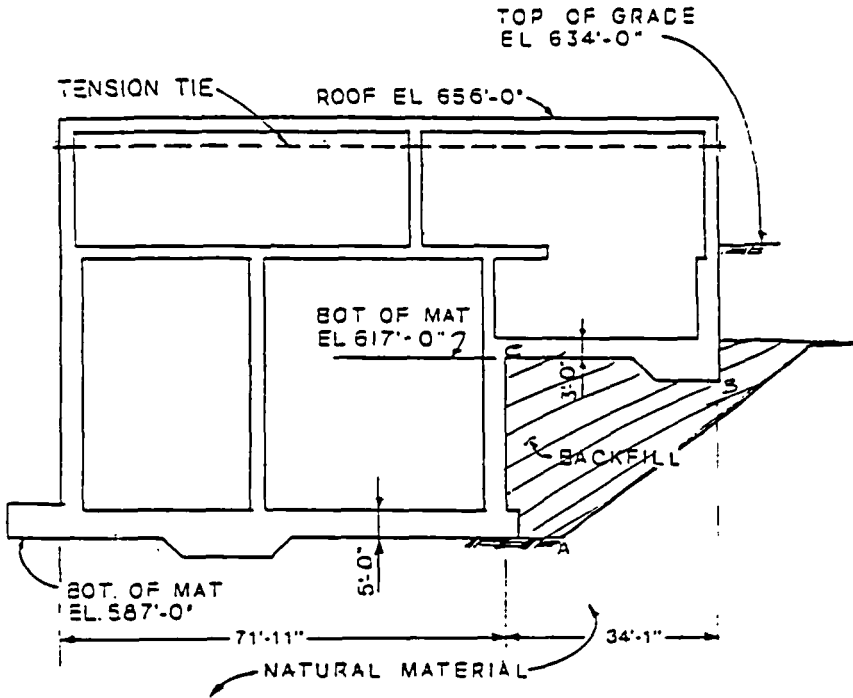


FIGURE 5. Typical section of service water pump structure (looking west) (from Applicant's Exh. 28 (corrections from the testimony)).

methodology, the basic SWPS structure was designed under the older DBE requirements and would be part of a project-wide seismic margin review were construction of Midland to be resumed under the existing construction permits. With underpinning in place, the entire SWPS structure would be founded on undisturbed till. As a result, soil liquefaction and seismic shakedown would not be factors in the SWPS' seismic response. In reaching our findings, we have taken into account proposed findings submitted by CPC and the Staff, which differ essentially only with respect to the sources of cracks. Ms. Stamiris submitted no proposed findings with respect to the design of the SWPS or the remedial measures applicable thereto.

We note that the seismic model which was to be utilized for the seismic margin review of the SWPS appears to be subject to the same design deficiency as was the model for the auxiliary building. See discussion, *supra* pp. 70-71. Our reasonable assurance findings with respect to the SWPS are therefore qualified to the extent that they apply only to the *nominal* values for the soil spring constant (or dynamic soil modulus).

Although the Staff initially had concerns similar to those expressed in Stamiris Contention 4.C(b), and in fact at one time supported that contention, as of the close of the record it was satisfied with CPC's remedial measures. With the exception of the design deficiency in the seismic model discussed above, the Board agrees and concludes that the Applicant has now adequately taken into account various dynamic responses in design of remedial soils measures for the SWPS. If completed as designed, the underpinning would provide an adequate and stable foundation for the overhang portion of the SWPS and would not adversely affect a nearby Seismic Category I retaining wall. These conclusions are subject to the outcome of a seismic margin review, including resolution of the design deficiency discussed above. The Board endorses monitoring arrangements agreed to by CPC and the Staff as well as arrangements for keeping the Staff well informed of the results of such monitoring.

VI. BORATED WATER STORAGE TANKS (Findings 168-195)

Two large borated water storage tanks (BWSTs), located to the north of the reactor and auxiliary buildings, were to have supplied borated water to the emergency core cooling system (and the reactor building spray system) during the injection phase of a loss-of-coolant accident. Because this function is necessary to safe emergency shutdown, the tanks are Seismic Category I structures. The foundations of the tanks

were constructed between July 1978 and January 1979; erection of the metal tanks was completed by December 1979.

Each tank has a reinforced concrete ring foundation with an integral valve pit which projects like the handle of a pan outside the perimeter of the ring. (The valve pits serve to provide access to the piping connections to the BWSTs and house valves for the fill and drain lines.) Most of the weight of the contained water was to be transferred through the flexible tank bottom to compacted granular backfill inside the ring. Lateral pressure developed from this load in the interior backfill is resisted by the ring foundation wall. The ring foundation also carries the weight of the metal tank and of some of the contained water. The area of vertical loading includes the ring foundation wall footing, the backfill within it and the projecting valve pits. Both tanks are supported by plant fill about 25 feet thick that was placed over competent natural soils. The design originally called for other small tanks to be mounted on the projecting valve pits, but their location was changed. The foundation design was not changed as a result of relocation of the tanks.

Beginning in October of 1980, the Applicant conducted a proof load test by filling both tanks with water and monitoring movements of the foundations by means of repeated surveys. Differential settlement of the ring foundation and between the ring foundation and the valve pits occurred and was initially reported to the NRC, pursuant to 10 C.F.R. § 50.55(e), on January 22, 1981. Structural analyses conducted by the Applicant indicated that the allowable moment capacity for the dead load and the differential settlement condition was exceeded at several locations in the foundation structure. Examination revealed cracking in the foundations of both tanks at the areas of highest calculated stresses — the junction of the ring wall and the valve pits.

Essentially what occurred during the load test was that the more heavily loaded areas within the ring walls settled more than the lightly loaded valve pits. Because they extended beyond the ring walls, the valve pits induced bending moments that exceeded the capacity of the design. This condition caused cracking at the junction of the valve pits with the ring walls and out-of-plane distortions around the perimeter of the ring walls. The bending moments had not been considered in the original design. Furthermore, differential settlement of the foundations was not the same at both tanks. The greater differential settlement of tank 1 than of tank 2 is mainly attributable to lateral variation in the properties of the backfill supporting tank 1.

Analyses of BWST 1 showed that, although it had been stressed beyond normal operating stress limits in two respects (a single point of

attachment of the tank to the foundation, and local tank wall compressive stresses), the tank had not undergone damaging stress resulting from the effects of the nonuniform support arising from differential settlement. (Since BWST 2 underwent lesser differential settlement, the analyses for BWST 1 were sufficient for evaluating both tanks.) With regard to the two exceptions cited, the stress conditions were within those allowed for emergency (short-term) conditions, and a considerable margin of safety was calculated to exist for buckling as a result of the local tank wall compressive stresses. Visual inspection of the tanks in the loaded condition verified that no buckling was present, and subsequent dye penetrant examination of the overstressed tank attachment point verified that no cracking was present.

The proposed remedial actions for the BWSTs involved (1) surcharging the valve pits and adjacent areas with sand (later removed) to compress the supporting soils and remove some of the deflection due to differential settlement; (2) constructing a new ring beam around the existing ring wall of each BWST, designed with sufficient capacity to withstand all future loads, and (3) releveling of tank 1. Also, existing cracks wider than 0.01 inch were pressure-grouted with epoxy, and monitoring programs for cracks in the new ring beams and for foundation settlement were proposed.

The new ring beams will rest on the upper surface of the existing ring wall footings, and shear connections will transfer shear force from the existing walls to the beams. New connections will be constructed to and through the valve pits. In the design of the new beam no credit was to be taken for any strength in the existing walls, although their stiffness was included in the design evaluations. Future settlement predictions used in the design of the new beams came from extrapolating settlement versus log-time curves for all the settlement markers, the settlement values being those recorded during the load test when the tanks were full.

The Applicant's consultants evaluated the settlement predictions and confirmed the adequacy of the static and dynamic bearing capacity calculations as well as the long- and short-term soil stiffness moduli for use in the seismic modeling of the BWSTs. The metal tanks were similarly reevaluated for their ability to withstand the predicted future differential settlement loads and seismic loads. The seismic evaluations and reevaluations were based on the 1.5 x DBE (FSAR SSE) response spectra which conservatively envelope the SSRS derived for the Midland site (and which we have found to be acceptable, *see supra* p. 69).

Plant fill soils beneath the BWST foundations were not found to be susceptible to soil liquefaction or to seismic shakedown. Settlement due

to dewatering loads beneath the BWSTs was minimal and would be implicitly included in the settlement calculations. While no commitment to dewater the plant fill beneath the BWSTs was made, nor was it necessary, some dewatering would occur as a consequence of dewatering requirements for the plant fill beneath the RBA and DGB.

The Staff reviewed and evaluated the Applicant's assessment of the integrity of the BWSTs following the load test, and the proposed remedial measures and monitoring programs. With the exception noted by the Staff regarding the unresolved technical specification for future settlement monitoring (Staff FOF, ¶ 290, at 30), the Staff agrees that the Applicant has now adequately evaluated and analyzed the dewatering, differential soil settlement and seismic effects in its proposed remedial actions for the BWSTs. The adequacy of such evaluations and analyses had been questioned by Ms. Stamiris' Contention 4.C(c). By way of indicating that this contention was well founded when submitted, however, the Staff notes that "the concerns expressed by Ms. Stamiris in this and other contentions are similar to the concerns that caused the Staff to issue the [Modification] Order." Staff FOF, ¶ 292, at 30. We agree.

The Staff and Applicant disagree as to the cause, or the principal cause, of the differential settlement of the BWSTs. As in the case of the overhanging portions of the auxiliary building and SWPS, the effects of differential settlement are primarily what the remedial measures are intended to address, although different measures were to be taken in the different cases. The effectiveness of the remedial measures is not dependent on the cause of the differential settlement. Thus we need not dwell on that cause.

We note, however, that in the case of differential settlement of the BWSTs, the Applicant has taken the unusual position of asserting that the cause was its own initial design error(s); i.e., the valve pits' projection well beyond the perimeter of the ring wall foundation, the removal of the small tanks that would have added some additional bearing pressure to the valve pits, and the failure to include the effects of the resultant bending moments induced by the valve pits when calculating the stresses in the original design. On the other hand, the Staff holds that the primary cause of differential settlement of the BWSTs was inadequately compacted fill. The Staff witnesses pointed to 1.1 inches of total settlement of a BWST foundation marker even before the tanks were filled (Finding 176). The Staff also referenced the Applicant's witness' nonresponsive answers to Board questions on the amount of total settlement (Staff FOF, ¶ 277, at 27-28). The Board notes, in this connection, the "less stiff" (i.e., softer) soil under part of tank 1 which led to increased differential settlement and required releveling of that tank.

Dr. Kennedy, another witness for the Applicant, provided what we regard as the most balanced — and most persuasive — explanation of the BWST cracks. He believed that there were three causes of cracking in the BWST foundation walls: first, the soft soil under the west side of tank 1; second, the light loading and projecting geometry of the valve pits; and third, under-reinforcing of the ring wall — i.e., had sufficient reinforcing steel been used to produce a more rigid structure, the load would have been spread to include the area beneath the valve pits without cracking.

We can see that the differential settlement was caused by the overall settlement of the soil. Had there been no settlement, as if the BWSTs were founded on rock, there would have been no differential settlement. Alternatively, had the design included reinforcing steel sufficient to resist totally the bending moment, there would have been no failure (but possibly some tilting) during settlement. Thus we see the admitted presence of soil beneath tank 1 that was soft enough to contribute to the additional differential settlement of that tank as indicating nonuniformity of soil compaction.

This situation is not unlike the question of “deficient design” in connection with the stepped foundations of portions of the auxiliary building and SWPS: had either the supporting backfill not settled, or had the design of the auxiliary building included the “cantilever” stresses and the design of the BWSTs the bending moment stresses, they would have been adequate. Our discussion here, where design deficiency is admitted, amplifies the reasons for our recommending Staff review and study of the generic requirements for, or generic acceptability of, the future use of such configurations on safety-related structures. *See supra* pp. 39, 93-94, for our recommendation stemming from the design of portions of the auxiliary building and SWPS.

VII. DIESEL FUEL OIL TANKS (Findings 196-203)

The design of the diesel fuel oil tanks became an issue in this proceeding because of uncertainties resulting from the presence of improperly compacted fill, as set forth in Stamiris Contention 4.C(d) and Warren Contention 2.B(2). Those contentions questioned whether the fuel oil tanks had been adequately evaluated with respect to such matters as the effects of dewatering, differential soil settlement, and seismic effects (including liquefaction). All aspects of this issue were considered thoroughly by both CPC and Staff witnesses. The hearing record and pro-

posed findings of the Applicant and Staff indicate no areas of disagreement between them, as of the time the record was closed on the design issue. Ms. Stamiris submitted no proposed findings with respect to the design aspects of the fuel oil tanks. With respect both to the potential for liquefaction under the diesel fuel oil tanks and the stability of soils under those tanks, however, recent developments (see below) preclude our resolving those issues at this time.

The hearing record, as summarized in our findings, indicates that the Applicant undertook a program of measurement, analysis and monitoring to assure that the tanks could perform their intended functions. Among other measures, the tanks were surcharged by being filled with water and monitored for about 8 months. The Applicant also analyzed each of the factors cited in the relevant contentions. The Staff concluded that, subject to an audit and the results of a seismic margin review, the structural concerns expressed by these contentions were (as of the close of the record on these questions) without merit.

However, by copy of a report from CPC to the Staff, dated November 21, 1984, the Board and parties were informed that certain 1977 boring logs purportedly reflecting borings taken in the area of the diesel fuel oil tanks were in fact logs of borings taken elsewhere in the Midland area. In response to a telephone request from the Board, seeking information as to the extent the incorrect boring logs might affect testimony currently in the record, the Applicant by letter dated December 6, 1984, advised that the only technical issue potentially affected is the liquefaction of soils below the diesel fuel oil tanks. It further advised that its analyses did utilize at least one of the erroneous logs; that such analyses had been presented to the Staff for licensing review; and that, as a result, the CPC analysis of the liquefaction potential of soils beneath the diesel fuel oil tanks is inconclusive. By letters dated December 21, 1984, and December 24, 1984, the NRC Staff and Ms. Stamiris agreed that we should issue no decision on the liquefaction question, but they went further. The Staff indicated that it had also used the subsurface information from the erroneous boring logs "to assess the compacted density of the plant fill and to evaluate the adequacy of the foundation soils in the diesel fuel oil tank area" and to "assist in accepting the placement of the concrete foundation pads for the diesel fuel oil tanks at elevation 612 feet." Ms. Stamiris sought an OI investigation and further hearings on facts bearing on the erroneous logs. (*See supra* pp. 38-39, for our resolution of these requests.)

The Applicant further indicated that, as a result of the project shutdown, it does not at this time plan to perform the additional analyses or obtain additional field information to close out this issue. The Staff has

advised that it has not received the correct boring logs for the diesel fuel oil tank area (Kane Affidavit, dated December 21, 1984, ¶ 3, at 4). Nor has this Board. Given the state of the record, this issue remains open. We are thus making no findings or conclusions at this time on either the liquefaction potential of soils beneath the diesel fuel oil tanks or the foundation stability of those soils. Furthermore, because of the significance of these "open items" to our evaluation of diesel fuel oil tank design issues, we also are not reaching any "reasonable assurance" conclusions with respect to those issues, or any final rulings on Stamiris Contention 4.C(d) or, insofar as it relates to liquefaction under the diesel fuel oil tanks, Warren Contention 2.B(2).

VIII. UNDERGROUND PIPING (Findings 204-292)

Underground piping is among the items which were covered by the Modification Order. Two of the contentions of Ms. Stamiris, and one of those of Ms. Warren (which the parties addressed³⁹), raised questions concerning the technical adequacy of such piping, motivated particularly by the excessive settlement of some of that piping. These contentions questioned whether CPC's analyses of piping had adequately taken into account such matters as the effects of the DGB surcharge, dewatering effects, and differential settlement.

In our findings, we describe in detail the various types of underground piping which were installed (or planned to be installed) at Midland. There are two general categories: Seismic Category I (which must be designed to withstand earthquake motions and also are subject to QA requirements) and Nonseismic Category I. The first category of piping was reviewed to assure that the pipes would perform their intended safety functions throughout the plant's projected service life. The second category was reviewed to the extent necessary to assure that postulated failures would not have an adverse impact on nearby Seismic Category I structures or piping.

The concerns with respect to underground piping reflect the inadequate compaction of plant fill supporting that piping, resulting in excessive and in some cases differential settlement of the piping. All of the underground Seismic Category I pipelines (of which there are five types) rest on compacted backfill material. Such piping was discovered to be located from 6 to 21 inches below originally intended elevations (4

³⁹ See *infra* note 41.

to 19 inches if credit is taken for placement tolerances), with the majority in the range of 9-11 inches.

At the time the Intervenor submitted their contentions on underground piping, it is apparent that insufficient analyses of underground piping had been performed to provide a basis for a reasonable assurance finding concerning such piping. Indeed, during the first hearing session on piping, there were major unresolved questions between the Applicant and Staff on that subject (*see, e.g.,* Chen/Hood, ff. Tr. 7762; Tr. 7763-77 (Kane, Hood, Chen)), leading us to remark that we were being offered little more than a progress report on the resolution of as-yet open questions (Tr. 7777-78).

The Applicant and Staff subsequently resolved their differences. As is reflected in our findings, there have been detailed and extensive analyses performed of all of the underground piping, and corrective actions taken or proposed where required. Criteria for evaluation were developed by the Applicant and reviewed by the Staff. Corrective actions for the service water system (SWS) piping included replacement, rebedding and re-installation, as well as extensive monitoring. For the borated water storage system piping, the corrective actions included partial recentering and rebedding, and monitoring. All of the Seismic Category I piping was analyzed for seismic effects and was subject to re-review as part of a seismic margin review. Finally, the Applicant and Staff agreed upon a number of technical specifications which would govern underground piping.

One subissue bearing upon underground piping was its susceptibility to corrosion. This is the major facet of the technical aspects of underground piping as to which Ms. Stamiris filed proposed findings. The potential corrosion of underground piping was not a part of any contention. However, during cross-examination on one of Ms. Stamiris' documents which dealt with other aspects of "soils deficiencies," as well as corrosion of the piping (Stamiris Exh. 35), it came to light that corrosive pitting had been discovered in two areas of underground stainless steel piping. The Board asked the Staff to furnish a witness who could address the corrosion of underground piping (Tr. 7835-36, 7863, 7914-16). The Staff responded by presenting Dr. John R. Weeks, a Senior Metallurgist who has been employed at Brookhaven National Laboratory since 1953.

The Board wishes to take this opportunity to give credit to the knowledgeability and forthrightness of Dr. Weeks. As detailed in our findings, we believe that Dr. Weeks has satisfactorily addressed and resolved the various outstanding open questions concerning the corrosion of underground piping. We also appreciate the Staff's efforts in obtaining Dr. Weeks as its witness.

One particular question which Dr. Weeks addressed warrants further comment in light of challenges to Dr. Weeks' opinion advanced by Ms. Stamiris in her proposed findings (Stamiris FOF, ¶¶ "23-27," at 8-10). Dr. Weeks expressed the opinion that the corrosion in stainless steel piping was probably caused by stray welding currents. In doing so, he was reaching the same conclusion that was reached in a 1981 study by Bechtel Group, Inc., the Applicant's consultant. Ms. Stamiris stressed that this conclusion varied from that of an earlier, 1979 study by Bechtel National, Inc., which had not been able to determine the cause of the pitting but had noted the lack of "known electrical sources" in the area of the corrosion. Dr. Weeks explained why he thought the second study was more likely correct — in particular because of the discovery of additional information concerning the welding procedures utilized on the site, and the contribution to the second study of a project engineer expert in corrosion matters with whom Dr. Weeks was familiar (Tr. 9180). He also explained how electrical sources could have caused the corrosion examined in the first report. Most important, however, Dr. Weeks reached his conclusion independently, after considering a number of pertinent considerations which he explicitly outlined. We have no hesitation in accepting Dr. Weeks' conclusions on this question, and in declining to adopt Ms. Stamiris' proposed findings which were premised on the information presented in the first report on the corrosion question. *See infra* Findings 279-280.

Based on the entire record on underground piping, we are in general agreement with the solutions to piping questions which, during the course of the hearings, were worked out between the Applicant and Staff. In addition, we are adding the following supplemental technical specifications or conditions (to take effect if the plant were to be operated or construction resumed):

1. If further placement or replacement of underground Seismic Category I piping were carried out, the Applicant must prepare as-built pipe profiles to verify the post-installation location of the pipes (Finding 210).
2. Based on the acceptance criterion of not more than 3 inches of additional settlement to occur at any pipe location, a technical specification should include alert and action limits. The alert limit shall require that, where settlement at any monitoring station reaches or exceeds 75% of the 3-inch acceptance criterion, the NRC Staff shall be notified (Findings 213, 260).
3. All Seismic Category I underground piping is to be subject to a seismic margin review (Findings 240, 244, 248, 250, 252).

4. An adequate monitoring program for strain gages must be instituted, extending throughout plant life and requiring repair or replacement of the gages, as necessary or appropriate (Findings 257, 263). The Staff should determine the monitoring frequency for the period beyond the first 5 years of monitoring.
5. There must be a pipe monitoring schedule for the period between the commencement of monitoring and the commencement of unit operation, at a frequency to be agreed upon by the Applicant and Staff (Finding 263).
6. The Staff shall have the authority to impose additional monitoring requirements to the extent necessitated by an extended period of time between the startup of Units 2 and 1, respectively (Finding 263).
7. There shall be annual rattlespace monitoring throughout plant life, subject to modification after 5 years if requested by the Applicant and approved by the Staff (under normal procedures for technical specification changes) (Finding 264).
8. To the extent that excavation of 36-inch pipes were yet to take place, the condition of the pipe wrappings should be checked (Finding 271).
9. If the galvanic protection system were to be shut down for an extended period of time, and construction were later resumed, the Staff should carefully consider whether further analysis of corrosion of existing underground piping is required (Finding 281).

In sum, we conclude that the questions concerning underground piping raised by Stamiris Contentions 4.A(4) and 4.C(f), and Warren Contention 3, have been satisfactorily addressed. Subject to the specifications or conditions to which the Staff and Applicant have agreed, supplemented by the further specifications or conditions set forth above, we have reasonable assurance that, so long as corrective actions would be carried out satisfactorily, the Seismic Category I piping would be able to perform its intended functions and would not place undue risk on the public health and safety. We further have reasonable assurance that postulated failures in Nonseismic Category I underground piping, were they to occur, would not adversely affect nearby Seismic Category I structures or piping.

IX. ELECTRICAL DUCT BANKS AND CONDUITS (Findings 293-305)

The design adequacy of electrical duct banks and conduits became an issue in this proceeding because of uncertainties resulting from the presence of improperly compacted fill, as set forth in Stamiris Contention 4.C(f) and Warren Contention 3. All aspects of this issue were addressed thoroughly by both CPC and Staff witnesses.

The CPC proposed findings on electrical duct banks and conduits provide a comprehensive analysis of the hearing record. We have used these proposed findings as a basis for our own findings. Staff proposed findings were in substantial agreement but provided useful elaborations and clarifications that we have incorporated in our findings. Ms. Stamiris submitted no proposed findings concerning the design aspects of electrical duct banks and conduits.

The hearing record summarized in our findings sets forth the acceptance criteria developed by the Applicant and the detailed analyses that were made of surface loads, effects of construction, crossings of the freeze wall, interfaces with the SWPS and DGB and possible seismic effects. Corrective actions in one area where requirements were not met were developed. The Staff has expressed **general agreement** with these corrective actions and the rest of the CPC testimony.

The Board concludes that the concerns expressed in the contentions regarding the electrical duct banks and conduits have been adequately addressed. The Board also finds reasonable assurance that the duct banks and conduits would be capable of performing their intended safety function over the projected lifetime of the plant, subject to satisfactory completion of remedial work north of the SWPS and the satisfactory outcome of a seismic margin review (*see infra* Findings 301, 302 and 305).

X. SLOPE STABILITY OF BAFFLE AND PERIMETER DIKES (Findings 306-318)

Stamiris Contention 4.B questions, *inter alia*, the slope stability of the cooling pond dikes, on the ground that the dikes were built with the same soils and procedures as was the soils foundation for the DGB. The issue was addressed fully by both CPC and Staff witnesses. It involves a safety concern of considerable importance because of possible adverse impacts on the emergency cooling water reservoir should dike stability suffer from the presence of insufficiently compacted soils similar to those present elsewhere on the Midland site. *See infra* Findings 306-309.

In response to a series of questions posed by the Staff and its consultant, the Army Corps of Engineers, CPC conducted a thorough study, including extensive borings by Woodward Cycle Consultants (at locations selected by the Corps of Engineers) and an analysis by Dr. Alfred J. Hendron of the University of Illinois of the shear strength of the dike materials. Based on the study and the analysis, the Staff concluded that the fill material placed in the baffle and perimeter dikes exceeds the design parameters and that the slopes of the dikes would remain stable under static loading conditions (*infra* Findings 310-312).

Dr. Hendron also analyzed dynamic conditions due to a rapid draw-down of pond water level associated with possible dike failure. Even using a very conservative method accepted by the Army Corps of Engineers, factors of safety of 1.34 for critical portions of the baffle dike and 1.50 for critical portions of the perimeter dike for such an event were obtained. The Staff agreed that this was adequate. Indeed, the Corps of Engineers considered 1.0 as the minimum factor of safety for this case. *See infra* Findings 313-315.

The Army Corps of Engineers initially had concern, based on preliminary hydrologic information, that a probable maximum flood (PMF) could breach the perimeter dike and cause erosion damage. PMF questions are not related directly to the shear strength and properties of dike materials and hence were peripheral to the contention under review. Nonetheless, these questions were extensively addressed on the record. After further study, the Staff and the Corps are now satisfied that the potential for dike overtopping during a PMF is small and any overtopping that might occur would not affect the safe operation of the plant. To preclude possible dike damage by erosion, the Staff would require a suitable dike inspection and maintenance program. *See infra* Finding 316. We concur in that requirement.

Dr. Hendron also analyzed dike stability under seismic loadings, using an approach that was accepted by the Staff. Based on conservative assumptions, he obtained yield accelerations for the critical sections of the dikes that were far larger than the 0.19g value which, in itself, was greater than that required at Midland. He also testified that soil liquefaction under the dikes will not be a problem. *See infra* Finding 317.

Based on the technical record summarized in our findings, we conclude that the dikes would be stable under all anticipated static and dynamic loads. Thus, contrary to Stamiris Contention 4.B (with respect to which Ms. Stamiris filed no proposed findings), we conclude that there is reasonable assurance that critical slopes of the baffle and perimeter dikes are stable and would not adversely affect safe operation of the Midland Plant, should it be finished and operated. This conclusion as-

sumes the applicability of the inspection and maintenance program proposed by the Staff.

XI. CONCLUSION

A. Technical Issues

In this Decision, we have reviewed only the programmatic aspects of remedial soils measures or "fixes," to the extent we believe that the record with respect to any particular remedial activity is adequate to warrant a ruling on that activity. In general, and subject to certain technical specifications or conditions and the resolution of certain unresolved technical issues, we have found those programs which we have reviewed to be adequate. If construction were to be resumed under the outstanding construction permits, those programs could continue to be undertaken, subject to the controls authorized by LBP-82-35 and the eventual resolution of the various QA/QC management attitude issues and the particular technical issues which remain unresolved. Verification efforts relative to as-built structures, along the lines of those which have been required by the Staff, would also have to be carried out or completed. (We note that further construction may well be subject to additional conditions imposed by the Staff.)

In reaching these conclusions, we have reviewed with great care the entire record of this proceeding dealing with the issues on which we are ruling, including the proposed findings of fact and conclusions of law submitted by CPC, Ms. Stamiris, and the NRC Staff. Our Opinion is based upon, and incorporates, the Findings of Fact and Conclusions of Law which follow. Any proposed findings or conclusions on remedial soils issues submitted by the parties which are not incorporated directly or inferentially in this Partial Initial Decision are rejected as being unsupported in law or in fact or as being unnecessary to the rendering of our Decision.

B. General Observations

It is somewhat ironic that, for a project which apparently is being halted for financial reasons, many of the extraordinary costs which have attended this project since its inception and undoubtedly contributed to its likely demise are costs which could easily have been — and should have been — avoided. As a Staff witness observed,

In 1975, 1976, 1977, in my best estimation, one 30-thousand-dollar-a-year geotechnical engineer would have prevented each and every one of these [soils settlement] problems on site.

Tr. 2444 (Gallagher).

Nor would the employment of such a geotechnical engineer have been an unusual step to have been followed. In fact, CPC admitted that it had made a commitment to NRC to have such an engineer on site at all times when soils were being compacted. Stamiris Exh. 3, Attach. 7 (I&E Rept. 78-20), at 24-25; Modification Order, Appendix, Allegation 2.b(2); and CPC's Answer to Notice of Hearing, dated April 16, 1980, Appendix at 4, Allegation 2.b(2). Such a requirement was in effect throughout the entire history of the project (Tr. 1834-35 (Gallagher)). For that reason, we can only reasonably conclude that the soils problems were to a significant extent the product of QA/QC implementation deficiencies for which both CPC and its contractor, Bechtel Corp., must assume responsibility. The soils problems have been a prime ingredient in the project's delay.

Although the soils problems were perhaps the most visible of the QA/QC implementation problems which have surfaced, we must observe that such implementation problems have been endemic to this project, arising even prior to the award of construction permits. See ALAB-106, 6 AEC 182 (1973). QA/QC implementation problems continued to surface prior to the time frame in which the soils problems arose. See, e.g., ALAB-283, 2 NRC 11 (1975), *clarified*, ALAB-315, 3 NRC 101 (1976). Following the Modification Order, and despite extensive corrective efforts, problems kept recurring. For example, when CPC (through Bechtel) attempted to cure the lack of a geotechnical engineer (mentioned above), it first hired a qualified engineer but thereafter replaced him with an individual whom the Staff judged to be unqualified for his position. Gallagher, ff. Tr. 1754, Attachment 4 (Appendix B, Notice of Deviation; I&E Rept. 81-01, at 10); Tr. 1834-37 (Gallagher); Tr. 1321, 1325-26 (Keeley). Also, as pointed out in LBP-82-35, various incidents such as improperly drilling into buried duct banks continued to recur. And, in the words of the Staff, a "significant breakdown" in implementation of the QA program with respect to the DGB later surfaced, resulting in numerous nonconforming conditions (Keppler, ff. Tr. 15,113, at 4 and Attachments 3 and 4); Tr. 15,131-32 (Keppler)). See *supra* p. 85. "[C]learly there has been a series of recurrences of quality assurance lapses at the site which should not have taken place" (Tr. 15,116 (Keppler)).

The controls imposed by LBP-82-35, together with the other extensive review efforts upon which the Staff insisted, were intended to assure that further soils-related construction activities would be carried out satisfactorily. Although we are not now ruling on whether these measures were successful, we do observe that, on the basis of recent I&E inspection reports which have been transmitted to us and the parties, covering periods prior to the shutdown of construction, there have appeared to be fewer violations of regulatory requirements than in the past. (Since the various reports are not part of the record, these observations should in no event be regarded as final.) We also must observe that considerable hearing time was devoted to alleged violations of the requirements imposed by LBP-82-35. Although we are not now resolving those issues, we note that, as a result of its investigation, the Staff required CPC to have a third-party "management appraisal" (which, insofar as we are aware, has not been completed). 49 Fed. Reg. 2562 (Jan. 20, 1984). By copy of a letter from NRC (Region III) to CPC, dated November 13, 1984, this Board and the parties were advised that NRC is requiring completion of this management appraisal as a predicate for resumption of construction.

The various controls imposed on construction were designed to assure the adequacy of construction but not necessarily to correct the root causes of the QA/QC implementation deficiencies. Indeed, the Staff was unable to discern exactly what those root causes were. Tr. 15,122, 15,163, 15,178, 15,182, 15,196 (Keppler). The QA/QC implementation difficulties were often attributed by both the Staff and Applicant to a lack of "attention to detail." Tr. 15,125 (Keppler); Tr. 14,731 (Landsman); Tr. 1199 (Keeley). Taking that into account, our own general observation would attribute the root cause of the difficulty to the general managerial attitude of those in control of the project — an attitude which failed to appreciate and stress the importance of taking all of the steps necessary to build quality into the project. Although the latter goal was often enunciated (*see, e.g.,* J. Cook, ff. Tr. 1693, at 22); there appeared to be a number of occasions when steps necessary to achieve that goal were bypassed or ignored (Tr. 15,124 (Keppler)).

That general attitude, in our view, contributed to CPC's attempt to blame others for its own deficiencies. In that regard, we must express our strong disagreement with (and disapproval of) the statements of CPC management officials (in particular, Mr. Stephen H. Howell, a CPC Executive Vice-President) made around 1980 to the press or Congress, to the effect that, were it not for the activities of Intervenor and/or the NRC Staff, the facility would long ago have been built and operating. Tr. 1723-24 (J. Cook); Tr. 2859-60, 20,988-95, 21,076, 21,083 (Howell);

Stamiris Exh. 118; *see also* Tr. 15,135-38 (Keppler). Mr. Howell, who had made the statement with respect to Intervenor, admitted that he had not examined, and did not know, how much time (if any) the conduct of hearings had delayed the plant (Tr. 21,092, 21,082). Indeed, Mr. Howell acknowledged that construction at Midland had not been halted for even 1 day because of the Intervenor (Tr. 21,103). The basis for the statement was a comparison between the licensing time for Midland and a statistical average of the times for five assertedly uncontested or little-contested facilities initiated in about the same time period (Tr. 21,091, 21,146-47 (Howell)). The comparison had not taken into account the facts at issue in any of the licensing proceedings; Mr. Howell conceded, however, that none of the "comparable plants" had had problems during construction of the magnitude of the soils problems encountered at Midland (Tr. 21,117-19).

Were we to resolve the QA/QC management attitude issues of this proceeding, we would regard CPC management's efforts to blame the Intervenor or the Staff for project delays as a reflection of poor managerial attitude. On the other hand, we view Mr. Howell's renunciation of further attempts to blame others for CPC's shortcomings (Tr. 21,087, 21,146-47) as a positive indication. (We express no opinion here as to what the effect of these preliminary findings would be on an eventual evaluation of CPC's managerial attitude.)

For our part, we view the contribution of the Intervenor in this proceeding as positive — particularly that of Ms. Stamiris, who devoted the greatest effort among the Intervenor to the resolution of the various soils issues which we have thus far heard. (Most of Ms. Sinclair's many contentions deal with other matters which for the most part have not yet been litigated.) We reiterate that the QA/QC and management attitude issues, including most of Ms. Stamiris' OM contentions, as well as issues raised by the Staff through the Modification Order, were extremely important issues in terms of the facility's licensability. Although we are declining (for reasons previously outlined) to rule on those issues at this time, we wish to commend both Ms. Stamiris and the NRC Staff for their efforts to build an adequate record on these questions.

In that connection, we wish to note that, early in this proceeding, CPC and the NRC Staff stipulated to the effect that (1) prior to issuance of the Modification Order, there were significant QA deficiencies related to soil construction activities under and around safety-related structures and systems; (2) CPC agreed not to contest the Staff's conclusions that the specified deficiencies constituted "a breakdown in quality assurance with respect to soils placement" and an "adequate basis" for the Modification Order; but (3) the QA/QC program then being followed was ade-

quate and NRC had "reasonable assurance" that such program would be "appropriately implemented with respect to future soils construction activities including remedial actions taken as a result of inadequate soil placement." App./Staff Exh. 1, ¶ 3; to the same effect, *see* Keppler, ff. Tr. 1864, at 8-9. Ms. Stamiris never joined in this stipulation; and, although the Board accepted the first two items of the stipulation recited above, we have never accepted the third item, except as a reflection of the then-current views of the Applicant and Staff (*see* Tr. 1172-75).

Through some superior efforts by NRC Staff inspectors (particularly I&E Inspectors Eugene J. Gallagher, Ross B. Landsman, and Ronald N. Gardner, and Resident Inspector Ronald J. Cook), and through the persistence of Ms. Stamiris, who made certain that these inspectors' views were explored at the hearings, the record was developed to an extent which necessitated our imposition of the interim conditions spelled out in LBP-82-35 (*see* discussion, *supra* p. 35, and *infra* Findings 14-15). Thereafter, following its successful effort to reopen the record, the Staff modified its earlier opinion by conditioning its reasonable assurance of the adequacy of QA/QC implementation upon CPC's adherence to the conditions brought about by LBP-82-35, as well as specified third-party overview efforts and enhanced Staff inspection efforts. Keppler, ff. Tr. 15,111, at 6; Keppler, ff. Tr. 15,114, at 6.⁴⁰ We express no opinion at this time whether we currently would have "reasonable assurance" with respect to implementation of the QA/QC program for construction, were the resumption of construction again to be contemplated. But, whatever our conclusion, we believe that the plant, if completed, likely would be measurably safer not only through the superior efforts of the Staff but also as a result of the persistence of Ms. Stamiris.

FINDINGS OF FACT AND CONCLUSIONS OF LAW

Findings of Fact

I. BACKGROUND, JURISDICTION AND PARTIES

1. This Partial Initial Decision treats certain issues in a consolidated proceeding involving (1) the application of Consumers Power Company (CPC or Applicant) for licenses to operate the Midland Plant,

⁴⁰ Both CPC and the Staff favored the continued applicability of those conditions in their most-recent proposed findings. CPC Second Supplemental FOF, ¶ 670; NRC Further Supp. FOF, ¶¶ 11, 15-40.

Units 1 and 2 (OL proceeding), and (2) the Order under 10 C.F.R. § 2.204 for modification of licenses, dated December 6, 1979 (OM proceeding).

2. The Midland Plant consists of two pressurized water nuclear reactors designed by Babcock & Wilcox Co. (B&W), located on the Applicant's site on the south shore of the Tittabawasee River in Midland County, Michigan. The site is adjacent to the Dow Chemical Company's main industrial complex in the city of Midland. 37 Fed. Reg. 28,312 (Dec. 22, 1972). Each unit was designed to operate at a reactor core power level of 2452 megawatts thermal. Unit 2 was scheduled as the first to be completed. As a result of financial problems, CPC currently has suspended construction of both Units and does not contemplate the revival of construction in the near future. Nonetheless, CPC has stated that, despite the project shutdown, it intends "for the time being, to maintain the Construction Permits and Operating License applications for both units" so as to "maintain its options." Letter, CPC to Harold Denton, NRC, dated July 27, 1984 (file 1300, serial 31636); letter, CPC to J.G. Keppler, NRC, dated July 27, 1984, file 0.4.9, serial 31797; also telephone communication to Board from CPC counsel, on July 17, 1984; and letter from CPC counsel to Board and parties dated September 10, 1984.

3. The facility as designed was unique in that the heat generated was proposed to be used not only to produce electrical energy but also to produce steam for the nearby Dow plant. The facility's turbine generators were designed to produce 504 megawatts electrical (MWe) from Unit 1 and 852 MWe from Unit 2. The remaining heat from Unit 1 was planned to produce 460 kg/s (approximately 3.6×10^6 lb/hr) at 1200 kPa gauge (175 psig) and 50 kg/s (approximately 0.4×10^6 lb/hr) at 4100 kPa gauge (600 psig) of process steam for use at the Dow plant. The proposed process steam system was to have been a tertiary system utilizing heat extracted from the secondary steam system of the Midland plant. Staff Exh. 14 (SER, § 1.2, at p. 1-8). However, reflecting delays and cost increases in the project, there developed a contractual dispute between Dow and CPC, and ongoing litigation resulting therefrom, and Dow gave up its plans to utilize the steam which Unit 1 was designed to produce. *Dow Chemical Co. v. Consumers Power Co.*, Circuit Court for Midland County, Michigan, File No. 83-002232-CK-D, complaint initially filed July 14, 1983. Construction of both units has now been suspended as a result of CPC's financial problems.

4. Construction Permits CPPR-81 and CPPR-82, for Units 1 and 2, respectively, were issued by the Atomic Energy Commission on December 15, 1972 (37 Fed. Reg. 28,312 (Dec. 22, 1972)). The initial

part of the application for operating licenses (OL) was filed with the NRC on August 31, 1977, and was formally docketed on November 18, 1977. SER, § 1.1 at 1-1; Appendix A, at A-3; *see also* 43 Fed. Reg. 8870 (March 3, 1978). On May 4, 1978, following the filing by CPC and docketing by NRC of the remainder of the OL application, the NRC published a notice of the "Consideration of Issuance of Facility Operating Licenses; and Opportunity for Hearing." 43 Fed. Reg. 19,304. This notice commenced the first of the proceedings under consideration here.

5. An Atomic Safety and Licensing Board was established to rule on intervention petitions and thereafter to conduct the hearing. 43 Fed. Reg. 25,748 (June 14, 1978); Memorandum for the Record, dated August 16, 1978. The OL Board has been reconstituted several times throughout the proceeding, with the latest change being effective on March 1, 1982. 47 Fed. Reg. 9939 (March 8, 1982).

6. Timely intervention petitions were received from Ms. Mary P. Sinclair, on behalf of the Saginaw Valley Nuclear Study Group (Saginaw), and from the Attorney General of the State of Michigan. Prior to the first prehearing conference, a late-filed petition was received from Mr. Wendell H. Marshall, on behalf of the Mapleton Intervenors. We tentatively admitted Ms. Sinclair and Mr. Marshall as intervenors in their personal capacities (subject to the acceptance of contentions) but denied intervention to Saginaw and to the Mapleton Intervenors (although permitting those groups to file additional information which could qualify them to intervene). The Attorney General of the State of Michigan was admitted as an interested State, pursuant to 10 C.F.R. § 2.715(c). Memorandum and Order dated August 14, 1978 (unpublished); Memorandum and Order dated October 12, 1978 (unpublished). A Notice of Hearing was published on October 18, 1978. 43 Fed. Reg. 48,089.

7. The special prehearing conference in the OL proceeding was held on December 16, 1978. Following that conference, we accepted several of Ms. Sinclair's OL contentions and reaffirmed our previous tentative admittance of Ms. Sinclair as an intervening party. (Ms. Sinclair did not continue to seek admission of the Saginaw group.) We also accepted one of Mr. Marshall's contentions and admitted him as an Intervenor, although we reaffirmed our earlier ruling denying intervention to the Mapleton Intervenors. Special Prehearing Conference Order, dated February 23, 1979 (unpublished). Subsequently, we accepted a late-filed petition to intervene in the nonsoils-related aspects of the OL proceeding by Ms. Barbara Stamiris (a then-Intervenor in the OM proceeding). Prehearing Conference Order, LBP-82-63, 16 NRC 571, 585-93 (1982).

8. In July 1978, during the placement of concrete on some of the upper elevations of the diesel generator building (DGB), which was then approximately half constructed, the construction survey crews could not close a traverse in surveying (Tr. 2375 (Gallagher)). Upon further investigation, the Applicant determined that the half-constructed DGB had settled both differentially and excessively — indeed, to a greater extent than had been anticipated for the 40-year anticipated life of the plant (Gallagher, ff. Tr. 1754, Attachment 2). *See supra* p. 82. This excessive settlement of the DGB comprised the foundation for one of Ms. Sinclair's OL contentions which we admitted in our February 23, 1979 Special Prehearing Conference Order — as well as for the only contention of Mr. Marshall, which we also admitted in that Order. *See supra* Finding 7. This settlement of the DGB also formed the underlying reason giving rise to the NRC Staff's "Order Modifying Construction Permits," dated December 6, 1979 ("Modification Order" or "OM") (Stamiris Exh. 3, Attachment 15).

9. The Modification Order, issued by the NRC Staff through its Offices of Nuclear Reactor Regulation (NRR) and Inspection and Enforcement (I&E), would have suspended all soils-related and remedial work on the Midland facility until the related safety issues were resolved and a construction permit amendment for the soils remedial work was submitted by CPC and approved by the Staff. It provided that the Applicant or any other person whose interest was affected could request a hearing with respect to all or any part of the Order; and that, if a hearing were requested, the Order would become effective "following the hearing." On December 26, 1979, in accordance with Part V of the Order, CPC stayed the effectiveness of the Modification Order by requesting a hearing. A Notice of Hearing for the OM proceeding was published on March 20, 1980. In the Notice, the NRC designated the same Licensing Board to conduct the OM Hearing as was then designated for the OL proceeding. 45 Fed. Reg. 18,214 (March 20, 1980). This Board, like the OL Board, has been reconstituted several times, most recently on March 1, 1982, with the membership for each of the two Boards remaining the same on each occasion. *See* 47 Fed. Reg. 9939 (March 8, 1982).

10. Both the Modification Order and the Notice of Hearing set forth as issues for adjudication in the OM proceeding (1) whether the facts set forth in Part II of the Order are correct, and (2) whether that Order should be sustained. On April 26, 1980, CPC filed its answer to the Notice of Hearing, responding to the factual allegations set forth in the Modification Order and presenting its position with respect to whether the Modification Order should be sustained.

11. On April 30, 1980, the NRC Staff filed a "Motion for Issuance of Amended Notice of Hearing," which reflected that the earlier notice of opportunity for hearing had never been published in the *Federal Register*. In response to that motion, which was supported by CPC, we published an "Amended Notice of Hearing" on May 28, 1980, providing notice of opportunity for interested persons to participate in the OM proceeding. 45 Fed. Reg. 35,949. Numerous petitions for leave to intervene were timely filed. On July 24, 1980, in our Memorandum and Order Ruling upon Standing to Intervene (unpublished), we determined that nine petitioners had satisfied the "interest" and "aspect" requirements of 10 C.F.R. § 2.714(a)(2). We provided for the later filing of OM contentions and deferred ruling on the letter-petition of Wendell H. Marshall, representative of the Mapleton Intervenors.

12. At a special prehearing conference for the OM proceeding on September 10, 1980, we accepted certain contentions submitted, respectively, by Ms. Barbara Stamiris and Ms. Sharon K. Warren and admitted each as an Intervenor in the OM proceeding (Tr. 398). Thereafter, in our Prehearing Conference Order Ruling on Contentions and on Consolidation of Proceedings, dated October 24, 1980 (unpublished), we ruled on other contentions of Ms. Stamiris and Ms. Warren, respectively, accepting most of them (some in modified form). (Some of Ms. Stamiris' contentions were later amended through her Answer to Applicant's Interrogatories, dated April 20, 1981; and two of her contentions were withdrawn by letter dated June 1, 1981.) We rejected Mr. Marshall's only OM contention and hence denied intervention status in the OM proceeding to him as well as to the Mapleton Intervenors. We also denied intervention to the other petitioners. However, inasmuch as two (similar) OL contentions — one sponsored by Ms. Sinclair and the other by Mr. Marshall — overlapped the scope of contentions properly litigable in the OM proceeding, we granted the Applicant's motion to consolidate the OM proceeding with those issues relating to soil conditions and plant fill materials raised in the OL proceeding. By virtue of that consolidation, we permitted the Intervenors in the OM and OL proceedings, respectively, to participate in both proceedings (with OM Intervenors' rights in the OL proceeding limited to soil settlement questions). As noted earlier, Ms. Stamiris was subsequently admitted as an Intervenor in the nonsoils-related aspects of the OL proceeding (*see supra* Finding 7). We later accepted two additional OM contentions of Ms. Stamiris, arising out of the litigation between Dow and CPC (*see supra* Finding 3). LBP-84-20, 19 NRC 1285 (1984). Ms. Warren, the other OM Intervenor, withdrew from the OM proceeding effective February 16, 1981

(see Notice of Withdrawal, dated February 11, 1981), and she never sought intervention status in the OL proceeding.⁴¹

13. Hearings on soils-related OM-OL issues commenced on July 7, 1981, and have been held during the weeks of July 7 and 13, August 4 and 10, October 13, and December 1 and 14, 1981; February 2 and 16, August 12, November 15 and 22, and December 6, 1982; and February 14, April 27, May 2, June 1, 6 and 27, July 28, August 1, September 20, October 31, November 7 and December 3, 1983. (In addition, hearings on nonsoils-related OL issues were held during the weeks of March 8 and 28, 1983.) All hearing sessions were held in Midland, Michigan, except the hearing on December 3, 1983, which was held in Bethesda, Maryland. Limited appearance statements from members of the public were accepted at several hearing sessions.

14. Following the hearings in October 1981, we had proposed to issue a Partial Initial Decision on soils-related quality assurance (QA)/management attitude issues, prior to the close of the record on technical questions bearing upon the remedial corrective actions associated with the OM issues. Memorandum (Concerning Telephone Conference Call of September 25, 1981 and Applicant's Motion for Partial Decision), dated October 2, 1981 (unpublished). Parties submitted proposed findings of fact and conclusions of law on such QA/management attitude issues.⁴² Subsequently, we reopened the record on related QA/management attitude issues; and, after the record was closed on February 19, 1982, parties submitted supplemental proposed findings and conclusions.⁴³ Thereafter, during the course of our preparation of a decision on those issues, we determined it to be necessary to issue an Order imposing interim conditions on further soils-related construction activities, pending completion of our Partial Initial Decision. We issued that Order on April 30, 1982. Memorandum and Order (Imposing Certain Interim Conditions Pending Issuance of Partial Initial Decision), LBP-82-35, 15 NRC 1060.

15. LBP-82-35, *supra*, required the Applicant, *inter alia*, to obtain explicit prior approval from the NRC Staff (to the extent such approval

⁴¹ In approving Ms. Warren's withdrawal, we asked the parties, in treating various OM issues, to include the substance of Ms. Warren's contentions (which was necessarily encompassed within the broader OM issues) (Tr. 906-07). Ms. Warren presented an oral limited appearance statement on July 7, 1981 (Tr. 1026).

⁴² CPC Proposed Findings of Fact and Conclusions of Law (FOF), dated October 28, 1981; Wendell H. Marshall FOF, dated November 21, 1981; Stamiris Proposed FOF, dated December 11, 1981 (Tr. 5986); NRC Staff FOF, dated December 30, 1981; CPC Responses to Stamiris FOF and Staff FOF, each dated April 26, 1982.

⁴³ CPC Supplemental Proposed FOF, dated March 15, 1982; Intervenor's [Stamiris] Proposed Supplemental FOF, dated March 29, 1982; Staff Proposed Supplemental FOF, dated March 26, 1982; CPC Responses to Stamiris FOF and Staff FOF, each dated April 26, 1982.

had not already been obtained) before proceeding with further soils-related construction activities (as defined therein). Because LBP-82-35 halted further soils-related construction activities in the absence of NRC Staff approval, the effect of issuing LBP-82-35 was generally to sustain, pending issuance of our Partial Initial Decision on QA/management attitude issues, the requirements of the Modification Order except the requirement for submission and approval of amendments to the applications for construction permits, a procedural step which in our opinion was not necessary to attain the safety goals which we believed should be achieved.⁴⁴

16. The conditions imposed on the Applicant by LBP-82-35 were motivated by QA (including quality control (QC)) considerations. They were intended to remain in effect for what we perceived as a relatively short period prior to the issuance of a Partial Initial Decision on QA/management attitude issues, which would have further reviewed the continuing necessity for such conditions or possibly others. Shortly after the issuance of LBP-82-35, however, events occurred which caused us ultimately to reopen the record on QA matters, at the Staff's request. The reopening is reflected by our Memorandum and Order dated July 7, 1982 (unpublished), in which we announced that we would defer the Partial Initial Decision until we had heard additional testimony on specified issues. The record was not thereafter closed until December 3, 1983 (Tr. 22,691) and proposed findings were subsequently submitted.⁴⁵ We are not resolving the QA/management attitude issues in this Decision; and, to the extent that further soils-related construction activities were to be undertaken, the interim conditions which we imposed through LBP-82-35 remain in effect.

17. Subsequent to LBP-82-35, *supra*, we concluded hearings on various technical issues associated with remedial soils activities, and proposed findings were submitted by the Applicant, Ms. Stamiris, and the NRC Staff.⁴⁶ Reflecting the probable lack of continuing materiality of the QA/management attitude issues in light of the shutdown of construction on the facility, but similarly reflecting the potential relevance of various programmatic technical findings should facility construction

⁴⁴ Although LBP-82-35 set forth that it was an appealable order, neither the Applicant nor Staff filed any appeal. Ms. Stamiris filed what purported to be an appeal, but the Appeal Board construed the filing as a complaint against the NRC Staff's compliance with and implementation of our order, rather than the order itself. The Appeal Board dismissed Ms. Stamiris' appeal without prejudice to her right to present the same arguments to us, in the first instance. ALAB-684, 16 NRC 162 (1982).

⁴⁵ CPC Proposed Second Supplemental FOF on QA Issues, dated January 27, 1984; Stamiris' Second Supplemental FOF on QA and Management Attitude Issues, dated May 11, 1984; NRC Staff Further Supplemental FOF Concerning QA, dated May 25, 1984; CPC's Replies to Ms. Stamiris' and the Staff's FOF, each dated June 22, 1984.

⁴⁶ See *supra* note 3.

again be resumed, we have determined to issue this Partial Initial Decision on a number of the technical issues associated with remedial soils activities and encompassed by the foregoing proposed findings. For reasons described in the Opinion section of this Partial Initial Decision (*supra* p. 38), however, we are not at this time ruling on technical questions associated with the DGB and with differential settlement of the control tower relative to the main structure of the auxiliary building. Nor, for reasons set forth *supra* p. 38, are we ruling on certain questions bearing upon (1) the adequacy of soil spring constants, and (2) liquefaction and soils stability relative to the diesel fuel oil tanks. We are here covering various seismic matters (including general seismic standards applicable to the Midland site, standards for the proposed seismic margin review (other than certain aspects of soil spring constants), soil liquefaction (except with respect to the diesel fuel oil tanks), and the effect of dewatering), the structural adequacy of the auxiliary building (except with respect to the differential settlement matters mentioned above), and various issues related to the service water pump structure (SWPS), borated water storage tanks (BWSTs), the diesel fuel oil tanks (except as indicated above), underground piping, electrical duct banks and conduits, and the baffle and perimeter dikes adjacent to the cooling pond.

18. Some of the remedial soils activities discussed in this Decision were commenced prior to the close of the record in these proceedings. With limited exceptions (*see, e.g.*, Tr. 7788a and Tr. 7790), they were subject to the controls imposed by our April 30, 1982 Order (LBP-82-35) or, for certain earlier activities, the voluntary but somewhat narrower commitment of the Applicant in February 1980 not to proceed with further soils remedial actions without NRC Staff review and concurrence. One such earlier approved activity was the underpinning of the auxiliary building and feedwater isolation valve pits. The NRC Staff concurred with the construction of access shafts and a freezeway in preparation for this underpinning on November 24, 1981 (Staff Exh. 5); for activation of the freezeway on February 18, 1982 (Tr. 7838); and by letter dated December 9, 1982, from NRC Region III to CPC, the Staff authorized the commencement on a step-by-step basis of the actual underpinning under the turbine building (Tr. 11,007). Other soils activities were also authorized. During these hearings, we heard testimony from various witnesses on the progress of this work and on various events which have occurred during the course of construction, including actual or potential items of noncompliance. With the shutdown of construction of the facility, we do not at this time plan a thorough evaluation of the Applicant's construction performance, but here we will occasionally rely on

certain data generated by such construction activities, as reflected by the record before us. In this Decision, we are not taking into account the fact that construction of particular structures has commenced (or even been completed) in evaluating the technical adequacy of the Applicant's soils remedial measures.

II. SEISMIC MATTERS

A. Introduction

19. The construction permits for the Midland plant were issued in 1972 (*see supra* Finding 4), after publication of the proposed Appendix A to 10 C.F.R. Part 100, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," but before its issuance and promulgation as a final rule, effective December 13, 1973. 36 Fed. Reg. 22,601 (Nov. 25, 1971); 38 Fed. Reg. 31,279 (Nov. 13, 1973); 10 C.F.R. Part 100, Appendix A. The Commission (AEC) set forth its expectation that, prior to their effective date, the proposed rules be used as guidance. 36 Fed. Reg. 22,601.

20. Appendix A, Part 100,

describes the nature of investigations [currently] required to obtain the geologic and seismic data necessary to determine site suitability and to provide reasonable assurance that a nuclear power plant can be constructed and operated at a proposed site without undue risk to the health and safety of the public. It describes procedures for determining the quantitative vibratory ground motion design basis at a site due to earthquakes

10 C.F.R. § 100.10(c)(1).

21. The Design Basis Earthquake (DBE) approved for the Midland site at the CP stage was based on a Modified Mercalli Intensity (MMI) of VI, the size of the largest earthquake within about 150 miles of the plant site. Staff Safety Evaluation ("SER"), CP stage, dated November 12, 1970, at 13, 114, 116. The DBE was not associated with any tectonic province, since the Staff's CP review, which formed the basis for the CP authorization, predated both the issuance of the proposed rule and the effective date of the final 10 C.F.R. Part 100, Appendix A, which required a tectonic province determination. (Insofar as the formulation of a tectonic province was involved, the proposed Appendix A does not appear to have been used as guidance in any portion of the CP review or proceedings. *See supra* note 6.) The ground motions associated with the DBE were represented by a modified Housner design response spectrum anchored at 0.12g (where g = acceleration due to gravity at the earth's

surface). The Housner spectrum was modified by increasing its levels of response motions by an additional 50% in the frequency range between about 1.6 Hz and 5 Hz (or 0.6- and 0.2-seconds-period range). CP "SER" at 13; Thiruvengadam Affidavit⁴⁷ at 2; Kimball, ff. Tr. 4539, at 2; Tr. 6041, 6087 (Kennedy).

22. Following issuance of 10 C.F.R. Part 100, Appendix A, and during the OL review, the Staff had two concerns about the DBE accepted during the CP review. First, the Staff had come to accept the "Central Stable Region" as a tectonic province which would include the Midland site, and which has a controlling earthquake similar to the Anna, Ohio earthquake of March 9, 1937 of intensity MMI = VII-VIII (and a magnitude of $m_{blg} = 5.3$). Second, the Staff was concerned about the use of a modified Housner response spectrum anchored at 0.12g to represent the maximum vibratory ground motion for design purposes. The Staff, in fact, determined that the design response spectrum as used was no longer a conservative representation of the ground motion. SER, § 2.5.2.1, at p. 2-34; Kimball, ff. Tr. 4690, at 2, 4-5.

23. From investigations assertedly performed pursuant to 10 C.F.R. Part 100, Appendix A, the Applicant in 1977 proposed an SSE (as well as an operating basis earthquake (OBE)) based upon designation of the Michigan Basin as a tectonic province separated out of the larger Central Stable Region. Thiruvengadam Affidavit at 3; *see also* FSAR, § 2.5.2.3 (not part of the evidentiary record of this proceeding). (The OBE has not been at issue in these proceedings, and we make no findings concerning its adequacy.) For an SSE, the Applicant proposed an intensity of MMI = VI, representing the intensity of the controlling earthquake in the Michigan Basin, derived from the largest historically recorded earthquake therein. The Applicant further proposed that the SSE ground motions be represented by modified Housner response spectra anchored at 0.12g. These characteristics of the SSE proposed in the current version of the FSAR are identical to those of the DBE determined at the CP stage, and are at issue in these proceedings. Thus the term "FSAR spectra" (or spectrum) as used to this point in time, should be read as equivalent to the DBE spectra. Holt Exh. 10,⁴⁸ at 2; CP "SER" at 12-13, 116, 124.

24. If the OL application were to be pursued, the FSAR would need to be revised to reflect the SSE and its ground motion characteristics, as determined by the outcome of these proceedings, for purposes of

⁴⁷ Affidavit of Thiru Thiruvengadam, dated March 6, 1981, submitted with Applicant's Motion to Defer Consideration of Seismic Issues Until the Operating Licensing Proceeding, dated March 18, 1981 (*see supra* p. 43); hereafter "Thiruvengadam Affidavit."

⁴⁸ *See supra* note 8.

design of the remedial structures and reevaluation of the seismic resistance of existing structures. As set forth *infra* Findings 27, 31 and 79, the Applicant was using (or was to use) a site-specific response spectra (SSRS) approach for these purposes, and we have found use of that approach to be reasonable and conservative. Thus, the DBE spectra served as the seismic design basis for the original safety-related structures, systems and components, but an SSE with SSRS ground motion characteristics would be considered as the seismic design basis in the final design analyses.

25. The Staff did not accept the proposed delineation of the Michigan Basin as a tectonic province and continued to be concerned about the adequacy of the DBE ground motion representations accepted at the CP stage. Tr. 867-68 (Hood); Holt Exh. 3; Thiruvengadam Affidavit at 3; SER, § 2.5.2.1, at p. 2-34, § 2.5.2.3, at p. 2-37.

26. While the December 9, 1979 Modification Order did not specifically address seismic issues, one of its major concerns was “the unresolved safety issue concerning the adequacy of the remedial action to correct the deficiencies in the soil construction under and around safety-related structures and systems . . .” (Modification Order at 4). Seismic design bases for the underpinning work clearly would have been included under the required acceptance criteria necessary for the Staff to evaluate the technical adequacy and proper implementation of the proposed remedial actions (*id.* at 3).

27. The Staff’s recommendations of two acceptable methods to be used in resolving the OL concerns about the SSE and seismic design bases for the remedial actions (Findings 22, 25, 26, *supra*) were transmitted to the Applicant in a letter (Tedesco to Cook, October 14, 1980, Holt Exh. 3 (“Tedesco letter”). Both alternatives were based on an SSE for the Midland site similar to the Anna, Ohio earthquake of March 9, 1937, which is the largest historically reported earthquake in the Central Stable Region tectonic province. The first approach would have prescribed use of the *standardized response spectra* of Regulatory Guide 1.60⁴⁹ anchored at 0.19g, consistent with an intensity MMI = VII-VIII earthquake. The other acceptable approach, which had been discussed with the Applicant as early as July 1979 (Thiruvengadam Affidavit at 3),

⁴⁹ Both the Staff and Applicant often refer to the Regulatory Guide 1.60 spectra as “site-independent,” as if implying that the only distinction between them and site-specific response spectra is found in site conditions. They are more appropriately described as *standardized* response spectra, and are also magnitude-independent, epicentral-distance-independent, and source-characteristic-independent. Their construction also involved normalization of all constituent earthquake records within the ensemble used to a standard value (1.0g). Staff Brief at 10-11; Holt, ff. Tr. 4539, at 5-6; Tr. 4585-86 (Holt); Kimball, ff. Tr. 4690, at 8-9. It is the Board’s understanding that the Housner spectrum is another, but generally lower, standardized response spectrum. See Figure 2, *supra* p. 66.

would have been to develop *site-specific spectra* by enveloping the 84th percentile spectral level of an ensemble of response spectra which were derived from actual, site-and-magnitude-matched accelerograms recorded at epicentral distances of 25 km or less. Site matching would be achieved through close similarity of materials properties beneath accelerometer station sites to materials properties beneath the Midland site. Magnitude matching was specified as equivalent to m_{blg} (central U.S.) = 5.3 ± 0.5 . Both approaches are discussed in the Standard Review Plan, §§ 2.5.2 and 3.7.1. Kimball, ff. Tr. 4690, at 5-6, *as corrected* at Tr. 4686; Holt Exh. 3.

28. A category of application of the "new" SSE would have been to the reevaluation of the seismic resistance of already-built structures, which are founded on plant fill and which were to be supported by the remedial work. This category needs to be distinguished because the construction of new foundations (underpinning) beneath fill-supported structures may alter seismic response of those structures to vibratory input motions. (The category results from a combination of the two other applications, i.e., reevaluation of already-built structures, components and systems using current seismic standards, and design of remedial structures or parts of structures, also to current seismic standards.) Thiruvengadam Affidavit at 7; Tr. 846, 857-59 (Statement of M. Miller, Applicant's counsel).

29. The main safety-related structures at the Midland facility are:

(a) containment buildings (founded on natural soils);

(b) auxiliary building:

main structure (located between containment buildings, founded on natural soils); railroad bay (located at north end, founded on plant fill); control tower (located at south end, founded on plant fill); electrical penetration areas (EPAs) (extend east and west from control tower, founded on plant fill);

(c) feedwater isolation valve pits (FIVPs) (structurally isolated, located adjacent to EPAs and containment buildings, founded on plant fill);

(d) service water pump structure (SWPS) (southern part founded on natural soils, northern overhang founded on soil fill);

(e) diesel generator building (DGB) (founded on plant fill);

(f) diesel fuel oil tanks (founded on plant fill);

(g) borated water storage tanks (BWSTs) (founded on plant fill).

Foundation underpinning structures were required to be constructed beneath the control tower and EPAs of the auxiliary building and the overhanging portion of the SWPS; and plant fill beneath the FIVPs was

to have been replaced with concrete and compacted granular fill. New ring foundations, structurally attached to the old and to the integral valve pits, were required to be constructed for the BWSTs and tank 1 was to be relevelled. Surcharging with sand fill was employed by the Applicant to compact plant fill beneath the DGB, as well as beneath the valve-pit projections of the BWSTs which caused foundation damage from differential settlement during a preload test. Permanent dewatering of the plant fill was required beneath the railroad bay and the DGB, as well as in the area of a portion of the service water piping, to reduce the potential for liquefaction of the granular foundation soils under SSE loading conditions. SSER # 2, § 2.5.4.1.2, Tables 2.2 and 2.3, § 2.5.4.4.3, at p. 2-34, § 2.5.4.5.5, at 2-43, 2-44.

30. For the reasons set forth in the Opinion section of this Decision (*supra* p. 43), we are here making findings with respect to seismic criteria, including determination of the SSE, ground motions and associated response spectra, and the analysis model for each structure as modified by the remedial actions. We are not making findings at this time on whether the safety-related structures as built (including those with and those without modifications necessitated by the soils remedial actions) conform to the newly determined seismic criteria.

31. The Applicant used the SSRS approach offered in the Tedesco letter as an alternative for characterizing the SSE ground motions but without conceding that the seismic design basis of the Midland plant approved at the construction permit stage is inappropriate or that the Michigan Basin is not a separate tectonic province. Thiruvengadam Affidavit at 4.

32. Departures from the SSRS approach offered in the Tedesco letter that were used, or proposed by the Applicant, in addition to what tectonic province should be used, are the subject of later findings, below. These include such issues as the range of earthquake magnitudes to be employed and the appropriate statistical spectral level to represent the SSRS-derived maximum ground motions, as well as the magnitude of the controlling earthquake in the Central Stable Region tectonic province.

33. Because of the lack of agreement at the time between the Applicant and Staff on a seismic design criterion, the Applicant incorporated a "reasonable margin" over the FSAR SSE (DBE) seismic criteria for design of the remedial "fixes" (Thiruvengadam Affidavit at 6-7). This "margin" was established as 1.5 times the "FSAR design spectra," which was found generally to envelop the SSRS being proposed and committed to by the Applicant for reevaluation of existing structures as

part of the seismic margin review, as well as for design of the remedial "fixes." Tr. 5997-98 (Kennedy).

34. Because the SSRS approach proposed in the Tedesco letter appeared to be a probabilistic methodology (at least in part), the Board directed the Applicant and Staff (and permitted other parties) to file trial briefs discussing the compatibility of the approach with 10 C.F.R. Part 100, Appendix A, should the Applicant elect to use this approach. The Applicant and Staff responded. For reasons expressed in the Opinion section of this Decision (*supra* pp. 46-50), we find that the methodology used by the Applicant and the NRC Staff in developing the SSRS for the Midland site is compatible with 10 C.F.R. Part 100, Appendix A.

35. General elements of investigation for determining the SSE and its representative ground motions, in situations where no capable faults (or similar tectonic structures with which historical earthquake activity can be reasonably correlated) exist within the vicinity of the site, are (1) determination of the tectonic province in which the site is located, (2) determination of the size and ground motions of the controlling earthquake within that tectonic province, (3) determination of the size and ground motions, at the plant site, of earthquakes associated with distant tectonic structures and those associated with adjacent tectonic provinces, and (4) definition of the response spectra corresponding to the maximum vibratory ground accelerations at the various foundation levels of safety-related structures on the plant site. 10 C.F.R. Part 100, Appendix A.

36. The Applicant determined, and the Staff agreed, that, on the basis of extensive investigations by the Applicant, no capable faults, or similar tectonic structures with which earthquake activity can be reasonably correlated, exist in the vicinity of the site that would generate earthquakes whose motions would control seismic design of the Midland plant. Holt, ff. Tr. 4539, at 7; Tr. 4571-72, 4611-14, 4660-61 (Holt); Tr. 4729 (Kimball); SER, § 2.5.3, at 2-41 to 2-44.

B. Tectonic Province and Controlling Earthquake (SSE)

37. The Applicant maintained that the Michigan Basin met the requirements in Appendix A to Part 100 for definition as a tectonic province. It is a very large tectonic structure or "unit" itself (Holt, ff. Tr. 4539, at 11⁵⁰; Tr. 4614 (Holt); *also see* Kimball, ff. Tr. 4690, at 3), dis-

⁵⁰ Mr. Holt in his prepared testimony (ff. Tr. 4539, at 11) incorrectly described the Michigan Basin as being "nearly 200 miles in diameter." It is readily apparent on Holt Exhibit 9 and in his oral testimony (Tr. 4575-76, 4578) that he meant "nearly 200 miles in radius" or "nearly 400 miles in diameter." See *also supra* Figure 1.

tinguishable from the tectonic arches around its southern perimeter on the bases of structural relief, parallel and cross structures on the arches and seismicity differences (Holt Exh. 10; Holt, ff. Tr. 4539, at 11-12; Tr. 4562, 4577 (Holt)). It has a relative consistency of tectonic features within it, namely the northwest-southeast trending anticlines, monoclines, and possible related faults, known mainly in the deep subsurface from petroleum exploration in the State. The controlling earthquake, derived from two historical events in the southern part of the basin, would have an intensity MMI = VI or magnitude $m_{blg} = 4.5$. Tr. 4598, 4601 (Holt); *see also* FSAR, § 2.5.2.3 (not introduced into evidence).

38. As a result of its evaluation of relative seismic hazard analyses performed by the Applicant, the Staff withdrew from that part of its position expressed in the Tedesco letter that the Central Stable Region, with a controlling earthquake of intensity MMI = VII-VIII (or magnitude $m_{blg} = 5.3$), was the appropriate tectonic province for evaluating the seismic hazards of the Midland site. This change in position apparently came late in the preparation of the Staff's testimony. The Staff, however, still did not agree that the Michigan Basin, as proposed by the Applicant, was the appropriate tectonic province, but would extend it westward to include Michigan's Upper Peninsula, the northern part of Wisconsin, most of Minnesota, and maybe parts of North Dakota and southern Canada. The Staff's proposed tectonic province would include, as well, all of the Michigan Basin province proposed by the Applicant except for a small corner in southeastern Michigan. (This possible exclusion apparently was based on the north trending zone of small earthquakes and cross structures on the flank of the Findlay Arch that can be seen on Staff Exhibit 5 to extend toward the Michigan Basin from the vicinity of the Anna, Ohio earthquake zone. Tr. 4837 (Kimball) *referring back to* Tr. 4577-80 (Holt)). The effect of extending the tectonic province boundary to Minnesota would be to include a magnitude 5.0 earthquake which occurred there in 1860, and which would represent the controlling earthquake for the province.⁵¹ The corresponding intensity of the controlling earthquake would be MMI = VI-VII, or VII, based on that event. Although the intensity of one or more earthquakes in the Keweenaw Peninsula of northern Michigan may have exceeded MMI = VII, the Staff's expert, Mr. Jeffrey K. Kimball, explained that the events there had anomalously high intensities because of their shallow depths of occurrence. Kimball, ff. Tr. 4690, at 2-5, 11, 20-23; Tr. 4697-98, 4713-14, 4769-83, 4787, 4794, 4837 (Kimball); Tr. 4602 (Holt).

⁵¹ The Staff also cited the occurrence of a magnitude 4.8 earthquake that occurred in Minnesota in 1975 (Kimball, ff. Tr. 4690, at 21).

39. The Applicant's witness, Mr. Richard J. Holt, was not aware of the change in the Staff's position when he prepared his written testimony prior to the hearings on October 13, 1981, judging from the content of that testimony and oral testimony at the hearing. During cross-examination by Staff counsel, Mr. Holt testified that, after reading the prepared testimony of the NRC witness, Mr. Kimball, he agreed with the use of seismicity as a tool (that the Staff had used in extending the province boundary westward) and he agreed that there have been no historic earthquakes of a magnitude greater than 5.0 in the area of the westward extension proposed by the Staff. While not specifically abandoning his proposed (Michigan Basin) tectonic province for the Midland site, Mr. Holt agreed that the choice of a magnitude 5.0, while "quite conservative," would be appropriate in this case and would correspond to the largest historical earthquake which should be associated with the seismotectonic province in which the Midland site resides. Holt, ff. Tr. 4539, at 11, 19-20; Tr. 4540-41, 4567-70, 4596-97, 4602-03 (Holt).

40. Two maps introduced by the Applicant showed somewhat different boundaries for the proposed Michigan Basin tectonic province, but the amount of disparity between the two representations appears to fall within the degree of acceptable uncertainty or "fuzziness" ascribed to those boundaries. Holt Exh. 9 and Exh. 10, Figure 5; Tr. 4561-65, 4576-80, 4597 (Holt); Tr. 4770, 4779, 4783-84 (Kimball). The larger representation on Holt Exhibit 9 apparently was the one intended by the Applicant to be used. Tr. 4781 (representation by Mr. P.A. Steptoe, Applicant's counsel). The Staff did not introduce map representations of the boundaries of its proposed tectonic province, or give it a name other than "the upper Midwestern U.S." (Tr. 4745, 4783, 4786, 4794 (Kimball)).

41. By reducing the Applicant's two cited map portrayals to a common scale and overlaying them, the Board has provided a single map here for convenience to show the proposed tectonic province boundaries, major tectonic structures, seismic source zones, and Central Stable Region sites used in the relative seismic hazard studies. Figure 1, *supra* p. 56. To this map the Board has added the delineation of what we understand from the verbal descriptions to be the boundaries of the Staff's proposed westward extension of the tectonic province and the area in southeastern Michigan that we would exclude based on the Staff's reservations about its inclusion. For ease in locating the places discussed in the testimony, we have also added a few place names mentioned therein. Tr. 4745-46, 4783, 4837 (referring back to Tr. 4577-80 (Holt)) (Kimball).

42. Both the Applicant and Staff argued (the Applicant more strongly) that the Central Stable Region could, or should, be subdivided. Both pointed out that it was based on the "veneer" of sedimentary rocks⁵² deposited over the area about 200-600 million years ago and that it does not represent a region of uniform seismicity, in that the larger earthquakes (magnitude = 5.1-5.3) have occurred in isolated regions which generally show more frequent small earthquakes than other parts of the region. The Applicant's witness believed those larger earthquakes were generally associated with tectonic structures. Holt, ff. Tr. 4539, at 12-13; Tr. 4555-58, 4561-67, 4572, 4601, 4644-47 (Holt); Holt Exh. 10, Figs. 5-6; Kimball, ff. Tr. 4690, at 3-4, Figs. 4-5; Tr. 4717, 4744 (Kimball). The Board notes that these isolated areas of correlative, but not definitely associated structures and magnitude 5.1-5.3 earthquakes arguably could be cited as evidence of the relative consistency of geological structural features needed to characterize a tectonic province, even though they are widely separated.

43. While the Applicant provided geologic and tectonic justifications for its proposed tectonic province to demonstrate its compatibility with the requirements of Appendix A to Part 100 (Findings 37, 39, *supra*), the Staff relied upon its evaluation of the Applicant's probabilistic seismic hazard studies, almost exclusively, to justify its definition of the larger tectonic province. While the Staff's witness indicated that factors other than seismicity should be used in such definitions, e.g., tectonic flux measurements, past strain releases, tectonic structural fabric such as amount of folding or faulting, and consistency of structure and geologic features, he gave no indication that the Staff had, indeed, examined any of those characteristics,⁵³ only that nothing in the geology "flagged" the region as requiring a larger controlling earthquake than the maximum historic event within it. Furthermore, the Staff has not fully determined what the boundaries for its proposed tectonic province would be. Kimball, ff. Tr. 4539, at 4, 16-21; Tr. 4697-98, 4713-14, 4745, 4769-71, 4779-81, 4783, 4786, 4826-30 (Kimball); Staff Brief at 7.

44. For reasons stated earlier (*supra* p. 58), we reject the view that the agreement between the Applicant and Staff on the appropriate SSE and the representation of its ground motions by the SSRS permits us not to define the proper tectonic province in which the Midland site resides. We view the agreement between the Staff's and Applicant's positions as being material to determination of the SSE and acceptance of the SSRS

⁵² See note 57, *infra* p. 133.

⁵³ These characteristics are paraphrased from § 2.5.2 of the Standard Review Plan (NUREG-0800), which is quoted in the Staff Brief (at 7) as providing criteria for acceptance of a proposed new tectonic province.

rather than to definition of the tectonic province, a point on which they disagreed.

45. The Staff based its almost exclusive reliance on historic seismicity for proposing a new tectonic province on a theory with which the Applicant agreed. That theory held that past earthquake occurrence, or historic seismicity, provides one of the most, or the most, accurate means available for inferring geologic mechanisms causing earthquakes at depths in the earth's crust where earthquakes occur. The next step in the Staff's logic was to equate tectonic (or seismotectonic) provinces with seismic source zones. Kimball, ff. Tr. 4690, at 4, 20; Tr. 4697-98, 4713-14, 4745, 4747-50, 4830 (Kimball); Tr. 4559-61, 4567-68 (Holt).

46. The Board finds that reliance upon historic seismicity as a tool to help establish, or to verify a tectonic province and the size of its controlling earthquake, is consistent with both Staff practice and Appendix A to Part 100.⁵⁴ In practice the Staff has relied upon seismicity, at least in part, to subdivide the Central Stable Region farther south into eastern and western parts each with a different level of seismic hazard. Tr. 4807, 4831-32 (Kimball). (We assume that the Staff there considered the other characteristics specified in the Standard Review Plan (Finding 43, including note 53, *supra*) as criteria when making that subdivision.)

47. Reliance upon seismicity to help establish a tectonic province is also consistent with precedent established in the *Seabrook* proceeding. In *Seabrook*, a postulated seismic source zone (the "Boston-Ottawa belt" or trend) was divided into two parts, each with a different level of seismic hazard, but separated by a large tectonic feature (the Green Mountain Anticlinorium) which has been essentially aseismic in historic times, and where "as one moves away from the anticlinorium into either of the two adjacent zones, seismic activity begins to increase." It was not just the aseismic gap, but the correlation of differences in historic seismicity with a tectonic feature that formed the basis for the subdivision. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33, 61 (1977).

48. This Board finds that the Staff's own past practice, Appendix A to Part 100, and the teaching of ALAB-422 do not support the definition, or subdivision, of a tectonic province solely on the basis of historic seismicity, even if that seismicity is viewed as somehow indicative of

⁵⁴ Appendix A, § V(a) of Part 100 requires that: "[t]he design basis for the maximum vibratory ground motion . . . should be determined through evaluation of the seismology, geology, and the seismic and geologic history of the site and the surrounding region." Seismicity studies, whether probabilistic or deterministic in nature, are clearly part of the evaluation of the seismic history of the site and surrounding region.

otherwise poorly known tectonic conditions.⁵⁵ To support that theory, much more information about what the earthquakes reveal about tectonic conditions would be needed, other than just earthquake location, frequency of occurrence, and size. The Board was not convinced by the Staff's arguments and the Applicant's support of those arguments that occurrence of historic earthquakes, alone, can provide enough information on subsurface geologic or tectonic conditions to permit definition of a tectonic province based on that premise.⁵⁶

49. An example of apparently inconsistent tectonic conditions within the Staff's proposed tectonic province is revealed by Staff Exhibit 5. On that map, northeast-trending tectonic structures prominently appear in the area of the Keweenaw Peninsula where the anomalously shallow historic earthquakes occurred, as well as in central Minnesota in the general region where we assume that the Staff's proposed controlling earthquake occurred. The northeast trend of tectonic structures in these two areas is orthogonal to the predominantly northwest trend of tectonic structures in the Michigan Basin that were cited by the Applicant as evidence of consistency of tectonic structure in its proposed province (*see supra* Finding 37). The Staff did not address this apparent tectonic inconsistency within its tectonic province that contains both sets of differently oriented tectonic structures, one set of which occurs in a region (the Keweenaw area) with anomalous historic earthquakes. In light of the definition of a tectonic province set forth in Appendix A to Part 100, we believe the Staff should have done so, especially since an uncited Staff discussion in the SER (§ 2.5.3.2.1, at 2-41, 2-42) of Applicant's studies of geology in the Midland region refers to a much subdued set of northeast-trending structures, orthogonal to the predominant trend, in the region. Kimball, ff. Tr. 4690, at 20-21; Tr. 4782-83, 4787 (Kimball).

50. The Staff's witness, Mr. Kimball (Tr. 4746-47, 4789), said that a problem of subdividing just the Michigan Basin from the Central Stable Region was the same as the problem perceived with retaining the Central Stable Region as a tectonic province — i.e., both would be large-

⁵⁵ The fact that these studies were probabilistic in nature was not material to our determination here. We simply were not convinced that the Staff had not just drawn lines around a cluster of historic earthquakes and called the area a "seismotectonic province" on that basis.

⁵⁶ Although agreeing in principle with the Staff's approach used in defining its proposed tectonic province, Mr. Holt stated elsewhere, "while I do not believe that tectonic provinces should be defined solely on the basis of historical seismicity or a probabilistic analysis of such seismicity, seismicity and analysis of seismicity can be used to test the validity of a defined tectonic province." Holt, ff. Tr. 4539, at 14.

ly based on “surficial Paleozoic geology.”⁵⁷ However, like the Applicant, he was apparently willing to consider the position of the flank of the Findlay Arch, a feature of the “surficial Paleozoic geology,” in the location of his proposed tectonic province boundary (Tr. 4837), and agreed that the Staff has used the Central Stable Region as a tectonic province (Tr. 4786). He also stated that there are some experts who would consider that portion of the Kankakee Arch that has had essentially no historic earthquakes to have a potential for earthquake activity (Tr. 4760). (For location of the Kankakee Arch, see Figure 1, *supra* p. 56.)

51. Mr. Kimball (Tr. 4791) also briefly noted that the historic earthquake activity in another basin, the Illinois Basin, which is also located within the Central Stable Region, was inconsistently higher than the historic activity in the Michigan Basin. We would assign little probative value to this argument against use of the Michigan Basin as a tectonic province because we do not know the causes of the earthquakes in either basin and do not assume that the causative tectonic mechanisms of earthquakes should be the same in all basins. Also, the Board notes that the Illinois Basin (*see* Staff Exh. 5) is adjacent to the very active New Madrid seismic zone where tectonic stresses are obviously high.

52. The Board finds that the Central Stable Region can be subdivided in the region surrounding the Midland plant site and that the Applicant has proposed a tectonic province, the Michigan Basin, that appears reasonably to meet the criteria for its establishment as prescribed by 10 C.F.R. Part 100, Appendix A (Findings 37, 43, *supra*). Because of agreement between the Staff’s and Applicant’s positions on the matter (Findings 38-39, *supra*) and for other reasons found below, the Board also finds that the appropriate magnitude of the controlling earthquake in the Michigan Basin tectonic province is $m_{blg} = 5.0$, rather than either the magnitude of 4.5 originally proposed in the FSAR, or the magnitude of 5.3 assigned to the controlling earthquake in remaining parts of the Central Stable Region.

53. The Board would accept either of the sets of boundaries for the Michigan Basin tectonic province that were provided by the Applicant (Holt Exh. 9 and Exh. 10, Fig. 5; Tr. 4562-62 (Holt)), except that we would exclude the southeastern corner of Michigan about which the Staff expressed reservations. Tr. 4837 (Kimball); *see also* our composite

⁵⁷ The Applicant’s witness used this same argument as to why the Central Stable Region should be divided, going so far as to state that “defining the tectonic province based on the presence of a veneer of sedimentary rock is unreasonable” (Holt, ff. Tr. 4539, at 13). Thus the Board views as inconsistent both the Applicant’s and Staff’s arguments against using the veneer of sedimentary rocks as a basis for defining a tectonic province.

map in the Opinion section, Figure 1, *supra*, for what we understand to be the area that should be excluded.

54. The number of historic earthquakes that have occurred within the Michigan Basin is quite small. The Staff's witness, Mr. Kimball, estimated the number as "around ten" for the State of Michigan and referred to the Applicant's documents as a source of the actual numbers (Tr. 4755). By referring to Holt Exhibit 9, the Board counted twenty-two earthquake epicenters on or within the boundaries of the larger version of the tectonic province shown thereon, five of which would have occurred within the excluded southeastern portion. Thus the larger version of the Applicant's proposed tectonic province, as modified herein, would have experienced seventeen earthquakes in historic times. The smaller version (Fig. 5 of Holt Exh. 10) of the Michigan Basin, also excluding the southeastern corner, would contain only about nine historic earthquakes, by the Board's count.

55. Approximately fourteen more historic earthquakes (depending upon how many are counted in the Keweenaw Peninsula) are shown on Holt Exhibit 9 as having occurred within the region that the Staff would have included in its westward extension of the tectonic province, which extension alone would have about twice the area of either version of the Applicant's proposed tectonic province.

56. While the Board finds that the paucity of historic earthquakes in the Michigan Basin is, indeed, indicative of low seismic hazard, the data are so scant that the uncertainty that the maximum reported event represents a conservative controlling earthquake is large. *See* responses to Board questions on seismological and statistical uncertainties in this region. Tr. 4749-57 (Kimball), *especially* Tr. 4753-54, 4756-57.

57. Although we find that the Staff did not adequately support its proposed westward extension of the Michigan Basin tectonic province, it is clear that the Staff's proposed basis for that extension is essentially a perceived uniformity of seismic hazard across the entire region from Michigan to Minnesota. Tr. 4785-86, 4791-92 (Kimball).

58. Ground motions from two historic earthquakes larger than magnitude 5.0, that occurred outside the Michigan Basin tectonic province, were considered in the determination of maximum vibratory ground motions at the Midland site. These occurred near Timiskaming, in Canada, and near Anna, Ohio. *See supra* Figure 1; also *infra* Finding 62, regarding the location and possible recurrence of the New Madrid earthquake. The magnitude of the Timiskaming event was greater than 6.0. Tr. 4777 (Kimball). The Anna, Ohio earthquake, which is the controlling earthquake in the Central Stable Region, has been assigned a

magnitude of 5.3, although the Applicant claimed that a recent authoritative report indicated that it should be 5.0 instead of 5.3. Mr. Holt, however, was unable to justify adequately the differences between this report and an earlier report by the same author which assigned a magnitude of 5.3 to this same earthquake. Finding 22, *supra*; Kimball, ff. Tr. 4690, at 5; Holt, ff. Tr. 4539, at 7, 13 n.4; Tr. 4573-74, 4633-34 (Holt). On the basis of the evidence of record, the Board finds no reason to support a reduction or modification of the magnitude of the Anna, Ohio earthquake to below 5.3.

59. Questions concerning the Timiskaming earthquake were raised by the Board (Tr. 4765-69, 4770-72, 4776-81) mainly to be reassured that it had not been overlooked because of its occurrence outside the United States. While this event fell within the Applicant's "Western Quebec Seismic Zone," a fact not obvious during the hearing (*but see* the Board's overlay of the Applicant's seismic maps, Figure 1, *supra*), it was not specifically discussed in either the Applicant's⁵⁸ or Staff's prepared testimony. The Staff's expert subsequently testified that, using a magnitude of 6.2 for the Timiskaming earthquake, it would have to occur at least as close as 100 miles from the site to produce ground motion that would exceed the potential for coming close to the accepted (SSRS) spectrum. He further testified that while the boundary of the tectonic province containing the Midland site might extend northeastward to abut the province containing the Timiskaming earthquake, the boundary in that direction would in any case be more than 100 miles from the Midland site. Tr. 4808-09 (Kimball).

60. The Anna earthquake occurred about 205 miles south of the Midland site. The Applicant's witness testified that the closest approach of the boundary of the Michigan Basin tectonic province was about 150 to 170 miles from the site in that direction. However, in making that statement, he had not considered excluding the southeastern corner of Michigan, as was later suggested by the Staff and which exclusion the Board is accepting in this decision. Holt Exh. 10, at 2; Tr. 4571, 4578 (Holt). Even with the exclusion, the nearest approach of the tectonic province boundary, which the Board has drawn conservatively, would be no closer than about 70 miles (*see supra* Figure 1). While Mr. Holt had not actually performed the calculation, he estimated that a 5.3 magnitude Anna-type event would have to come closer than 100 miles from the site, possibly within 50 miles, before its motions would exceed motions

⁵⁸ While Mr. Holt did not testify on this subject, the Board assumes that the Applicant's witness would have associated the Timiskaming earthquake with his "Western Quebec Seismic Zone," had he had the opportunity to do so. The Board also notes that this zone appears to be the same as the Ottawa portion of the "Boston-Ottawa belt" discussed *supra*, in Finding 47.

of a magnitude 5.0 event at the site. Tr. 4575 (Holt). The Staff's actual calculations indicated that an Anna-type event would have to occur much closer, something like 25 miles, to the site, before its motions would exceed those of a magnitude 5.0 earthquake at the site. Tr. 4784 (Kimball).

61. The Board finds that the magnitude $m_{blg} = 5.0$ controlling earthquake for the tectonic province in which the site is located is the appropriate basis for the SSE at the Midland site. It would produce the maximum ground acceleration at the site because no capable faults or tectonic structures with which earthquakes may reasonably be correlated exist within 200 miles of the site, and because its ground accelerations would be greater at the site than those resulting from earthquakes in adjacent or nearby tectonic provinces, assuming those earthquakes occurred at a point on the tectonic province boundary nearest the site. Findings 36, 58-60, *supra*.

C. Construction of the SSRS

62. Representation of the ground motions associated with the SSE was evaluated by the Staff using the SSRS determinations made by the Applicant, but without including spectra from the Parkfield event, the only earthquake in the Applicant's SSRS ensemble with a magnitude greater than $m_{blg} = 5.5$. Thus for a magnitude 5.0 SSE, the "without Parkfield" site-specific spectra conservatively met the Staff's magnitude criterion specified in the Tedesco letter of ± 0.5 magnitude units. The low-frequency end of the SSRS was modified so as not to fall below the DBE spectrum and to account for the possible effects at the site of distant, very large earthquakes, such as a recurrence of the New Madrid earthquake. The Applicant's witness agreed that the Staff's use of the SSRS without the Parkfield records was an accurate, and conservative, representation for a magnitude 5.0 event at the Midland site. Kimball, ff. Tr. 4690, at 22-23; Tr. 4700 (Kimball); Holt, ff. Tr. 4539, at 8-9, 22-23; Holt Exh. 5, Table 2; Tr. 4541-42, 4570-71, 4586-88 (Holt).

63. Different representations of the SSE ground motions were derived for those safety-related structures founded on natural soils (glacial till and lacustrine clays) and for those founded on soil fill material, to comply with the requirement of Appendix A to Part 100 that SSE response spectra be determined at the elevations of the foundations of plant structures. Holt, ff. Tr. 4539, at 9-10; Kimball, ff. Tr. 4690, at 23-25; *see infra* Findings 66, 72-74.

64. During the hearings there was very little real controversy about the acceptability of the Applicant's SSRS and their applicability to the

Midland site. However, Mr. Holt's prepared testimony, especially that objecting to use of the magnitude 5.3 Anna-type earthquake and consequent inclusion of spectra from the Parkfield event (Holt, ff. Tr. 4539, at 7, 15-20; Holt Exhs. 7, 10, at 4-5, 9-10) must be read in light of Staff's subsequent conclusion, and this Board's concurrence, that a smaller SSE would be appropriate. Similarly, those parts of Mr. Kimball's prepared testimony on the Staff position that Parkfield spectra should be included (ff. Tr. 4690, at 12-16) should be read as if dependent upon a finding that the Central Stable Region with a magnitude 5.3 controlling earthquake would be the appropriate tectonic province for seismic design considerations at Midland. The Staff position that Parkfield records would be appropriate for inclusion in the SSRS ensemble for an Anna-type SSE (magnitude 5.3) was unchanged. Both witnesses agreed, eventually, that Parkfield spectra should not be used in construction of the SSRS for Midland because the magnitude of that event (between 5.6 and 5.9) was outside the magnitude range of $5.0 \pm 0.5 m_{blg}$. Tr. 4594-95 (Holt); Tr. 4723-24, 4727, 4735-36, 4814-17 (Kimball).

65. Aspects of the testimony concerning inclusion or exclusion of Parkfield data were material, however, to two issues on general criteria for construction of SSRS, i.e., selection of the appropriate statistical (percentile) spectral level within the ensemble of response spectra⁵⁹ for representing the SSE, and the inclusion of response spectra from accelerograms recorded at short distances from an earthquake (the so-called "at the site" requirement of § V(a)(1)(ii) of Appendix A to Part 100, applicable where the SSE is identified with the tectonic province in which the site is located).

66. Construction of the site-specific response spectra at the top of the natural soils ("original ground surface") for the Midland site involved calculation and statistical combination of individual spectra from records of forty-four horizontal components⁶⁰ of twenty-two acceler-

⁵⁹ Appendix A to Part 100 (at § III(1)) defines a response spectrum as "a plot of the maximum responses (acceleration, velocity or displacement) of a family of idealized single-degree-of-freedom damped oscillators against natural frequencies (or periods) of the oscillators to a specified vibratory motion input at their supports." Essentially it shows how structures (the oscillators) with a given level of inherent damping but different natural (resonant) frequencies, would amplify the input motions of a postulated earthquake. Damping values and natural frequencies of structures depend upon their physical properties and dimensions, and their determination is another part of the seismic design process. For purposes of comparison, the response spectra generally have been displayed in this proceeding as calculated for 5% of critical damping, but response spectra for other damping values have been constructed and will be applied as appropriate to the individual structures. See Holt, ff. Tr. 4539, at 4; App. FOF, ¶ 2, n.5, quoting *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-644, 13 NRC 903, 924 n.40 (1981); Holt Exh. 5, at 13.

⁶⁰ A strong-motion instrument station usually measures motions along three orthogonal axes, two horizontal and one vertical. Tr. 4582 (Holt). The horizontal components are those of greatest concern in seismic analysis and design practice.

ogram sets taken during ten earthquakes that occurred within 25 km (about 15.5 miles) of the individual recording stations. Five of the earthquakes occurred in California and five in Italy. The records were selected to include all those available worldwide from stations that have recorded earthquakes within the 25-km distance, and in the magnitude range equivalent to Central United States $m_{blg} = 5.3 \pm 0.5$,⁶¹ and founded on stiff soils having approximately the same shear-wave-velocity profiles and horizontal layering as those occurring beneath the Midland site. When the Parkfield event is excluded, the magnitude range of earthquakes actually used is 4.9-5.5. Holt Exh. 5, at 6-10, and Table 2; Tr. 4583-85 (Holt).

67. Mr. Holt in several places attacked the Staff's requirement, as expressed in the Tedesco letter, for using the 84th percentile level in statistically combining the individual spectra to arrive at the SSRS. He addressed this requirement as arbitrary and as not being required statistically. While he also asserted that justifications exist for spectral combination at some lower level, i.e., the mean, the 72nd or the 76th percentile, he presented no evidence or reasoning sufficient, in the Board's view, to support those assertions. Holt, ff. Tr. 4539, at 17-18, 20; Holt Exh. 3; Holt Exh. 10, at 9-10.

68. One of the Staff's principal reasons for requiring this particular spectral level (84th percentile) was that it was the level used in construction of the generalized response spectra found in Regulatory Guide 1.60 and, therefore, was appropriately conservative. Additionally the Staff pointed to the necessity of including records that account for uncertainty in the source properties of the design earthquake other than its magnitude, e.g., stress drop, fault rupture length, fault displacement, and rupture velocity. Kimball, ff. Tr. 4690, at 10-11, 15-16; Tr. 4735-36 (Kimball). Records containing the possible effects of such variables can appropriately influence the combined spectra when enveloped at the 84th percentile level. The effect of including a few such spectra, among a total of thirty or more, would be inappropriately minimized when combination is at the mean or median level. The Board finds that a purpose of utilizing many records, assuming they meet the site-and-magnitude matching and distance requirements, is to *include* the effects of these unknown parameters, not to average them out of the design spectrum.

⁶¹ The m_{blg} magnitude was devised by Dr. Otto Nuttli for use in the central United States. In the magnitude range around 5.0 to 5.5 it is approximately equivalent to the Richter magnitude, M_L , developed for California and also applicable in Europe. Thus M_L values in California and Italy can be used as equivalent to m_{blg} values in the central United States. See Tr. 4691-95, 4711-13, 4718-23 (Kimball) for clear and concise discussions of various earthquake magnitude relationships.

69. A distinction of considerable importance in constructing site-specific response spectra was drawn by the Staff's witness between "nearfield response spectra" and response spectra that include some nearfield records and are used to characterize the SSE where the SSE is identified with the tectonic province in which the site is located. "Nearfield response spectra" (which are also site-specific) represent ground motions at a given distance from a known nearby earthquake source such as a capable fault or zone of reservoir-induced seismicity. On the other hand, where neither tectonic structures with associated earthquake activity nor reservoir-induced earthquake activity are known to occur near the site, as at Midland, some nearfield records, if meeting the other matching criteria, would be included in the SSRS ensemble of records. The number of nearfield records to be included would be a specific consideration on a case-by-case basis. Indeed, nearfield records were included in the Applicant's construction of the SSRS for the Midland site, even without the Parkfield earthquake records, and the Staff's witness made the unrefuted statement that the Applicant's consultant had previously used Parkfield records in developing site-specific spectra for other central U.S. sites. Tr. 4727-34, 4799-4806, 4813-17 (Kimball); Tr. 4629-30, 4658 (lines 10-23), 4674-75, 4682-83 (Holt); *also see* col. 9 on Table 2 of Holt Exh. 5 for distances less than 10 to 15 km.

70. Use of earthquake records from California and Italy to construct the SSRS for the Midland site was justified on the basis that, out to about 25 km from an earthquake source, the attenuation in all three areas could be assumed to be roughly the same. Thus, if the other parameters (magnitude and site conditions) are matched to those of the plant site, source-to-site attenuation conditions do not significantly affect the records out to a distance of about 25 km. Tr. 4580-83 (Holt); Tr. 4691-95, 4803, 4805 (Kimball).

71. The SSE response spectra, or SSRS, as accepted here for the Midland site are higher than the modified Housner original design spectra except that they have been constrained not to fall below, and to be congruent with, the original spectra in the frequency range below 1 Hz. In the high-frequency range between 5 Hz and 25 Hz (where the original Housner spectra, "anchored" at 0.12g, had not been raised, or modified, at the CP stage), the SSE response spectrum (for 5% damping) exceeds the original design spectrum by 18% to 104%; that is, the SSRS is about double the original design spectrum from 5 Hz out to about 15 Hz.⁶²

⁶² In footnote 157 to its Proposed FOF, ¶ 77, the Applicant incorrectly reversed the meaning of its witness' statement on the relationship between the two spectra. While the question and answer may have

(Continued)

The SSRS, or SSE response spectrum, is roughly equivalent to a Regulatory Guide 1.60 standardized response spectrum anchored at 0.12g to 0.13g. Kimball, ff. Tr. 4690, at 10-11, 22-23, Fig. 1; Tr. 4787-88 (Kimball); SER at 2-34, 2-37, 2-38, Fig. 2.7; Tr. 4639-40 (Holt); Holt Exhs. 1 and 2; Holt Exh. 6, Figs. 1.1 and 1.2; Holt Exh. 11. Figure 2.7 of the SER, and Holt Exh. 1, with an overlay of Holt Exhibit 2 are reproduced here for convenience as Figures 2 and 3, *supra* pp. 66-67.

72. Appendix A to 10 C.F.R. Part 100, § V(a)(1)(iv), requires the development of response spectra at each of the various foundation locations of safety-related structures at the plant site. Because some of the main structures were founded entirely in plant fill and were not to be underpinned to the natural soils below, site-specific response spectra were constructed for the top of the plant fill. The effect of the layer of fill, which is about 30 feet thick and softer than the natural soils, would be to amplify certain ground motions, mainly those with a vibratory frequency between 1 Hz and 4 Hz, in the event of occurrence of an earthquake. These response spectra would have been applicable to the seismic reevaluation of the diesel generator building, the borated water storage tanks and the railroad bay area of the auxiliary building. Holt, ff. Tr. 4539, at 9-10; Holt Exhs. 1, 2, 11, and 8, at 1-7 and Fig. 7; Kimball ff. Tr. 4690, at 23-25; Tr. 5107, 5110-11 (Kimball); SER, Table 2.2, at p. 2-46.

73. The same general methodology that was used for calculating the SSRS at the top of the natural soils was employed to calculate the SSRS at the top of the plant fill, except that allowances were made for the softer materials and 30-foot thickness of the fill layer, placed on the stiffer natural soils. The ensemble of records used consisted of thirty-six components (from eighteen record sets) taken at ten sites during twelve earthquakes, eight of which occurred in California and four in Italy. The earthquakes ranged in magnitude from 4.9 to 5.6; epicentral distances ranged from 6 to 30.5 km, and the accelerograph stations were selected on the basis of the similarities of their soil properties and layering to those beneath the Midland plant site areas with the soil fill layer. Ten of the eighteen record sets taken at five sites had also been used in preparation of SSRS for the top of the natural soils. This overlap of sites and records used in the two compilations was cited as "reflecting the flexibility in the station characteristics that must be allowed during the selection

allowed this ambiguity (Tr. 4639-40), it is clear from Mr. Holt's other testimony, e.g., Holt Exhs. 2 and 11, that he was aware that the original design spectrum ("FSAR SSE accelerations") never exceeded the SSRS by any amount in the frequency range specified (5 Hz = 0.2 second-period and 15 Hz = 0.067 second-period).

process" (Holt Exh. 8, at 4). The Board assumes that this means that the materials and layering at those accelerograph sites were sufficiently similar to match either of the profiles to be modeled at the Midland site. Holt, ff. Tr. 4539, at 9-10; Holt Exh. 8, at 2-5, Table 1 (cf. Table 2 of Holt Exh. 5), Fig. 7; Kimball, ff. Tr. 4690, at 24-25.

74. An alternative approach to determine the SSRS at the top of the plant fill would be to compute amplification factors (and an amplification spectrum) for increasing the SSRS responses at the top of the natural soil. The Applicant accomplished this as a check against the top-of-fill SSRS that was calculated directly from the site-and-magnitude-matched ensemble of earthquake records. The SHAKE one-dimensional wave propagation computer code was applied to four different soil profiles to account for the heterogeneous nature of the plant fill, and amplification spectra were determined. Holt, ff. Tr. 4539, at 10; Holt Exh. 8, at B-1 to B-5; Kimball, ff. Tr. 4690, at 23-24.

75. The Staff employed Dr. Paul F. Hadala of the Army Corps of Engineers to review the Applicant's amplification spectra analyses. Dr. Hadala also performed his own analyses using the SHAKE computer code, but used what he believed to be more realistic soil and bedrock outcrop stiffnesses and earthquakes as input. He concluded that if one accepts the validity of the SSRS for the original ground surface then the directly computed SSRS for the top of plant fill is more conservative than the response spectrum derived from the theoretically calculated amplification factors. Hadala, ff. Tr. 5081, at 2-7; Kimball, ff. Tr. 4690, at 25.

76. The SSRS developed for the top of plant fill was modified in the low-frequency range (1 Hz and below) in a manner similar to that developed for the top of the natural soils, i.e., it was constrained so as not to fall below the original design spectrum for the Midland plant. Tr. 5108-14 (Kimball); Holt Exh. 11; *see also* Finding 71, *supra*. The Board accepts this SSRS (as shown on Holt Exhibit 11) with the understanding that, were the project reactivated, it would be used for seismic reevaluation of safety-related structures founded on, or in, the plant fill.

77. At the time when the Applicant undertook design of the underpinning structures and the new ring-beam foundation of the borated water storage tanks, and began seismic reevaluation of structures founded in soils, no agreement existed on the seismic criteria for those structures. In order to proceed, the Applicant incorporated what it believed to be a reasonable margin over the original DBE into the design or reevaluation of those structures. The Applicant directed its contractors to use 1.5 times the DBE (or "FSAR SSE") response spectra as the seismic

design basis for the remedial structures and for the various seismic re-evaluations (but not for the seismic margin review). Subsequently, the Applicant committed to use of the SSRS, as accepted here, as a seismic design basis, but it continued to use the 1.5 times the DBE ("FSAR SSE") spectra in the actual remedial design work. The Applicant also had dynamic analyses performed which demonstrated that, for purposes of design of the remedial structures, the seismic design basis used exceeded the responses derived from the SSRS. Thiruvengadam Affidavit at 6-7; Tr. 5996-97, 5996-6005, 6027-28, 6040-43 (Kennedy).

78. In answers to questions about the adequacy of 1.5 times the DBE as a design basis, the Applicant's witness, Mr. Robert P. Kennedy, testified that in parts of at least one structure or substructure not founded on plant fill (the missile shield in the main portion of the auxiliary building) the SSRS responses were 1.7 times the DBE spectral responses, but that the SSRS responses would be used in the seismic reevaluation of the missile shield. Tr. 6002-03, 6029-32 (Kennedy). That reevaluation, as part of the seismic margin review, would have been considered in the later-scheduled OL portion of this proceeding, but is not material to issues dealt with in this Decision. SSER # 2, § 3.7.2.1, at 3-2.

79. Accordingly, the Board finds that the Applicant's use of the SSRS for seismic reevaluation of safety-related structures, systems and components of the plant, and its substitute use of 1.5 times the DBE ("FSAR SSE") response spectra in seismic design of the remedial structures, is reasonable and conservative.

D. Seismic Models and Soil Spring Constants

80. As provided in our May 5, 1981 Prehearing Conference Order, one of the issues considered in the soils hearings was the mathematical models to be used for dynamic analyses of structures as modified by the remedial soil settlement measures, including the bases for the derivation of the spring constants. The Applicant's consultant, Dr. Robert P. Kennedy of Structural Mechanics Associates, Inc. ("SMA"), testified on the dynamic mathematical models being used to perform the seismic evaluation of structures in conjunction with the foundation remedial work. Dr. Kennedy summarized the dynamic models developed for (1) the auxiliary building — control tower — electrical penetration area ("auxiliary building") which is supported on an interconnected foundation system; (2) the service water pump structure ("SWPS"); and (3) the borated water storage tank ("BWST"). The auxiliary building and SWPS models were developed by Bechtel Corporation, and important features of the models were reviewed by Dr. Kennedy and SMA. The BWST model was

developed by Dr. Kennedy and SMA. Kennedy, ff. Tr. 5995, at 1; Tr. 5998-6121, 6250-86 (Kennedy). The NRC Staff structural reviewer, Mr. Frank Rinaldi, and the Staff's consultants, Dr. Paul Hadala of the Corps of Engineers and Mr. John Matra of the Naval Surface Weapons Laboratory, presented the results of their review of the Applicant's dynamic models. Rinaldi/Matra, ff. Tr. 6129; Tr. 6121-36, 6252-86 (Rinaldi, Matra, Hadala).

81. Dynamic mathematical models are used to define the response characteristics of a structure subjected to a dynamic forcing function.⁶³ For the seismic evaluation of complex buildings, such as the auxiliary building or the SWPS, a two-step modeling procedure is commonly used. First, an overall dynamic response model of the complete structure is developed. This model must be adequate to determine the seismic-induced forces, shears, moments, displacements, and accelerations at all important locations throughout the structure, as well as to determine the seismic input to equipment mounted on the structure. Second, detailed static models for local regions of the complex structure are developed. These detailed static models are used to convert the overall seismic-induced dynamic responses (step one) to local forces and stresses for use in the seismic evaluation of the design of individual structural elements. The dynamic mathematical models presented by Dr. Kennedy are only intended for the first step; i.e., to determine adequately and conservatively the overall seismic-induced forces, shears, moments, displacements, and accelerations throughout the auxiliary building, SWPS, and BWST structures and foundations and to determine the seismic input to equipment mounted on these structures. Kennedy, ff. Tr. 5995, at 2-3; Tr. 6009-10, 6102-05 (Kennedy).⁶⁴

82. Dr. Kennedy's testimony addressed various influences upon the overall dynamic response of a complex structural system to seismic input, but this Partial Initial Decision will summarize only the Applicant's treatment of soil-structure interaction and energy dissipation capability, which have special pertinence to this proceeding. A soil-structure interaction model must (1) feed the seismic input into the building models at the appropriate elevations and plan view locations (center of rigidity of the supporting soil); (2) account for the reduced

⁶³ The mathematical representation of structures by dynamic models is not always necessary. For a very simple building, or for simple below-ground structures such as valve pits and retaining walls, an analyst can determine the natural frequency of vibration and thus the structural responses without constructing a dynamic model. Kennedy, ff. Tr. 5995, at 6.

⁶⁴ The Applicant described the detailed static (finite-element) models used in designing the remedial underpinning work in other testimony. See Burke, *et al.*, ff. Tr. 5509 (auxiliary building); Boos, *et al.*, ff. Tr. 9490 (SWPS); Boos/Hanson, ff. Tr. 7173 (BWST).

stiffness of the overall building system due to the flexibility of the supporting soil; and (3) conservatively account for the radiation of energy (associated with building response relative to the soil) from the building into the surrounding soil. Kennedy, ff. Tr. 5995, at 5.

83. The soil-structure interaction effect on complex buildings such as the auxiliary building is a complicated and controversial subject. A complete interaction analysis is beyond the current state of the art and cannot be performed for complex buildings. Dr. Kennedy testified that the soil-structure interaction models incorporated into the auxiliary building, SWPS, and BWST dynamic models for the foundation remedial work are very simple. They do not represent the most advanced state-of-the-art models, but they were developed in such a way as to provide high confidence that they will either accurately compute or conservatively overpredict the seismic response of the structures. Kennedy, ff. Tr. 5995, at 7-8; Tr. 6099-6102, 6105-08, 6118 (Kennedy).

84. Because of uncertainties in soil properties and in the mathematical modeling of soil-structure interaction, there is significant uncertainty in the "softening" effect of soil-structure interaction.⁶⁵ In order to cover this uncertainty, the Applicant and its consultant were to have varied the soil-structure interaction stiffnesses within the range from 0.5 to 1.5 times the "best estimate" soil-structure interaction stiffnesses. Dr. Kennedy testified that using this wide range of soil properties avoids the need for more sophisticated soil-structure interaction modeling. Kennedy, ff. Tr. 5995, at 9.⁶⁶

85. Dr. Paul Hadala of the Corps of Engineers evaluated for the NRC Staff the methods used by the Applicant in calculating soil spring constants and damping parameters for the auxiliary building, the SWPS, and the BWSTs. Dr. Hadala used a different method of calculation than did the Applicant. Dr. Hadala used field-measured seismic shear wave velocities in the plant fill and in the glacial till to derive a shear modulus. He then made a reduction based on the work of Seed and Idris to account for the fact that strain levels in earthquakes are larger than those in field seismic shear wave velocity tests. His result was in close agreement with the Applicant's best-estimate soil properties. Dr. Hadala testified that the methodology used by the Applicant and its consultant in determining soil spring constants and damping parameters is a sound one which provides conservative answers for estimating the transmission

⁶⁵ The "softening" effect is the effect of soil-structure interaction on the natural frequencies and mode shapes of vibration of the structure.

⁶⁶ As we point out elsewhere in this Decision, *supra* pp. 70-71, the Applicant (through Bechtel) failed to include the \pm 50% variation in soil modules in analyzing the auxiliary building and SWPS. Dr. Kennedy did include this variation in his BWST analysis. See *infra* Finding 88.

of energy away from the structure due to radiation damping and the contribution of the foundation soil to the stiffness of the system. Tr. 6130-31, 6278-79 (Hadala).

86. The Applicant's witnesses presented the dynamic models for the auxiliary building, SWPS and BWSTs. The auxiliary building is represented by a three-dimensional, lumped-mass stick model, with additional detail in the electrical penetration areas, which preserves the physical geometry of the various building components. The SWPS is represented by a three-dimensional lumped-mass stick model using beam elements. The model which has been submitted for the BWST, which was developed by Dr. Kennedy and SMA, and replaces a model which Bechtel had developed, is somewhat different.⁶⁷ The BWST is a vertical cylindrical tank which is supported by the soil beneath the tank and anchored to a ring foundation. The ring foundation must withstand the seismic-induced forces in the tank shell. These forces are nearly totally due to the water in the tank since the tank shell weight is negligible when compared to the weight of the borated water. Therefore, the primary seismic modeling concern is to model properly and conservatively the seismic forces induced by the water on the tank shell and thus also on the foundation. Dr. Kennedy testified that it is best to model the impulsive mode, the sloshing mode, and the vertical mode of fluid-structure interaction individually. The seismic forces imposed upon the tank shell and ring foundation are added by the square-root-sum-of-squares method. The impulsive mode is modeled by vertical stick elements between mass points distributed up the tank shell. A dynamic model is not required to evaluate the forces in the sloshing and vertical modes. The forces in these two modes can be determined by mathematical equations. Dr. Kennedy testified that the foundation ring does not affect seismic modeling except that the rings act as an anchor for vertical movement. Thus, the facts that the old foundation ring is out of plane and is cracked, and that another foundation ring will be added to the BWST foundation as a remedial measure, are irrelevant in the determination of seismic response of the BWST.⁶⁸ For details on all of these models, see Kennedy, ff. Tr. 5995, at 13-22, Figs. 2-12; Rinaldi/Matra, ff. Tr. 6129, at 3-5.

⁶⁷ The foundation of the BWST has been designed based upon the Bechtel dynamic model. The Bechtel model predicts higher loads on the foundation than the Kennedy model by about 20% or a factor of 1.2. Because BWST foundation design loads are based upon the higher Bechtel model, extra conservatism is provided in the remedial work. Dr. Kennedy's model was to be used in the seismic margin review and in checking of the forces on the tank for the SSRS. Tr. 5991-94, 6006-08 (Kennedy); Tr. 6279-80 (Rinaldi).

⁶⁸ Unlike Dr. Kennedy's model, which considers the tank to be supported by the soil at the base point of the tank, Bechtel's dynamic model includes the foundation ring. Dr. Kennedy explained that this is one of the reasons why his model is better and more accurate. Tr. 6044-52, 6059-63 (Kennedy).

Dr. Kennedy concluded that the dynamic models for the auxiliary building, SWPS and BWST are adequate for establishing the conservative seismic forces to be used in the design of the remedial work and in the seismic margin review. Kennedy, ff. Tr. 5595, at 19-22, Figs. 13-14, Attachment B.

87. In addition to the review of soil spring constants and damping parameters by Dr. Hadala, the NRC Staff's structural reviewer, Mr. Frank Rinaldi, and its consultant Mr. John Matra of the Naval Surface Weapons Laboratory reviewed the other aspects of Applicant's dynamic models. The NRC Staff found that the methodologies used by the Applicant and its consultant to develop and to review the dynamic mathematical models are within the state of the art, and that the auxiliary building and SWPS models adequately represented those structures within the state of the art. Rinaldi/Matra, ff. Tr. 6129, at 9, 11-14; Tr. 6131 (Hadala); Tr. 6131-34, 6258, 6266 (Rinaldi); Tr. 6134 (Matra). *But see* Finding 88, *infra*. Following its review of the dynamic model for the BWST, Mr. Rinaldi and Mr. Matra testified that the Applicant's dynamic analysis of the BWST was satisfactory. Rinaldi/Matra, ff. Tr. 7537, at 3.

88. By Board Notification BN 84-115, "Seismic and Structural Design Departures from Licensing and Design Criteria — Midland Plant," issued June 18, 1984, by the Staff, the Board and parties were advised of the Applicant's discovery during a design review that, in the original seismic design, Category I structures were analyzed using only the nominal soil dynamic modulus value without considering the \pm 50% variation of that value as required by the FSAR. The design review, and BN 84-115, followed by several months the presentation of testimony on the seismic models. By letter dated August 2, 1984, the Staff supplemented BN 84-115 by identifying certain of its testimony and evidence which would be affected by the reported deficiencies (including testimony by Messrs. Rinaldi, Matra and Hadala). The impact of the design deficiency would be applicable to the seismic design of the underpinning structures (under the auxiliary building and the SWPS), and to the criteria to be established for subsequent seismic margin reviews of plant safety structures, i.e., the soil spring constants. The deficiency would not be applicable to the seismic design of the BWSTs, since Dr. Kennedy took into account the requisite variation in the nominal soil dynamic modulus value in deriving his new seismic model for the BWSTs. Tr. 6001-04 (Kennedy); *see also infra* Finding 192. Our conclusions with respect to the seismic models for the auxiliary building and SWPS — but not the BWSTs — are qualified to the extent they may be affected by the design deficiency.

89. The Licensing Board finds that the methodology used to develop the models for the auxiliary building, SWPS, and BWST was within the state of the art. The Board concludes that these models are adequate for the purpose of defining seismic design forces to be used in the design of foundation remedial work, for conservatively estimating the seismic-induced forces in these structures, and for defining the seismic input to equipment, systems, and components mounted on these structures. With respect to the auxiliary building and SWPS models, however, this conclusion is limited to the establishment and validity of the nominal values of the soil spring constants. Although the record establishes some measure of conservatism in the seismic design of the auxiliary building and SWPS by virtue of the exceedance of the SSRS by 1.5 x the DBE (FSAR SSE) response spectra actually used in the design of the underpinning, the record is not sufficient to permit a determination of whether the conservatism in calculation of seismic loads provided by use of the 1.5 x DBE (FSAR SSE) response spectra is sufficient to include the range of seismic loads that would result from the required variation of soil spring constants in those calculations.

E. Soil Liquefaction Potential

90. The potential for liquefaction⁶⁹ at a power plant site is a necessary part of the seismic evaluation prescribed by NRC regulations. See 10 C.F.R. Part 100, Appendix A, §§ V(d) and VI(a).⁷⁰ Its potential occurrence at Midland gave rise, *inter alia*, to the permanent dewatering system discussed *infra* in Findings 98-117. That potential became apparent when, following the discovery of excessive settlement of the partly built DGB in July of 1978 the Applicant undertook an extensive underground soils investigation program. One of the results of the borings and

⁶⁹ Liquefaction of loose, cohesionless sands that are saturated with water is a phenomenon that may occur during strong earthquake shaking that results in loss of shear strength of the material. During the shaking, partial compaction may occur and the weight of the overburden and any overlying structures, if present, is transferred to the pore water which cannot escape rapidly enough to dissipate the elevated porewater pressures that result. Because the load, then, is borne largely or entirely by the water, which has no shear strength, the sand-water mixture behaves like a liquid. Woods, ff. Tr. 9745 at 3; cf. Woods, ff. Tr. 11,549, at 23 on a related phenomenon, seismic shakedown, in unsaturated loose sand.

⁷⁰ The adequacy of the seismic evaluation at Midland, and of the capacity of various structures to withstand liquefaction, was dealt with generally by Ms. Stamiris' Contentions 4.C and 4.D (which are quoted in full in findings on particular structures or dewatering, as well as in Appendix A). The only contention which specifically mentioned liquefaction was Warren Contention 2.B, which reads as follows:

Given the facts alleged in Contention 2.A [concerning the adequacy of the permanent dewatering system], and considering also that the Saginaw Valley is built upon centuries of silt deposits, these highly permeable soils which underlie, in part, the diesel generator building and other class I structures may be adversely affected by increased water levels producing liquefaction of these soils. . . .

soils testing was the identification, in isolated areas, of potentially liquefiable sands in the plant fill beneath certain safety-related structures and underground utilities at the Midland facility. These were the DGB, the EPAs and railroad bay/radwaste structure (RBA)⁷¹ of the auxiliary building, the overhanging portion of the SWPS, and a portion of the service water piping. Underpinning the EPAs and the "cantilevered" part of the SWPS was to have eliminated the concern about potential liquefaction of their foundation soils, by extending their foundations down to dense natural soils beneath the plant fill. Other remedial action (e.g., dewatering or removal of loose sands) was needed to reduce or eliminate the liquefaction potential of plant fill soils beneath the DGB and the RBA, and beneath parts of the service water piping. While sands of questionable density were discovered in a few places in the natural soils, the evaluations of the Applicant and Staff showed that potential liquefaction of natural soils was not a problem beneath any safety-related structures or utilities. SSER # 2, § 2.5.4.5.5, at 2-42 to 2-43; Woods, ff. Tr. 9745, at 7-14, Figs. L-3, L-4, L-5 (locations of borings); Tr. 9786, 9793, 9802-03 (Kane). (With respect to borings under the diesel fuel oil tanks, we are making no findings, for reasons set forth *supra* pp. 38 and 103-04, and *infra* Finding 202.)

91. The Applicant and the Staff both conducted independent evaluations of the liquefaction potential of the loose sands encountered during the boring program. The U.S. Army Corps of Engineers, acting as a consultant to the Staff, performed a study of soils liquefaction potential and the permanent dewatering system proposed by the Applicant to eliminate liquefaction potential of loose sands under the DGB and RBA. The Applicant's witness on soils liquefaction was Dr. Richard D. Woods, a professor of civil engineering at the University of Michigan acting as a private consultant. The Staff's testimony on soils liquefaction was presented by Mr. Joseph Kane, a geotechnical engineer with the NRC Staff. SSER # 2, § 2.5.4.4.4, at p. 2-35 and § 2.5.4.5.5, at 2-42 to 2-44; Woods, ff. Tr. 9745; Tr. 9782, *et seq.* (Kane).

92. In their analyses of liquefaction potential, both the Applicant and the Corps of Engineers assumed a magnitude 6.0 earthquake and a peak acceleration of 0.19g. Dr. Woods explained that earthquake magnitude determines the number of cycles of stress reversal used in deriving liquefaction potential, and that a single cycle of peak motion would not

⁷¹ The area committed to be dewatered included a small portion of the northeast corner of the radwaste building. The term RBA as used herein includes that corner of the radwaste building (see SSER # 2, Fig. 2.4, at p. 2-8).

be a concern. Both the earthquake magnitude used and the peak acceleration used are higher than corresponding values of the SSE (magnitude 5.0) and the peak acceleration (0.12g-0.13g) associated with the SSRS for the Midland site. Woods, ff. Tr. 9745, at 2; SSER # 2, § 2.5.4.5.5, at 2-43 and 2-44; Tr. 9749-52 (Woods).

93. Whether a specific sand body or layer will liquefy or not depends upon several factors. First, the sand must be loosely compacted, i.e., relatively low in density. Second, the sand must be low in cohesion, or cohesionless, i.e., it does not have a high proportion of clay or other binders. Third, the sand must be saturated; this occurs when the sand is below the water table and the pore spaces are filled with water. If not saturated, a loose, cohesionless sand body may undergo partial compaction during strong earthquake shaking, resulting in settlement (“seismic shakedown”), but not liquefaction (*see infra* Findings 114, 117). Other factors also influence the potential for liquefaction, such as the strength and duration (number of shaking cycles) of earthquake motions, an increase in either of which would increase liquefaction potential. Also, an increase in the effective confining pressure on a sand body (as from a greater depth of occurrence) decreases its liquefaction potential.⁷² Manifestations of liquefaction of foundation soils include settlement and tilting of structures, cracking and lateral spreading of slopes and embankments, and disruptions of the ground surface. Woods, ff. Tr. 9745, at 3-7; Tr. 9785-86 (Kane); Woods, ff. Tr. 11,549, at 2-3.

94. Certain of the low-blowcount sand bodies encountered in the borings were not encountered in nearby borings and were surrounded above and below by nonliquefiable soils. These isolated small pockets were not regarded by the Applicant as significant threats to the integrity of safety-related structures. Woods, ff. Tr. 9745 at 11-13; Tr. 9747-48, 9753, 9761-62, 9765-66 (Woods). (With respect to borings used to evaluate the potential for liquefaction under the diesel fuel oil tanks (Tr. 9347-48 (Woods)), we are not making any findings, as a result of the discovery of information indicating those borings may be erroneous. *See*

⁷² The Standard Penetration Test (SPT) is commonly employed when making borings to estimate relative density and liquefaction potential of soils. The test procedure consists of driving a standard sampling tube into soil at the bottom of the hole by dropping a “hammer” of specified weight from a specified height onto the drill stem to which the sampler in the hole is attached. The number of blows required to drive the sampler a specified distance is recorded. In general, a low blowcount indicates low relative density and a high liquefaction potential in sand. In his evaluation here, Dr. Woods’ calculations resulted in a comparison between the *in situ* blowcount and the predicted blowcount at which liquefaction would not occur during a magnitude 6 earthquake, accounting for sample depth, relative density, and elevation of the water table. Curves were shown for the cyclic stress ratio at which liquefaction would not occur (safety factor of 1.0), and for a safety factor of 1.5 in that value. Woods, ff. Tr. 9745, at 3-7.

supra pp. 38, 103-04, and *infra* Finding 202.) In response to Board questions concerning the necessary lateral extent of sands in order for liquefaction to occur, Dr. Woods stated that, based on his examination of published records of liquefaction events, liquefaction has not occurred in areas where there have not been several acres of liquefiable material that is both in connection and fully saturated (Tr. 9769-72, *corrected* at Tr. 11,550-51 (Woods)). On the other hand, Mr. Kane believed that liquefaction could be a problem in saturated sands in areas under 1 acre. He indicated that, in the consideration of lateral restraint of a confined pocket of sand, it is necessary to consider the depth of the pocket and its location with respect to the foundation of the structure. For example, if it were located so as to be the layer most heavily stressed by the foundation pressures, and it lost its strength through liquefaction, there would be a risk of losing foundation support. Mr. Kane indicated further that dewatering the sands to below elevation 610 feet would resolve the Staff's concerns with respect to liquefaction. Tr. 9793-96, 9799-9800, 9810 (Kane).

95. Dewatering, however, was not to be employed to resolve potential liquefaction of those loose sands beneath service water piping and duct banks located in the vicinity of the SWPS. This was because of the proximity of that area to the cooling pond, the primary source of recharge of the ground water in the plant area. If the dewatering system were to fail, the water table could rise very rapidly in this area and the loose sands, which lie above 610-foot elevation, would become saturated. According to the Staff, it has been demonstrated that the water table, which would have been drawn down to elevation 595 feet, could reach an elevation of 610 feet in this recharge zone in approximately 3 days, which might not allow sufficient time to repair the dewatering system. Therefore the soil beneath the safety-related service water piping and duct banks near the SWPS was to have been removed and replaced with nonliquefiable material down to elevation 610 feet. Woods, ff. Tr. 9745, at 12-13; SSER # 2, § 2.5.4.4.5, at p. 2-36; Paris, ff. Tr. 9900, at B-3; Tr. 9902 (Paris).

96. The potentially liquefiable sands near the SWPS were not identified by the Applicant's representatives during a meeting held with the NRC Staff on March 3, 1982, the purpose of which was to obtain Staff approval of the Applicant's proposed site dewatering criteria, including limitation of ground water control to the areas near the DGB and RBA. The Staff had become aware of loose sands near the SWPS by July of 1980 through its review of the Applicant's logs of borings made in 1979. At the March 3, 1982 meeting, the Staff requested that the Applicant supply the NRC with copies of Bechtel's liquefaction analysis for soils

above elevation 610 feet. CPC subsequently did so. The analysis showed loose sand in the plant fill at locations other than the RBA and DGB, including that beneath the service water piping just north of the SWPS. The Applicant advised the Staff of CPC's intention to remove and replace the loose sand during a telephone call on March 12, 1982. Hood, ff. Tr. 12,144, with attachments; Tr. 12,145-47 (Hood); Tr. 9785-86, 12,168-70 (Kane); Tr. 12,186-99 (Budzik); Tr. 9901-03 (Paris). Because the issue of liquefaction potential in this area was resolved by the commitment to remove and replace the loose sands beneath the service water piping and duct banks north of the SWPS (Finding 95, *supra*), the controversy surrounding the March 3, 1982 meeting is not material to the technical aspects of liquefaction on which we are here ruling. The extent, if any, to which testimony on the March 3, 1982 meeting bears on management attitude was to have been addressed in a subsequent Decision in these proceedings.

97. The Applicant's evaluation of the bodies of loose sand present in the plant fill under the RBA and DGB indicated that almost all of them lie above 610-foot elevation. The few pockets that lie below that elevation are of such limited extent and deep enough that they do not present a liquefaction problem, even if saturated. Therefore, lowering the ground water table and maintaining it at a level below 610 feet beneath the RBA and DGB will ensure that there is no potential for liquefaction of soils to affect the integrity of either structure. The Staff reached the same conclusion based on its independent evaluation and review. SSER # 2, § 2.5.4.5.5, at 2-43 to 2-44; Woods, ff. Tr. 9745, at 8-9, 13, Figs. L-6 through L-9; Tr. 9784-86, 9810-11 (Kane). We agree.

F. Dewatering of Plant Soils

98. In order to reduce or eliminate the potential for liquefaction beneath the DGB and RBA, a permanent dewatering system was to be installed. Woods, ff. Tr. 9745, at 9, 13; Paris, ff. Tr. 9900, at 3-4, 39. This system was the subject of Stamiris Contention 4.D, which reads as follows:

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:

* * *

D. Permanent dewatering

- 1) would change the water table, soil and seismic characteristics of the dewatered site from their originally approved PSAR characteristics — characteristics on which the safety and integrity of the plant were based,

thereby necessitating a reevaluation of these characteristics for affected Category I structures;

- 2) may cause an unacceptable degree of further settlement in safety-related structures due to the anticipated drawdown effect;
- 3) to the extent subject to failure or degradation, would allow inadequate time in which to initiate shutdown, thereby necessitating reassessment of these times.⁷³

(1) Sufficiency of Permanent Dewatering System (Stamiris Contention 4.D(3))

99. Two witnesses described the design of the permanent dewatering system. Mr. William Paris, an engineering geologist with Bechtel testified for the Applicant, and Mr. Raymond O. Gonzales, a hydraulic engineer, testified for the NRC Staff. Other Staff witnesses, including Mr. Kane and Mr. Darl S. Hood, the Midland Project Manager, provided additional testimony pertinent to the effects of dewatering upon plant soils, and other aspects of the dewatering system. *See generally* Paris, ff. Tr. 9900; Tr. 10,012, *et seq.* (Gonzales); SSER # 2, §§ 2.4.6.2, 2.4.6.3, 2.4.6.4; Tr. 10,013, *et seq.* (Hood); Tr. 9812-51 (Kane).

100. The permanent dewatering system was designed to maintain the ground water table below 610-foot elevation beneath the DGB and RBA to eliminate or reduce the liquefaction potential of loose, noncohesive sands present in the plant fill beneath those structures (*see supra* Findings 97, 98). Although the system was not required to be designed to Seismic Category I standards, it was designed to lower the water table to elevation 595 feet. Hence, even in the event of total failure of all pumping capacity, the time required for the water table to rise to elevation 610 feet under the DGB or the RBA (about 40 days) would allow time to repair and restore the system. Paris, ff. Tr. 9900, at 4-5, 30-31; SSER # 2, § 2.4.6.2, at 2-1, 2-5.

101. The main source of water supply, or recharge, to the plant fill would be the cooling water pond, which was to have been maintained at a pool elevation of 627 feet. The main area of recharge would have been in the vicinity of the SWPS and adjacent circulating water intake structure, from where the water would flow through natural sand just below the plant fill. The sands in the plant fill are hydraulically connected to

⁷³ Similar considerations were raised by Warren Contention 2.A, which reads as follows:

Because of the known seepage of water from the cooling pond into the fill soils in the power block area, permanent dewatering procedures being proposed by Consumers Power Company are inadequate, particularly in the event of increased water seepage, flooding, failure of pumping systems and power outages. Under these conditions, Consumers cannot provide reasonable assurance that stated maximum levels can be maintained.

the underlying natural sand. Water from the dewatering system would have been pumped back to the cooling pond. Paris, ff. Tr. 9900, at 6-7, 10-13; SSER # 2, § 2.4.6.2, at 2-1.

102. The cooling pond and area of the power block to be dewatered are hydraulically isolated from aquifers of the regional ground water systems by a widespread underlying natural clay layer about 135 feet thick, and by the enclosing perimeter dike core, cutoff dikes and slurry trenches that were designed to extend down to the natural clay. The dikes and slurry trenches prevent hydraulic connection of the plant fill with laterally adjacent shallow sediments where ground water occurs under water-table conditions in the upper ground water system. An aquifer of a lower ground water system, located beneath the 135-foot-thick natural clay layer, is under artesian pressure with a hydrostatic head about equal to the water-table level of the upper ground water system. Observation wells drilled to the lower aquifer outside the perimeter dike showed no fluctuations with changes of water level inside the dike, indicating a lack of hydraulic connection between the upper and lower systems. The casings of these wells were sealed with grout to prevent a connection whereby water could rise from the lower aquifer and escape into the upper system. Water flow in the opposite direction would be prevented by the artesian pressure in the lower aquifer. Thus the potential sources of recharge of the ground water in the plant fill beneath the DGB and RBA are the cooling pond, leakage from pipes, and natural precipitation falling within the confines of the cutoff dikes and slurry trenches.⁷⁴ Paris ff. Tr. 9900, at 6-13; Tr. 9917-31, 9933-34, 9958-62 (Paris); Tr. 9835-37, 9841-43 (Kane); Tr. 10,017-20, 10,035-39, 10,045-51 (Gonzales).

103. Twenty interceptor and twenty backup interceptor wells located in two lines along the primary recharge area, and twenty-four area wells in the site area, form the main components of the permanent dewatering system. They are designed to lower the water table to elevation 595 feet, and to intercept recharge from the cooling pond and from natural precipitation or pipe leakage. While it is anticipated that only one line of interceptor wells and two of the area wells would need to remain in operation to maintain the ground water level at or below the design level, all of these wells were to be operational should the need for any of them arise.

⁷⁴ Testimony was given that granular materials existed beneath the cutoff dike just west of the administration building, which permitted some inflow of water from the upper ground water system to the plant fill. However, because the degree of connection apparently was slight and the difference in head across the dike would be only about 3 feet, even with dewatering, no significant inflow from the upper system was considered likely. Tr. 9846-48 (Kane); Tr. 10,020-21, 10,035-39 (Gonzales); Tr. 10,022-24 (Hood).

Paris, ff. Tr. 9900, at 13-16, 31-32; SSER # 2, § 2.4.6.2, at 2-1 to 2-5, § 2.4.6.4, at p. 2-10.

104. Each of the pumping wells was equipped with a well screen/sand filter pack to reduce the quantity of soils fines removed from the sand through which the ground water would flow. Following well construction and initial development, each well had to meet a test limit of no more than 10 parts per million (ppm) of soils fines to be accepted (*cf.* SSER # 2, § 2.5.4.4.4, at p. 2-35). A lifetime limit of 1 cubic yard of soils fines was to have been specified for each well. If the limit had been reached during plant operation, that well would have been shut down and a new well would have been developed to replace it. Monthly testing to determine the quantity of fines being removed was to have been required. Paris, ff. Tr. 9900, at 18-19, 24-26, 36-38; Tr. 9814-15 (Kane).

105. Water quality samples were to have been taken annually to determine the concentration of compounds associated with encrustation. Acid treatment of the wells would have been employed, if needed, to remove encrusting minerals in order to prevent a decrease in dewatering efficiency that might result from encrustation of the well screens. Paris, ff. Tr. 9900, at 38-39; Tr. 10,065-67 (Gonzales).

106. Each primary interceptor well was to have been controlled by its own timer for cycling and a low-level cutoff switch to prevent pump damage if unexpected low flow were to occur. Timer settings were to have been determined on the basis of experience with the dewatering system and were to have been adjusted periodically to meet the limiting conditions of the operating technical specifications. The backup interceptor wells and the area wells were to have been automatically controlled by high-water-level and low-water-level switches. Electrical wiring was to have been designed so that a temporary outage of one or more wells would have no effect on the other wells. In the event of loss of power to the system, a separate diesel generator was to be provided to power the interceptor wells. Paris, ff. Tr. 9900, at 21-22; SSER # 2, § 2.4.6.4, at p. 2-10.

107. The first line of interceptor wells and the backup line were to be connected to different header lines so that if some problem developed in the header of the first line, the backup line would have been able to discharge excess ground water through its own header system. In addition, provision would have been made to attach flexible hoses to each well, thus bypassing the header system entirely, if so needed in the event of rupture of an underground header near a dewatering well. Paris, ff. Tr. 9900, at 32-33.

108. The Applicant committed to store on site one complete set of replacement parts for any repair, replacement, or installation which may

be required for a dewatering well during the operating life of the plant (Paris, ff. Tr. 9900, at 36). The Board (at Tr. 9979) questioned whether this was sufficient based on a pipe break scenario which postulates damage to two dewatering wells (*see* Paris, ff. Tr. 9900, at 33). Mr. Paris would recommend that more than one set of replacement parts be stored on site. Although the Staff would have no difficulty with the Board imposing such a requirement, it pointed out that this kind of requirement would not usually be a matter for technical specifications but, rather, would generally be covered by other procedures that the Applicant would maintain. Tr. 9979-80 (Paris); Tr. 10,102-03 (Hood). In view of this approach, and in consideration of the water-level monitoring requirements and the technical specification that the plant be shut down before the ground water rose to a level where a liquefaction hazard existed (Findings 109-110, 113, *infra*), we see no safety reason compelling imposition of a requirement for more than one set of dewatering well replacement parts on site.

109. Six permanent water-level monitoring wells were to have provided continuous recordings of water level during plant operation, and alarms to alert plant personnel to a significant rise in level at any of the wells. Of these six monitoring wells, two each were to have been located in the area of the DGB and the RBA. The remaining two were to have been located between each of those structures and the main recharge area. The Staff position was that the four permanent monitoring wells near the DGB and RBA would provide sufficient information on the ground water level at those structures, but would require additional monitoring of other wells to supplement, and check on, the recording wells. Paris, ff. Tr. 9900, at 22-23, 37, FSAR Fig. 2.4-46 (attached); SSER # 2, § 2.4.6.4, at p. 2-7 (*also see* Fig. 2.1 at 2-2 for plan location of all wells in the permanent dewatering system).

110. The Applicant and Staff each evaluated the impact of various pipe breaks on the ground water levels. A postulated break in the 66-inch cooling pond blowdown line near the service water pump structure would have minimal impact on the dewatering system because this is a low-pressure line and the dewatering system has sufficient capacity to remove all the released water from such a line break. Paris, ff. Tr. 9900 at 33-34; SSER # 2, § 2.4.6.3, at p. 2-7. A postulated break in the Unit 2 circulating water pipe near the DGB was considered. This is a 96-inch line located on natural material just to the east of the DGB. It was calculated that the ground water would rise over a period of about 3.3 days to about elevation 607 feet before the closest permanent area well would have been automatically activated. Operation of one area well would be sufficient to prevent ground water from rising significantly

above elevation 610 feet. While this 607-foot elevation would be just slightly above the 606.5-foot elevation at which plant shutdown would have been initiated, there still would have been time to shut down the plant before elevation 610 feet was reached. Moreover, the analysis was very conservative in that it assumed that 100% of the water flowed into the ground, that plant personnel did not notice the diversion of this water which normally would flow into the cooling pond, that the observation wells in the vicinity failed to alarm, and that all the water flowed towards the DGB. Paris, ff. Tr. 9900, at 34; SSER # 2, § 2.4.6.3, at p. 2-5; Tr. 9938-45 (Paris); Tr. 10,062 (Gonzales). Finally, the effect of a postulated break in the 20-inch condensate water pipe, which is located directly beneath the DGB, was evaluated. Using a simplified analysis, it was conservatively assumed that the entire contents of the condensate water tank (300,000 gallons) were spilled directly beneath the DGB, and that all the water would be contained in this area. It was determined that the ground water elevation would not rise above 610 feet, even if the area wells did not operate. However, there would have been an alarm if the level in the condensate tank dropped below 175,000 gallons. At that point another proposed technical specification would have required plant shutdown unless the low tank level could be mitigated in a given period of time. Tr. 9944-45, 9969-72 (Paris); Tr. 10,063-65 (Gonzales); Tr. 10,064-65 (Hood).

111. An evaluation of the impact of unusually heavy rainfall on the ground water level also was made. Such rainfall could be accommodated by the permanent dewatering system and would not result in the ground water level rising to elevation 610 feet. This evaluation was based on a prediction of the 100-year maximum rainfall. Tr. 9973-75 (Paris); Tr. 10,134 (Gonzales).

112. A recharge test of the dewatered portion of the site was requested by the Staff and conducted in 1982 by the Applicant. The purpose of the test was to verify the time it would take the ground water to rise from elevation 595 feet to elevation 610 feet, the elevation above which a potential soil liquefaction hazard would exist beneath the DGB and RBA as a result of ground water saturation of loose sands in the plant fill. The test was necessary to determine whether there would be sufficient time in the event of total failure of the dewatering system to repair or replace the system or safely shut down the plant. At the time of the recharge test, the cooling pond was full and the plant soils had been dewatered to elevation 595 feet, or considerably below, except for isolated perched water the drainage of which was retarded by impervious soil layers. All pumps were shut off and water levels were allowed to rise nor-

mally for a period of 60 days.⁷⁵ The water level rose beneath the DGB, in that time, to about 609-foot elevation (worked out to be about 52 days for a rise from 595- to 610-foot elevation). The rise in water level beneath the RBA was complicated by water leaking from a buried pipe that was not related to the test but which was accidentally ruptured during the period of the recharge test. It was nonetheless possible to estimate that about 40 days would be required for the ground water to rise from 595- to 610-foot elevation beneath the RBA in the event of complete failure of the dewatering system. The Staff estimated rates of water-level rise from the last 2 weeks of the recharge test as being 0.35 ft/day beneath the DGB and 0.41 ft/day beneath the RBA. SSER # 2, § 2.4.6.2, at 2-1 to 2-5; Paris, ff. Tr. 9900, at D1-D5, FSAR Fig. 2.4-58 (attached).

113. A permanent dewatering system technical specification was to have been provided detailing the measures to identify and verify a water-level rise above elevation 595 feet and to initiate repairs or, if the ground water level rose to elevation 606.5 feet, to initiate and coordinate plant shutdown. Based on the last 2 weeks of the recharge test, the Staff found that, with no wells operating, the rate of ground water rise beneath the RBA was about 0.41 ft/day. This was slightly faster than the 0.35 ft/day rate beneath the DGB. Using the faster rate, it would take about 8.5 days for the ground water level to rise from 606.5 feet to 610 feet, the design base elevation to mitigate soil liquefaction. It would have taken about 36 hours to bring the plant to cold shutdown. Thus, there would have been time to shut down the plant before the ground water reached an elevation that would present a liquefaction hazard. SSER # 2, § 2.4.6.2, at 2-4 to 2-5, § 2.4.6.4, at 2-7 to 2-10; Paris, ff. Tr. 9900, at 37; Tr. 9831-32 (Hood).

(2) *Effects of Dewatering on Soils (Stamiris Contentions 4.D(1) and 4.D(2))*

114. In addition to eliminating or reducing the potential for soil liquefaction, as discussed above, dewatering may have other effects on the engineering characteristics of site soils. Some of these effects may be advantageous while others may be adverse. Dewatering will increase the shear strength of soils which would increase their bearing capacity. Eliminating the lateral force exerted by ground water against underground walls of certain structures would be another advantage of dewatering.

⁷⁵ Dewatering did not actually resume until about 4 weeks after the end of the recharge test. Tr. 9954-58 (Paris).

Potentially adverse effects of dewatering might come from the removal of soil fines, or from the loss of buoyancy of soil particles accompanying removal of the interstitial water and lead to increased compression of the soil. Seismic shakedown is a permanent vertical strain of loose sands related to their densification during earthquake shaking, and which might cause settlement of overlying structures. While not a consequence, strictly speaking, of dewatering, it is a lesser effect that must be considered in lieu of liquefaction of the same sands. The potential for seismic shakedown at the Midland site is governed by the same characteristics of loose sand in the plant fill that caused concern for liquefaction and engendered the need for dewatering (*see supra* Findings 90, 94, 98). Tr. 9212-16, 9814 (Kane); Woods, ff. Tr. 11,549 at 2-6; Hendron, ff. Tr. 8586 at 25, C-10 to C-12; Hendron, ff. Tr. 8675, at 1, 4-8; Tr. 8638-39, 8676 (Hendron).

115. What impact the removal of soil fines would have had on plant soils was not explored in the testimony because both the Applicant's and the Staff's experts agreed that proper discharge-well filter-pack design and construction would obviate the potential cause. The actual tests performed by pumping the dewatering wells and monitoring the content of fines in the discharged water demonstrated that the quantity of fines removed fell within the Staff's acceptance criterion by a considerable margin — less than 2 ppm observed, versus 10 ppm allowed. Monthly monitoring of the discharge from the dewatering wells was to be a requirement during operation of the plant (*supra* Finding 104), and would assure that continued operation of the dewatering system would not remove excessive quantities of soil fines. SSER # 2, § 2.5.4.4, at p. 2-35; Tr. 9814-15, 9828-30 (Kane); Paris, ff. Tr. 9990, at 18-19, 27, 37-38.

116. Dewatering would remove the effect of buoyancy from soil particles, and would hence increase the effective weight of the soil mass. This increase, in turn, would place greater loads on the foundation soils and lead to soil compression.⁷⁶ Tr. 9816 (Kane). The effects of the dewatering loads were seen in plots of measured settlement and parallel plots of water-table elevation. As the water table was lowered, the rate of soil settlement, as indicated by the slope of the settlement curve, increased. During the recharge test, some soil rebound was correlated

⁷⁶ Soil compression refers to the reduction in vertical height in a soil due to loading. Consolidation of soil is the inelastic portion that is not recovered upon removal of the load. Tr. 20,588 (Kane). The effect of dewatering on soil compression would influence settlement of structures founded on natural soils as well as plant fill. For example, the long-term settlement of the containment buildings, founded on natural soils, was estimated at 2.3 and 2.4 inches, of which 0.6 inch was attributable to the dewatering load (SSER # 2, § 2.5.4.5.2, at p. 2-41).

with the rise of ground water level. The effects were expected. For each of the safety-related structures and underground utilities at the Midland site,⁷⁷ the Applicant assessed the additional settlements that would be caused by dewatering, and the Staff was satisfied that they are adequately included in the predicted settlements that were to be used in the structural analyses. Tr. 9816, 9818, 20,535-37, 20,543-45, 20,578 (Kane); SSER # 2, § 2.5.4.5.2, at p. 2-41 (reactor containment buildings only); Staff Exh. 23 ("Diesel Generator Building Dewatering Settlement Report," accompanied by Affidavit of Ralph B. Peck, dated March 4, 1983). For general background, *see also* App. FOF, ¶¶ 122-125 and 137 (DGB), 226-227 (Aux. Bldg.), 261-262 (SWPS), 294 (BWST), 335 (piping), 410 (duct banks).

117. Seismically induced settlements of structures may occur as a result of "seismic shakedown" of loose cohesionless sands in the plant fill. The structures potentially affected would be the DGB and the RBA, as well as the diesel fuel oil storage tanks. The sand bodies subject to shakedown are those that would be potentially subject to liquefaction if not dewatered. The Applicant analyzed the potential additional settlement using conservative earthquake input, i.e., 0.19g peak acceleration and 10 cycles of shearing strain reversal, applied to each known sand body capable of affecting a safety-related structure. The seismically induced settlement was derived by summing the potential shakedown for each layer beneath each structure. Dr. A.J. Hendron presented testimony on his analyses of seismic shakedown potential at the DGB and Dr. R.D. Woods presented results of his analyses on the other safety-related structures and buried utilities potentially affected. Dr. Woods estimated that for an SSE of 0.12g (as accepted here for the Midland site, *see supra* Finding 71) the shakedown settlement would be about 50% of that determined by him (Woods, ff. Tr. 11,549, at 9). The Staff was in agreement with the magnitude of the settlements and concluded that they are reasonable and acceptable for use in design (Tr. 11,558-59 (Kane)). The seismic shakedown settlement for the DGB was 0.25 inch \pm 0.15 inch (Hendron, ff. Tr. 8675, at 1, 8; Tr. 8682-83 (Hendron)) and about ¼ inch or less for the other affected structures (Woods, ff. Tr. 11,549, at 6-9). *See also* Wiedner, ff. Tr. 10,790, at 18-19; Shunmugavel, ff. Tr. 11,997; Shunmugavel, ff. Tr. 12,016, at 5-6.

⁷⁷ While we do not here reach any conclusions on the acceptability of the DGB or its foundation soils, or on the prediction of differential settlement between the main structure of the auxiliary building and the control tower, no unresolved controversy over dewatering effects at those structures exists between the Applicant and Staff. Ms. Stamiris submitted no proposed findings with regard to the technical design of the dewatering system.

III. AUXILIARY BUILDING AND FEEDWATER ISOLATION VALVE PITS

118. Stamiris Contention 4.C(a) asserts:

Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement, and seismic effects for these structures:

- a. Auxiliary Building Electrical Penetration Areas [EPAs] and Feedwater Isolation Valve Pits [FIVPs].

Prehearing Conference Order, dated October 24, 1980, Appendix at 6-7, as supplemented by Ms. Stamiris' Answer to Applicant's Interrogatories, dated April 20, 1981.

119. The Applicant's testimony on remedial measures for the auxiliary building and FIVPs was presented by a panel consisting of Mr. Edmund M. Burke, Dr. W. Gene Corley, Dr. James P. Gould, Mr. Theodore E. Johnson, and Dr. Mete A. Sozen. Burke, *et al.*, ff. Tr. 5509. The Applicant's witness on seismic shakedown of sands in the plant fill beneath the RBA, control tower, EPAs and FIVPs was Mr. Palanichamy Shunmugavel. Shunmugavel, ff. Tr. 11,997. The Staff panel presenting testimony on the remedial underpinning of the auxiliary building was made up of Messrs. Darl Hood, Joseph Kane and Hari N. Singh. Hood, *et al.*, ff. Tr. 5839. Mr. Frank Rinaldi, of the NRC Staff, gave testimony on structural engineering evaluations of the auxiliary building underpinning design. Rinaldi, ff. Tr. 5944 and ff. Tr. 12,080.

120. The auxiliary building is a large, mainly reinforced concrete building located between the containment buildings to the east and west, and adjacent to the turbine building on the south. The main structure is founded on overconsolidated, hard lacustrine clay, a competent natural soil, at elevation 562 feet, about 73 feet below plant grade. The RBA projects northward about 28 feet and is founded on plant fill at elevation 630.5 feet, about 4 feet below plant grade. The control tower projects southward about 48 feet from the main structure, and the EPAs extend as wings about 90 feet to the east and to the west of the control tower. The control tower and EPAs are founded on plant fill at elevation 609 feet, about 25 feet below plant grade. The FIVPs are structurally isolated, but each is adjacent to the outer end of an EPA wing and to the respective containment building which each serves. The FIVPs are supported by plant fill at elevation 615 feet, about 20 feet below plant grade. The auxiliary building, its control tower and EPAs, as well as the FIVPs all contain safety-related equipment and are required to be designed to Seismic Category I standards. Burke, *et al.*, ff. Tr. 5509, at 7-9, Figs.

Aux-1 to Aux-5; Hood, *et al.*, ff. Tr. 5839, at 4-6, 7-8; Shunmugavel, ff. Tr. 11,997, at 2-3, Figs. 1, 2; SSER # 2, § 2.5.4.1.2, at 2-12, 2-13, Tables 2.2, 2.3.

121. The Applicant undertook a soils exploration program in 1978 following discovery of excessive settlement of the DGB. Three borings were taken in the vicinity of the RBA on the north side, and twelve borings were taken along the south side in the vicinity of the control tower, the EPAs and the FIVPs. Inadequately compacted soils that could lead to differential settlement were found in the backfill supporting the EPAs and the FIVPs. An early proposed remedial "fix," subsequently abandoned, would have supported the extreme ends of each EPA by caissons to control their differential settlement. Burke, *et al.*, ff. Tr. 5509, at 10-11, Figs. Aux-6 to Aux-8; Hood, *et al.*, ff. Tr. 5839, at 8-11, 13-14; Tr. 5856-57 (Kane); Tr. 5747-49 (Johnson). *See also* Staff FOF, ¶ 215.

122. In its evaluation of the proposed plan for caisson support of the extreme ends of the EPAs, the Staff determined that the plan did not adequately address the loads it would add to the control tower at the center. In the Staff's view, the added loads likely would have caused over-stressing of the plant fill supporting the control tower under some loading conditions (e.g., dynamic bearing capacity). This problem was to have been solved by the eventually approved plan which required underpinning the control tower and EPAs with new foundation walls that would extend down to the hard lacustrine clay at elevations 562 feet and 571 feet, respectively. Hood, *et al.*, ff. Tr. 5839, at 13-14; Rinaldi, ff. Tr. 5944, at 4; Burke, *et al.*, ff. Tr. 5509, at 1, Figs. Aux-23, Aux-38; Tr. 5873-78 (Singh). The proposed remedy for the FIVPs, i.e., removal of supporting plant fill and replacement by competent nonliquefiable material, was not changed. SSER # 2, § 2.5.4.4.1, at p. 2-17; Burke, *et al.*, ff. Tr. 5509, at 13-14; *see infra* Finding 144, *re* proposed remedial action for the RBA.

123. The Staff's concern over the adequacy of the fill foundation soils supporting the control tower was engendered in part by the differential settlement of the south end of the control tower that had occurred, and by the location of cracks in the auxiliary building. The presence of a 1-foot void between a concrete mudmat and the underlying plant fill, encountered in one of the exploratory borings, also contributed to the Staff's concern over the adequacy of the plant fill beneath the control tower. While the measured differential settlement of the south end of the control tower had been slight (on the order of ¼ inch between

July of 1978⁷⁸ and August of 1981), the Staff believed it was reasonable to expect that it might have been as much as 0.5 to 1 inch, or more, since the beginning of construction. Cracks observed in the auxiliary building concrete, including some through-cracks, were regarded by the Staff as possible manifestations of distress. Tr. 5880-82 (Kane); SSER # 2, § 2.5.4.4.1, at p. 2-17, § 2.5.4.5.2, at p. 2-40; Burke, *et al.*, ff. Tr. 5509, at Fig. Aux-8-A; Hood, *et al.*, ff. Tr. 5839, at 9.

124. The Applicant, on the other hand, regarded the cracking in the auxiliary building as primarily caused by constrained volume changes in the concrete due to temperature changes and drying shrinkage during curing. The Applicant's witnesses recognized the possibility that there may have been some very slight structural deformation associated with rotation of the auxiliary building to the south during settlement. However, their analyses of the locations, patterns and widths of cracks did not indicate to them that the primary cause of cracking was differential settlement, nor that there was evidence of any structural distress, or even structural significance, to be found in the cracking. Burke, *et al.*, ff. Tr. 5509, at 11-12, Figs. Aux-9 to Aux-21, Appendix A.

125. As to the *cause* of the cracking in the auxiliary building, the Staff was unwilling to accept a determination that all of the cracks stemmed from shrinkage of the concrete. (*See* first conclusion, Burke, *et al.*, ff. Tr. 5509, at A-15.) The Staff required an evaluation of the *effect* of the cracks on the Seismic Category I structures supported fully or partially by plant fill, and found that the Applicant's analyses were acceptable. The results of the Applicant's analyses showed that existing cracks do not significantly affect the strength in tension, compression, and shear of properly reinforced concrete members. The results further showed that, provided the structure has been proportioned and detailed to resist design load combinations, reinforced concrete structures will develop their design strength, even if they have "precracks." Crack mapping, repair and monitoring programs were instituted to prevent degradation of the structures during construction of the underpinnings and during the operating lifetime of the plant if construction were to be completed. SSER # 2, § 3.8.3.5, at 3-27 to 3-29; Burke, *et al.*, ff. Tr. 5509, at 11-12, Figs. Aux-9 to Aux-21, Appendix A.

⁷⁸ The Applicant stated that a Foundation Data Survey Program was established in May 1977, with the attachment, at that time, of a settlement marker to *one* corner of the auxiliary building (Burke, *et al.*, ff. Tr. 5509, at 10). Except for a general reference to the FSAR and to asserted use of the observation, the Board found no reference that provided or used the actual elevation data from the marker in the evidentiary record (*cf.* App. FOF, ¶ 216; Burke *et al.*, ff. Tr. 5509, at 56).

126. Underpinning the control tower and EPAs and replacement of the plant fill beneath the FIVPs were selected as the best remedial measures for assuring proper foundation support for the southern portions of the auxiliary building. If properly designed and executed, this approach would cause the foundation loads of these overhanging structures to be borne by the hard natural clay layer and eliminate those concerns about differential settlement arising from the unsatisfactorily compacted plant fill. Potentially, it also would have reduced, or effectively eliminated, stresses in the existing structures that might have been induced during underpinning construction or stresses possibly indicated by the presence of cracking ("precracking"). Burke, *et al.*, ff. Tr. 5509, at 12-14, 31-32, 37, 39-44, 50-53, 56-59, A-12 to A-15; SSER # 2, § 2.5.4.4.1, at 2-16 to 2-23.

127. Following a design audit conducted on September 14-15, 1983, the NRC Staff issued a Board Notification (BN 83-174) concerning soils remedial activities potentially at issue in these proceedings. The Staff cited three open items from the audit findings (items "d," "e," and "g") which it believed pertinent to soils remedial design issues. Open item "d" pertains to the Applicant's method of analyzing differential settlement between the main auxiliary building and the control tower and concerned the baseline length over which effects of a fixed differential and, hence, resultant structural stresses, were to be calculated. This item relates to the Stamiris Contention 4.C(a) allegation on inadequacy of the underpinning design to account for the effect of (future) differential settlement, as well as to the validity of acceptance criteria to be provided to the Staff (as cited in the Modification Order). Open items "e" and "g" call into question the permissible limits of upward movements on the structures during jacking operations, whether residual stresses in the building can be removed during jacking, and how the residual stresses would be treated in the final design analysis load combinations. Items "e" and "g" relate to questions of validity of acceptance criteria, but only indirectly, if at all, to the design adequacy aspects of Ms. Stamiris' contention. Nevertheless, the effect is the same, and the Board makes no findings at this time on any of the three open items referred to above from BN 83-174.⁷⁹ Board Notification Regarding Midland Auxiliary Building Underpinning (BN 83-174), dated November 21, 1983, transmitted to Board and Parties by memorandum from

⁷⁹ The other open items from the Staff's design audit, items a, b, c and f, were not identified as subjects of BN 83-174. BN 83-174 has been provided to all parties but has not been introduced into evidence at this time. We rejected Ms. Stamiris' motion to reopen the record on matters covered by BN 83-174 as premature — see *supra* p. 37.

Thomas M. Novak of the NRC Staff (hereinafter "BN 83-174"); Modification Order at 3.

128. During hearings on quality assurance/management attitude issues, Dr. Ross Landsman, a soils engineer with the NRC Staff, volunteered that in his opinion the design of the auxiliary building, and the SWPS, whereby the main part of the structure was founded on hard soil and another part was founded (at a higher elevation) on plant fill, constituted a design deficiency. See Figure 5, *supra* p. 97. He asserted that this design had an inherent potential for developing problems as a result of differential settlement. The "overhanging" part, resting on [a thick section of] backfill, could act as a cantilever projecting from the main structure if the backfill settled more than anticipated in the design. This would cause overstressing of the structure in the region where the two parts of the building connect. Dr. Landsman believed that, even if the backfill had been compacted as designed, the configuration would still have presented a problem at the Midland plant. However, similar design configurations have been accepted not only at the Midland plant (at the construction permit stage) but at other plants; the configuration violates no regulatory requirements and, if properly built, would be licensable. Dr. Landsman testified that differential settlement also was a problem at at least one of the other sites (South Texas), but he did not know if the differential settlement there was attributable to design of the foundations or to the compacted fill. Because this condition is what the underpinning was principally intended to remedy, the potential safety problems to which the cantilevered design might give rise would be adequately resolved for the Midland structures. We therefore need not determine whether or not the original design practice is generally acceptable. We are therefore not doing so — but see our recommendation in the Opinion section, *supra* pp. 93-94. Tr. 15,060, 16,316-17, 16,319, 16,392-99, 16,404-05, 16,505-09, 16,589-91, 16,816 (Landsman); Tr. 20,218-43, 20,281-88 (Thomas).

129. The underpinning wall for each electrical penetration area was to extend down to undisturbed lacustrine clay at about elevation 571 feet. Each wall would have a minimum thickness of 6 feet with an increased thickness at the base to provide greater soil bearing area. The thickness of the base would vary as the north face of each wall curves about the containment, leaving a 4-foot gap for compacted sand fill. Burke, *et al.*, ff. Tr. 5509, at 12, Figs. Aux-22 to Aux-29. (In its responsive FOF, ¶ 219, the Staff advised the Board that the Applicant was planning to use lean concrete instead of sand to fill the 4-foot gap left by the curving of the walls around each containment. The Applicant's Reply FOF, ¶ 219, indicated that any change would be submitted for Staff ap-

proval pursuant to the Work Authorization Procedure adopted as a result of LBP-82-35, *supra*.)

130. The underpinning wall for the control tower would extend down to undisturbed glacial till at elevation 562 feet and consist of 6-foot-wide by 3-foot-long piers (which provide support during construction operations) and closure portions which interconnect the individual piers to provide a continuous permanent underpinning wall. The piers and wall sections were to be belled out to 14 feet wide at the base to provide greater soil bearing area. The underpinning walls would have formed a box in conjunction with the existing south foundation wall of the main portion of the auxiliary building to which they were to be attached. The control tower underpinning walls would also have been attached to the underpinning walls of the electrical penetration areas. Burke, *et al.*, ff. Tr. 5509, at 12-13, Figs. Aux-22 to Aux-25.

131. The FIVPs were to be supported in a different manner than the control tower and EPAs. The existing backfill under the FIVPs was to be removed and replaced with well-compacted granular material to a suitable height below the existing valve pit mat. The new granular backfill was to be compacted to 95% maximum dry density as determined by ASTM Test D-1557 or ASTM Test D-2049, whichever results in the greater maximum dry density. A reinforced concrete slab would have been cast on top of the new fill and jacks placed between the slab and the original mat to precompress the new fill. After precompression of the fill was completed, the space between the slab and the original mat was to be filled with grout and concrete. A beam-and-tie system which provides temporary support for the FIVPs was installed for their support during the underpinning operation. *Id.* at 13-14, Figs. Aux-21, Aux-31; SSER # 2, § 2.5.4.4.1, at p. 2-17.

132. In order to accomplish the underpinning of the control tower and EPAs and the removal and replacement of the soil backfill under the FIVPs, access shafts were dug on the west and east ends of the affected area. These shafts were located immediately to the north of the turbine building and immediately to the west and east of the respective FIVPs. From these access shafts, tunnels were excavated which allowed workers to drift under the turbine building and, as the work progressed, under the EPAs, FIVPs and control tower. The work was to progress in a stepwise fashion, tunneling far enough to construct the first temporary supports, constructing those supports, tunneling far enough to accomplish the next part of the construction, constructing it and so on. Burke, *et al.*, ff. Tr. 5509, at 14-28, Figs. Aux-22 to Aux-26, Aux-30; SSER # 2, § 2.5.4.4.1, at 2-17 to 2-23; *see also* Tr. 5532-72 (Burke).

133. Because excavation under and alongside existing structures was necessary to accomplish underpinning efforts, the construction procedures to be used included measures to support the soil adjacent to all excavations and to provide temporary support for the affected structures during the construction process. In addition to the piers which were to become part of the foundation walls, and the beam-and-tie system to support the FIVPs, the EPAs were to be supported by a grillage system of beams and cross-beams supported at one end by steel posts resting on a projection of the containment structure and at the other end by a constructed pier (Pier M) bearing on the undisturbed natural soil (Tr. 5542-46 (Burke)). The procedures and sequence of construction of the underpinning operation for the auxiliary building and FIVPs are explained in detail by one of the Applicant's witnesses, Mr. Burke (at Tr. 5532-72), and in the prepared testimony of the Burke panel, ff. Tr. 5509, at 14-28. *See also* SSER # 2, Appendix I.

134. Temporary post-tensioning ties were installed to the upper part of the east-west wall of each EPA on either side of, and through, the control tower. These ties served to compensate for loads induced by loss of buoyancy under the EPAs resulting from construction dewatering of the foundation soils (*see infra* Finding 137). Burke, *et al.*, ff. Tr. 5509, at 16, Fig. Aux-27 (*cf.* SSER # 2, § 3.8.3.1, at p. 3-6).

135. During underpinning construction, the ground water level was lowered in the area of the southern end of the auxiliary building to about 565-foot elevation (30 feet below the permanent dewatering level). A freeze-wall or freeze-curtain dam, in conjunction with the existing west cutoff dike and the impermeable clay beneath the containment buildings, was created in order to maintain relatively dry working conditions. Burke, *et al.*, ff. Tr. 5509, at 16-18, 55, Fig. Aux-28; Tr. 5511-18 (Burke).

136. The freeze-wall was emplaced by drilling a line of closely spaced bore holes and circulating a coolant at low temperatures through pipes in the boreholes. The coolant froze water in the soil in a narrow strip along the line of boreholes and from elevation 610 feet down to the undisturbed natural soil (lacustrine clay). The frozen soil acted as a dam which minimized seepage of ground water into the excavations from surrounding areas. Breaks in the freeze-wall were left in the vicinity of buried utilities to prevent possible damage that might have resulted in heaving of the utility lines or ducts where they were crossed by the freeze-wall. Seepage through the freeze-wall at these breaks was to have been controlled by excavating and backfilling with impermeable materials and/or by temporary dewatering wells installed in their vicinity.

Burke, *et al.*, ff. Tr. 5509, at 16-18, 55, Fig. Aux-28; Tr. 5511-18 (Burke); SSER # 2, Appendix I at I-1 to I-2; Tr. 22,106-07 (Wheeler).

137. The Applicant took into account the loads resulting from the lowered ground water elevations to be maintained by permanent dewatering and by temporary (construction) dewatering in its design of the remedial soils measures for the control tower, electrical penetration areas and FIVPs. The NRC Staff verified that these loads were considered in the design of the remedial soils measures and that, with the exceptions noted in BN 83-174 in regard to differential settlement between the main part of auxiliary building and the control tower, the Applicant's design loads with respect to effects of dewatering were acceptable. Rinaldi, ff. Tr. 12,080 at 2-3; Tr. 12,101-03 (Rinaldi); Burke, *et al.*, ff. Tr. 5509, at 16-18, 55-57; Board Notification BN 83-174.

138. The natural clay soil which was to provide foundation support for the underpinning of the control tower, EPAs and FIVPs is the same as that supporting the containment buildings and main part of the auxiliary building. All parties and the Board in these proceedings often referred to all the natural soils at the Midland site simply as "till" or "glacial till," when, in fact, glacial till actually occurs only in limited areas of the plant site. The natural soil in the vicinity of the auxiliary building is a very stiff to hard clay of lacustrine origin which has been overconsolidated by glacial ice (probably many hundreds of feet thick) that produced a compressive burden on the clay greatly in excess of the foundation load that will be exerted by the Midland Plant structures. In determining settlement, an overconsolidated or precompressed clay will have no "virgin" compression and the elastic modulus (Young's Modulus) can be used to calculate the elastic recompression of the soil. Jacking loads were to have been maintained until pier settlements indicated that the full elastic recompression had been attained. Secondary, long-term settlements can be computed separately by extrapolating observed secondary compression or by using coefficients of secondary consolidation. The settlement calculated from secondary consolidation would be added to the initial settlement from elastic recompression to predict total settlement of the piers. Future settlement of structures resting on the piers would be predicted from the secondary consolidation of the clay, because of the preloading procedure. Tr. 5873-79 (Singh), *amending* Hood, *et al.*, ff. Tr. 5839, at 15-16; Burke, *et al.*, ff. Tr. 5509, at 50-51, 53-55, Table Aux-4; *see also* Staff FOF, ¶ 219 (and authorities there cited) for clarification of natural soils terminology.

139. Hydraulic jacks placed at the tops of the piers were to be used to impose predetermined pre-loads on the underpinning supporting soil

before the control tower and EPAs were finally fixed to the underpinning. After each increment of jacking, sets of steel plates and wedges adjacent to the jacks were to be driven tight to prevent settlement of the structure when jacking pressures were removed. The structural motions were to be monitored to assure that excessive stresses were not developed in the structure during the jacking process. Stresses in the piers were to be monitored by means of Carlson gages embedded in the top and bottom of the pier concrete or by load cells at the top of the pier. Pier vertical deflections were to be monitored to ensure that primary compression (elastic recompression) of the supporting clay was attained, and predicted future long-term settlements would be checked by extrapolation of the trend of the measured secondary settlements while the jacks were still active. Burke, *et al.*, ff. Tr. 5509, at 22-34, 36-37, 53-55; SSER # 2, § 2.5.4.6.1, at 2-44 to 2-46, 2-48 to 2-50; § 3.8.3.a, at 3-6 to 3-9.

140. During underpinning construction the Applicant conducted a pier load test to evaluate the soil parameters and settlement response of the lacustrine clay. The test procedure, which was found acceptable to the Staff, was to load pier W-11 by jacking to 50% of the maximum load predicted throughout the operating life of the plant, unloading to 25%, and then raising to 130% of the maximum predicted load. After completion of the test the load was lowered to the design jacking load (SSER # 2, § 2.5.4.6.1.2, at p. 2-51). The pier load test did not produce expected results in that the Carlson stress meters on the pier indicated that the load was not reaching the bottom of the pier (Tr. 14,370-71, 14,664 (Landsman)). Also, settlement of pier W-11 during (or subsequent to) the test was apparently more than predicted (Tr. 16,601-05 (Landsman)). As a result, the Applicant reevaluated the structure using an assumed settlement of twice the originally calculated amount, equivalent to an assumption of a soil modulus of one-half the originally estimated value. The purpose of the reanalysis, according to the Applicant, "was to ensure that even if the soils conditions were as poor as the tests indicated, the building would perform satisfactorily over the life of the plant" (Tr. 17,170 (Mooney)). This reanalysis was the subject of the NRC design audit that resulted in the issuance of BN 83-174 (*supra* Finding 127). The Board notes that the Applicant's assumption of a reduced elasticity modulus in its reanalysis was derived from an option provided to it by the Staff following unsatisfactory completion of the pier W-11 load test (Tr. 16,604-05 (Landsman)). The assumption of a reduced soil modulus does not equate to a reduction of bearing capacity by one-half, as alleged in Ms. Stamiris' FOF "13," item (1) at 5. *See*

Burke, *et al.*, ff. Tr. 5509, at 51-53, for a discussion of “ultimate bearing capacity” and the determination of the “bearing capacity factor” for the clay; and, *id.* at 53-55, for a discussion of the settlement estimates using the elastic method for estimating settlement of overconsolidated clay.

141. The Applicant took into account loads which would be imposed by postulated seismic events as well as flooding events in developing and evaluating the design of the remedial soils measures for the control tower, EPAs and FIVPs and, in so doing, complied with the requirements of SRP §§ 3.7.2, 3.8.3 and 3.8.5. Rinaldi, ff. Tr. 12,080, at 6-8; SSER # 2, § 3.8.3.1, at 3-10 to 3-11; Burke, *et al.*, ff. Tr. 5509 at 46, Appendix B. *See also supra* Findings 19-79, for general background on seismic issues. However, the seismic evaluation is subject to the resolution of the design deficiency identified in BN 84-115 (*see supra* Findings 88-89) and our findings on seismic design are limited by this open item.

142. Because the SSRS was not yet agreed upon when the design of the remedial soils measures was developed, the Applicant used loads equal to 1.5 times the loads which would result from the FSAR SSE in evaluating the design of the remedial soils measures for the control tower, electrical penetration areas and the FIVPs. Subsequent analysis by a consultant hired by the Applicant and an audit of the Applicant’s design calculations by the NRC Staff determined that loads equal to 1.5 times FSAR SSE loads are conservative in relation to loads which would result from the now-agreed-upon SSRS. Tr. 6004-28, 6038-41 (Kennedy); Rinaldi, ff. Tr. 12,080, at 7-8; Tr. 12,130-31 (Rinaldi); *see also supra* Findings 77-79, on seismic issues.

143. The Applicant analyzed the potential for seismic shakedown of loose sands in the fill to affect the performance of Category I structures. However, because the replacement fill under the FIVPs was to be compacted to a 95% maximum dry density and all of the underpinning was to be founded on the natural hard clay, like the main portion of the auxiliary building, seismic shakedown is a potential concern only with respect to the RBA portion of the auxiliary building. The Applicant evaluated the seismic shakedown effects for the railroad bay and liquid radwaste areas and determined that, even in the event of an earthquake with peak ground acceleration of 0.19g, settlement of no more than approximately 0.25 inch would occur. This amount of settlement would not affect the integrity of the auxiliary building. Shunmugavel, ff. Tr. 11,997, at 3-7; Woods, ff. Tr. 11,547, at 6; Tr. 12,004-11 (Shunmugavel).

144. The Applicant and the Corps of Engineers, for the NRC Staff, conducted independent liquefaction analyses for the Midland site. Insofar as they apply to the underpinned auxiliary building and the FIVPs,

these studies indicated that a potential for liquefaction would remain in the plant fill soils only beneath the RBA portion of the auxiliary building. By lowering and maintaining the ground water elevation in this area to below elevation 610 feet, the Applicant's permanent dewatering system would eliminate concerns about soil liquefaction potential beneath the RBA. The natural hard clay beneath the auxiliary building is not liquefiable. Therefore the underpinning and excavation-and-backfill measures for the control tower, EPAs and FIVPs would eliminate any concern, if it existed, for potential soil liquefaction in these areas. In carrying out its liquefaction analysis, the Corps of Engineers postulated a seismic event with peak ground acceleration of 0.19g, which is more severe than the SSE for the Midland site determined during the course of these proceedings. SSER # 2, § 2.5.4.5.5, at 2-42 to 2-44; Woods, ff. Tr. 9745; *see also supra* Findings 90-93, 97 on soil liquefaction potential. The Board concludes that there is an acceptable margin of safety against liquefaction of soil beneath the RBA, provided the ground water in that area is maintained below elevation 610 feet.

145. Because of the possibility of structural movement as a result of the excavations alongside and under existing structures necessary for construction of the remedial soils measures for the control tower, EPAs and FIVPs, the Applicant installed extensive instrumentation to monitor any absolute or relative movement which might occur.⁸⁰ For a detailed description of the instrumentation, places of installation and movements measured, *see* Burke, *et al.*, ff. Tr. 5509 at 29-34, Fig. Aux-36; SSER # 2, § 2.5.4.6.1, at 2-44 to 2-49; Tr. 9400-05 (Krause).

146. The primary monitoring system consists of a network of state-of-the-art electronic measuring devices which were to be read by computer every hour and which were to be attended by a technician 24 hours a day. Tr. 9400-03 (Krause). At every point where an electronic device is installed there is also installed a mechanical gauge which does not depend on the electricity to operate. The mechanical gauges would be used to cross-check the electronic readings and would serve as a backup system in the event of a power outage. Tr. 9404-05 (Krause). All the instrumentation was installed away from the immediate area of any construction activities and all the measuring devices were in metal

⁸⁰ This monitoring of structures during underpinning construction activities addressed concerns expressed by the Board to the effect that:

(1) the system for detecting structure movement be reliable as well as accurate so that large data gaps do not occur or instruments get covered up with sand; (2) the plan for arresting structural movement, if it should occur, is adequate; and (3) there is sufficient clearance between the turbine building and the auxiliary building, after taking into account any settlement of the buildings, so that the two buildings would not collide during an earthquake.

Tr. 7122-28.

cases so they should not become covered with sand or suffer degradation due to environmental conditions. Tr. 9405 (Krause). Together the mechanical and electronic devices would provide a reliable and accurate monitoring system for detecting any structural movement and provide reasonable assurance that no significant data gaps would occur. Tr. 9404-05 (Krause); R. Cook, *et al.*, ff. Tr. 11,391, at 3-4, Attach. 5, at 4. Also, extensometers were installed to monitor strains that might occur in certain walls, and a crack-monitoring program was initiated to monitor development of any new cracks or changes in the width of already-mapped cracks. Tr. 5521-26 (Burke); Tr. 9413-14 (Shunmugavel); Tr. 9549-50 (Shunmugavel, Boos, Burke).

147. The computer took hourly readings of all the instruments monitoring structural movement and was set to sound an alarm and immediately print out the data it had collected if an alert or action level were reached. In the event an action level were reached, the NRC Staff was to be notified. An NRC Staff test verified that the computer did sound an alarm and print out collected data when displacement exceeding the alert level was recorded by one of the instruments. Tr. 9400-04 (Krause); R. Cook, *et al.*, ff. Tr. 11,391, at 3-4; Tr. 11,396-97 (Landsman); Tr. 9412 (Boos).

148. The Applicant and the NRC Staff agreed on alert and action levels for structural movement which, if reached, would require that appropriate procedures be followed. The action levels for the auxiliary building were arrived at by analyzing the structure to determine what would constitute tolerable deflections. Once these were calculated and the action levels were set, with the concurrence of the NRC Staff, half the action level would generally be used as the alert level. The action levels for deflection of the auxiliary building are based on a very conservative analysis of what that structure could tolerate. R. Cook, *et al.*, ff. Tr. 11,391, Attach. 2 (Bechtel Specification C-200); SSER # 2, § 2.5.4.6.1.2, Table 2.7, at p. 2-49; Tr. 9413-14 (Shunmugavel).

149. Any movement the monitoring system detected would have been analyzed and appropriate steps would have been taken in response to that movement. In response to any movement trends in the monitoring record which suggest that an alert or action level might be reached, the applicant would have taken steps to arrest the movement before an alert or action level was reached. The primary method which would be used to arrest structural movement would be to jack additional loads into the existing piers and underpinning. However, there were contingency plans for installing additional temporary supports in those instances when the jacking would not be relied upon. If appropriate, all work would be stopped in the area of the movement. Tr. 9406-08

(Burke, Boos); 9634-37 (Poulos); Tr. 11,392 (Landsman); *see also* R. Cook, *et al.*, ff. Tr. 11,391, Attach. 2.

150. The Applicant performed an analysis of how much space is needed between the nonsafety-related turbine building and the safety-related auxiliary building at various elevations in order to ensure that these buildings do not come in contact with each other during an earthquake. Calculations of the maximum amount of deflection of each of these buildings during an earthquake determined that at all elevations there is significantly more space available between the building than the combined amount of deflection of both buildings. Instrumentation was installed by the Applicant to measure relative horizontal displacement between these two buildings to assure that settlement rotation during underpinning activities does not reduce the existing clearance to a point where the buildings would interact during an earthquake. Thus, there is reasonable assurance that the turbine building and the auxiliary building would not impact during an earthquake as large as the SSE determined during the course of these proceedings. Tr. 9416-22, 9621-23 (Shunmugavel); Tr. 9608-21, 9626-29 (Rinaldi); *see also* App. Exh. 27.

151. This Board finds that the concerns expressed in Stamiris Contention 4.C(a) have been adequately addressed, except with respect to the soil spring constants to be utilized in a seismic margin review. The Applicant at this time has adequately evaluated and taken into account during design of the soils remedial actions the responses regarding dewatering effects and (except as noted below) seismic effects, whether static or dynamic, for the auxiliary building electrical penetration areas and feedwater isolation valve pits. However, in the absence of a complete record on resolution of open issues described in Board Notifications BN 83-174 and BN 84-115, as discussed, *supra*, in Findings 127 and 88-89, we make no finding on the adequacy of the design of the remedial action to account for effects of differential settlement between the main portion of the auxiliary building and the control tower; our findings concerning the conservatism of the soil spring constants to be used in a seismic margin review of the auxiliary building structures are limited to the *nominal* value of such constants (and are subject to resolution of the reported design deficiency).

IV. SERVICE WATER PUMP STRUCTURE

152. The service water pump structure (SWPS), which houses the five pumps and support equipment for the service water system, is a Seismic Category I structure, located at the northwest bank of the return

leg of the cooling pond, adjacent to the circulating water intake structure (CWIS) and the Seismic Category I retaining wall of the cooling pond. It is a rectangular, reinforced concrete building with upper and lower sections of different dimensions. The lower section is approximately 72 feet long and 86 feet wide. Its base slab is supported on undisturbed glacial till at elevation 587 feet. The upper section is 106 feet long and 86 feet wide. This size difference results in an overhang at the north end of the upper section, resting on soil. Excavation of the natural clay material left a generally triangular (or trapezoidal) volume under the overhang to be backfilled. Thus the overhang was to be supported by this volume of fill as well as the unexcavated natural material above the undisturbed glacial till layer supporting the main part of the SWPS at elevation 587 feet. Boos, *et al.*, ff. Tr. 9490, at 1-3, Figs. SWP 2-4; Tr. 9728-29 (Hood); SER, § 1.12.7, at p. 1-23; Tr. 9536-41 (Boos); App. Exh. 28; SSER # 2, Fig. 2.8; *see* Figure 5, *supra* p. 97.

153. To evaluate the backfill under the overhang portion of the SWPS, eleven soil borings were taken — two inside the SWPS and nine in the surrounding area. These borings indicated that some localized areas of the soil backfill underneath and adjacent to the overhang portion of the SWPS had not been sufficiently compacted. The inadequately compacted fill revealed by the borings, however, has not caused the SWPS to undergo any unusual settlement, or to experience any significant structural distress. A Foundation Data Survey Program was established by the Applicant in May 1977 to monitor settlement of Seismic Category I buildings. Pursuant to this program, settlement markers were attached to the four corners of the SWPS by the Summer of 1978. In addition, six construction survey control points were installed a short time after concrete placement. Monitoring of the settlement markers and the survey control points has shown that the SWPS has been very stable, with a maximum north-south differential settlement of 0.25 inch. Settlements predicted by the Applicant after completion of the underpinning wall of the SWPS overhang, relative to the portion currently on the till, are 0.1 to 0.2 inch. The Staff considers these estimates of differential settlements for the underpinned SWPS reasonable and acceptable. Boos, *et al.*, ff. Tr. 9490, at 3-5; Tr. 9517-18 (Boos); SSER # 2, § 2.5.4.5.2, at p. 2-41; Tr. 9737-38 (Kane).

154. In December 1978, the Applicant instituted a crack-mapping program for all Seismic Category I buildings founded on plant fill. Several crack mappings of the SWPS were conducted pursuant to this program. The Applicant and Staff reached different conclusions on the reasons for cracks. Dr. W. Gene Corley, the Applicant's expert, concluded that the primary reason for the cracking was restrained volume changes

that occur during curing and drying of concrete. Although he could not completely rule out the possibility that stresses due to differential settlement contributed to some degree to the observed cracking, Dr. Corley indicated that the observed crack patterns do not support the conclusion that stress due to differential settlement was a primary cause of cracking. Dr. Corley observed no evidence of structural distress. On the other hand, the Staff noted the presence of some cracks at locations where one would expect them to occur if caused by differential settlement. Accordingly, in assessing the effects of cracks, the Staff directed its attention to determining whether the cracks significantly diminish the strength of the structure. The Applicant has shown that there is no such diminution in strength. A program for crack monitoring (and repair where appropriate) has been agreed to and found acceptable by the Staff. See discussion, *infra* Finding 163. The Staff concluded that, once concerns about future differential settlement were addressed by the remedial measures, it was no longer necessary to address further the reasons for the cracks. Dr. Corley agreed.

While the observed settlement of the SWPS and an analysis of the observed cracks in the SWPS indicate that the SWPS has not suffered significant structural distress to date, the Applicant elected to underpin the overhang portion of the SWPS in order to ensure long-term foundation stability and to allay concerns about future differential settlement due to the pockets of compressible backfill discovered under the overhang portion of the SWPS. Burke, *et al.*, ff. Tr. 5509, at 11; Corley, ff. Tr. 11,204, at 11-29 (crack mapping), 29-34 (crack significance), and 34-40 (crack monitoring); Tr. 9721 (Rinaldi); SSER # 2, § 2.5.4.4.1, at p. 2-23, § 3.8.3.5, at 3-27 to 3-29; Corley, ff. Tr. 11,206, at 1-3 and Attach. 1; Boos, *et al.*, ff. Tr. 9490, at 6; Tr. 18,483-84 (J. Cook); Tr. 2743-46 (Hood); Tr. 9738 (Kane).

155. The underpinning design for the SWPS consists of a continuous perimeter underpinning wall beneath the north end of the SWPS. The reinforced concrete wall was to form a box structure beneath the overhang, connected to the sides of the lower portion of the existing structure, and extending from the upper foundation slab to undisturbed glacial till at approximately elevation 587 feet. The completed underpinning wall would thus provide a structural foundation resting on undisturbed glacial till. *But see infra* Finding 158. In order to construct the underpinning for the SWPS, an access cofferdam was to be constructed to provide access for workers and equipment. It was to be excavated in two stages using soldier piles, tubular steel lagging and wales to ensure proper support for the adjacent soil. Initially it would be excavated, adjacent to the SWPS, to elevation 618 feet to permit installation through ap-

proach pits of the piers at the corners of the SWPS. Then the cofferdam would be lowered at the northwest corner to elevation 609 feet to provide access for excavation of a tunnel beneath the west wall of the SWPS. A tunnel was planned to provide access for constructing the west underpinning wall because of the location of the CWIS. All of the underpinning under the north and east walls of the SWPS would be constructed from elevation 618 feet by means of approach pits from the access cofferdam. Boos, *et al.*, ff. Tr. 9490, at 6-9; SSER # 2, § 3.8.3.2, at p. 3-15; Tr. 5534-36 (Burke).

156. Construction of the underpinning made it necessary to lower temporarily the ground water table, and construction dewatering wells were to be installed in the vicinity of the SWPS for this purpose. Operation of these wells would maintain the ground water level 2 feet below the lowest point of any existing excavation during the construction of the SWPS underpinning. To offset any loss of buoyancy force during the construction due to temporary dewatering, post-tensioning ties were installed along the tops of the east and west exterior walls of the SWPS in November 1981. These ties, which consist of two tendon groups on each side of the building, apply a compressive force of approximately 500 kips (kilo-pounds) to the upper portion of the east and west exterior walls. Boos, *et al.*, ff. Tr. 9490, at 8 and 10; SSER # 2, § 2.5.4.6.1.2, at p. 2-51; Tr. 9515-17 (Shunmugavel).

157. It was planned that the construction of the underpinning progress in stages. The principal consideration in the first stage of construction was to provide initial support for the north end of the SWPS in order to compensate for the possible loss of support under the base slab caused by the underpinning operations and further to counteract any loss of buoyancy force. After completion of the first stage, the rest of the piers would be constructed in a designated sequence. A typical pier would be 5 feet long, 4 feet wide and 30 feet deep. The piers along the north wall would be belled to 6 feet wide at the bottom. Shear keys and reinforcement would be used so that the individual piers, though cast separately, would form one continuous wall upon completion. Boos, *et al.*, ff. Tr. 9490, at 9-15 and Figs. SWP 11-13; SSER # 2, Fig. 2.9, at 2-27 to 2-30.

158. It was expected that all the piers would be founded on undisturbed glacial till which would have been inspected and accepted as adequate by a geotechnical engineer before each pier was cast. It is possible, however, that some pockets of alluvial sand might be encountered at the 587-foot elevation. If alluvial sand were encountered at the base of any of the piers, it would be removed if the pocket were shallow (less than 18 inches deep); however, if it were deep, it would have been accepted

as an adequate foundation material if undisturbed. The alluvial sand found so far has exhibited a higher median blowcount than the undisturbed glacial till and therefore would provide an adequate foundation. A lean concrete working mat was to be cast on top of the inspected and accepted soil to ensure that it remained undisturbed throughout the casting of the pier. A load test of pier 1E at the SWPS was to be performed as was done at the auxiliary building; i.e., using an initial loading of 130% of the maximum predicted bearing pressure, eventually reduced to the design jacking load. The Staff found this procedure acceptable. However, at the SWPS an additional pier would have been load-tested if the bearing level for any of the piers were on the dense sandy alluvium rather than the hard sandy clay fill.⁸¹ Boos, *et al.*, ff. Tr. 9490, at 11-13 and 29-32; Tr. 9545-47 (Burke); SSER # 2, § 2.5.4.6.1.2, at p. 2-51 (pier foundation load tests).

159. Ms. Stamiris' Contention 4.C(b), as amended, expresses certain safety-related concerns with respect to the remedial measures the Applicant has proposed for ensuring adequate foundation conditions for the SWPS. The contention states:

- C. Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement and seismic effects for these structures:

* * *

- b. Service Water Intake Building [sic] and its Retaining Walls

Prehearing Conference Order, dated October 24, 1980, Appendix at 6-7, as modified by Ms. Stamiris' Answer to Applicant's Interrogatories, dated April 20, 1981. (Ms. Stamiris clarified (at Tr. 9500) that this contention refers to the SWPS rather than to the adjacent Circulating Water Intake Structure (CWIS), which is not safety-related.)

160. The Seismic Category I retaining wall in the vicinity of the SWPS is structurally isolated from the SWPS and would therefore not be affected by the underpinning of the overhang portion of the SWPS. The retaining wall was constructed in two sections which are structurally isolated from one another (though the sections would perform as a unit). One section is totally founded on undisturbed glacial till and the other is totally founded on plant fill. The retaining wall has exhibited only very small settlement to date and no compressible layers of soil

⁸¹ We were informed (App. Reply FOF, ¶ 258) that the Applicant was giving consideration to substituting a plate load test for the test described in SSER # 2 because of the poor experience with the pier load test encountered at the auxiliary building. Since such a change, along with other possible last-minute modifications, would have been subject to Staff approval under the Work Authorization Procedure, it is not a factor in our formulation of this Partial Initial Decision. See discussion at Tr. 14,379.

were found in the plant fill supporting one section of the retaining wall. Therefore the foundation of the retaining wall was not part of the problem involving plant fill and it was determined that no remedial soils measures were required. Tr. 9692-93, 9723-27 (Kane); Tr. 9726-27 (Hood).

161. In evaluating the design of the SWPS underpinning, the Applicant has taken into account the load resulting from the lowest ground water level possible as a result of the temporary dewatering necessary for the construction of that underpinning (587 feet), as well as the highest possible ground water level (627 feet) (estimated as equal to the highest water elevation predicated for the cooling pond). The NRC Staff reviewed the calculations the Applicant used to analyze the design, in light of the loads which would result from the lowest and highest possible ground water levels, and found that the design was acceptable and met all applicable requirements with regard to its capacity to withstand those loads. Tr. 9698-99 (Rinaldi).

162. The Applicant predicted that after completion of the underpinning there should be no more than 0.1 to 0.2 inch of differential settlement between the overhang portion of the SWPS and the portion currently founded on glacial till. The planned method of construction would achieve small values of differential settlement by jacking loads onto the underpinning until only secondary settlement remains, before final lock-off. The NRC Staff considered this estimate of differential settlement to be reasonable and acceptable. Moreover, the NRC Staff indicated that the Applicant had considered loads associated with both the predicted differential settlement and the predicted total settlement in analyzing the design of the underpinning for the SWPS. The Applicant assigned a load factor of 1.4 (equivalent to the load factor for deadweight loads) to differential settlement loads in accordance with the requirements of the Standard Review Plan. The NRC Staff found the Applicant's calculations to be acceptable and the design for the SWPS underpinning to be conservative with respect to its capacity to withstand any loads which would be imposed as a result of predicted differential settlement. Boos, *et al.*, ff. Tr. 9490, at 34-39; Tr. 9690-91 (Kane); Tr. 9697-99 (Rinaldi); SSER # 2, § 2.5.4.5.2, at p. 2-41.

163. To implement the crack-monitoring and repair program referenced supra in Finding 154, the Applicant installed instrumentation in the underpinning itself and in the SWPS. The instrumentation would have been used to monitor any building movement which might occur prior to or during construction, in order to determine if the SWPS were suffering any structural distress as a result of the underpinning

operation. Acceptance criteria for movement and strain limits were developed and incorporated into the Applicant's construction specifications as "alert" and "action" limits, each with specified consequences. In particular, if a new crack greater than 0.01 inch developed or if an existing crack exceeded 0.03 inch in width, an evaluation would have been undertaken to determine whether underpinning procedures should be altered or halted. Requirements for repair of certain cracks were also specified. If an "action" level were reached, a report would be required to be made to the Staff; in our view, the Staff should also have been authorized to require reports (if it deemed them useful) whenever an "alert" level was reached, and (insofar as construction might be resumed) we grant such authority. Furthermore, efforts have been made to anticipate and plan for contingencies which might cause structural movement or cracking. For example, the portion of the SWPS wall which comes into contact with cooling pond water was to be coated with waterproofing compounds. Precautions were also to be taken to assure against skin friction during the pier load testing. Boos, *et al.*, ff. Tr. 9490, at 15-20; Tr. 9549-55, 9570-74, 9584-91 (Boos, Burke, Shunmugavel); SSER # 2, § 2.5.4.6.1.2, at 2-50 to 2-51 and § 3.8.3.5, at p. 3-29; Tr. 9634-38, 9641 (Poulos); statement by Steptoe (Applicant's counsel) at Tr. 9592.

164. The Applicant took into account seismic effects in evaluating its design of the underpinning for the SWPS. The SWPS underpinning was required to be designed to meet loads associated with the site-specific response spectrum (SSRS). However, because the SSRS had not been agreed upon when the design was developed, the Applicant used loads equal to 1.5 times the FSAR SSE loads in developing and evaluating the design. Subsequent analysis has determined that loads equal to 1.5 times FSAR SSE loads exceed those which would result from the now-agreed-upon SSRS. The NRC Staff reviewed the Applicant's design calculations and was satisfied that the SWPS underpinning would be adequate to meet design conditions, including earthquake motions equal to those of the SSRS. As part of the seismic margin review, the entire SWPS, existing portion plus underpinning, would have been evaluated to determine whether the integrity of the structure would be affected by earthquake motions equal to those of the SSRS. Preliminary indications were that the SWPS would withstand an SSRS earthquake without impairing safety-related functions. SSER # 2, § 3.7.2, at 3-2 to 3-4, § 3.8.3.2, at 3-14 and 3-15; Tr. 6004 (Kennedy); Tr. 9568-69 (Shunmugavel); Tr. 9626-30, 9694-97, 9701, 9713-19 (Rinaldi); Boos, *et al.*, ff. Tr. 9490, ¶¶ 5.1 and 5.2, at 20 and 21, and ¶ 7.1.1.5, at 25 and 26. We note, however, that the seismic model which was to have been utilized

for the seismic margin review of the SWPS appears to be subject to the same design deficiency as has been discussed, *supra*, at pp. 70-71 and Finding 88. Our finding with respect to the SWPS seismic model is limited to the adequacy of the *nominal* values of the soil spring constants and is subject to resolution of the design deficiency noted above.

165. Because once the underpinning for the overhang portion of the SWPS was complete the entire SWPS would be founded on undisturbed glacial till, soil liquefaction and seismic shakedown are not factors which would affect the performance of the SWPS during a seismic event. (Findings on site-wide problems of liquefaction and dewatering are set forth in Findings 90 to 117, *supra*.) The Applicant also analyzed the possibility of an interaction between the SWPS and the nearby CWIS during postulated seismic events. The results of this analysis showed that there was sufficient space between the two buildings to ensure they would not collide during an SSRS earthquake. The space available between the SWPS and the CWIS is 1 inch, while the sum of the maximum displacements of the two buildings during a postulated FSAR SSE (DBE) is 0.3 inch and during a postulated SSRS earthquake is 0.5 inch. The Staff has expressed agreement with the Applicant's analysis of possible interactions between the SWPS and the CWIS but expected to reexamine this matter as part of the seismic margin review. SSER # 2, § 2.5.4.5.5, at 2-42 to 2-44; § 3.7.2.4, at 3-4 and 3-5; Tr. 9519-21, 9575-82 (Shunmugavel); Tr. 9626-30 (Rinaldi); Tr. 9730-35 (Kane).

166. The NRC Staff was in agreement with Ms. Stamiris' Contention 4.C(b) at the time it was submitted but later became satisfied with CPC's remedial measures for the SWPS based on information subsequently submitted by CPC (Tr. 9734 (Kane)). The Board agrees and concludes, based on Findings 159 to 165, *supra*, that the Applicant has adequately taken into account the dynamic responses of the remedial soils measures for the SWPS with regard to dewatering effects, differential soil settlement and seismic effects, in the design and evaluation of those remedial soils measures. Insofar as the seismic model of the SWPS is concerned, this conclusion is limited to the *nominal* values of the soil spring constants and is subject to resolution of the design deficiency noted *supra* in Findings 88 and 164. Further, the Board concludes that the Seismic Category I retaining wall, to which Contention 4.C(b) apparently also refers, would not be affected by remedial soils measures taken with respect to the SWPS, nor would any remedial soils measures be necessary with respect to it.

167. The Licensing Board also concludes that the Applicant has complied with all applicable requirements in designing the underpinning for the SWPS. The design is conservative with respect to the loads it would

have been expected to encounter and withstand and provides reasonable assurance that, if completed as designed, the underpinning would provide an adequate and stable foundation for the overhang portion of the SWPS. Our conclusions in regard to the SWPS remedial design are subject to the outcome of a seismic margin review (including resolution of the adequacy of the soil spring constants), as well as to satisfactory execution of the remedial measures. Although we are not now resolving the QA/QC and management attitude issues which bear upon such remedial measures, any possible granting of operating licenses would necessarily be contingent upon satisfactory evaluation of past practices and construction, including the matters which have been the subject of the independent overview commenced by Stone and Webster (but not completed at the time construction was suspended — *see* letter, J.G. Keppler (NRC) to CPC, dated November 13, 1984).

V. BORATED WATER STORAGE TANKS

168. Each unit of the Midland Plant has an identical 500,000-gallon, stainless steel, borated water storage tank (BWST), which was to have supplied borated water to the emergency core cooling system (and the reactor building spray system) during the injection phase of a loss-of-coolant accident. These Seismic Category I structures, which are located in the tank farm area on the north side of the containment and auxiliary buildings, are 32 feet high and 52 feet in diameter. Each tank foundation also includes a valve pit (larger for Unit 1 than for Unit 2) connected to the southeast side of each BWST, to provide access to the piping connections to the tank and house valves for the fill and drain lines. SSER # 2, § 3.8.3.3, at p. 3-16; Hendron, ff. Tr. 7186, at 5 and Fig. 1; Boos/Hanson, ff. Tr. 7173, at 1 and Figs. BWST-1 and BWST-2; Hood, *et al.*, ff. Tr. 7444, at 4-6.

169. Each BWST is a cylindrical structure with a flexible, flat bottom. The tank shell, roof, and part of the water in the tank are supported by a reinforced concrete ring wall. Compacted granular fill lies inside the ring wall with a 6-inch layer of oiled sand separating the tank bottom from the granular fill. There is a ½-inch-thick asphalt-impregnated fiberboard (Celotex) between the tank bottom and the ring wall. The material is compressible and tends to distribute the tank wall loading to the ring wall in a more uniform manner than if there were no compressible material at the interface. Approximately 25 feet of compacted fill lies under the foundation structure. The flexible tank bottom enables most of the vertical pressure created by the weight of the water to transfer directly to the soil within the ring wall. This vertical pressure also causes a latera

pressure in the sand which is resisted by the ring wall. Anchorage for resisting overturning loads caused by externally applied lateral forces is provided by forty 1½-inch-diameter anchor bolts which attach the tank to the ring foundation. Boos/Hanson, ff. Tr. 7173, at 1-2; Kennedy/Campbell, ff. Tr. 7345, at 2 and Attach. B, at 1-3; Tr. 7382-84 (Kennedy); Tr. 7550 (Rinaldi); Tr. 7954-56 (Boos); SSER # 2, § 3.8.3.3, at p. 3-16.

170. Plant grade around the BWSTs is approximately at elevation 634 feet. From that elevation down to between 595 and 605 feet, the foundation material is compacted backfill. Below elevation 595 to 605 feet, there are competent natural soils. An area of "less stiff" or soft backfill material occurs in the southwest side of the Unit 1 BWST. Hendron, ff. Tr. 7186, at 6; Tr. 7943-44 (Boos); App. Exh. 25.

171. Exploratory programs were conducted on the natural soils at the Midland site in 1968, 1969 and 1970. Following discovery of the settlement of the DGB, additional exploratory programs were carried out in the area of the BWSTs during 1978-79 and 1981, after compacted fill materials had been placed. The foundations for the two BWSTs were constructed between July 1978 and January 1979. Erection of the tanks was completed by December 1979. Hendron, ff. Tr. 7186, at 6-8.

172. The structural adequacy of the BWSTs was questioned by Stamiris Contention 4.C(c), which reads as follows:

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:

* * *

C. Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement, and seismic effects for these structures:

* * *

c. Borated Water Storage Tanks.

Prehearing Conference Order, dated October 24, 1980, Appendix at 5-7, as supplemented by Ms. Stamiris' Answer to Applicant's Interrogatories, dated April 20, 1981.⁸²

⁸² Since the BWST valve pits were subject to surcharging (i.e., "pre-loading techniques"), Warren Contention 1 applies to the BWSTs. It reads:

The composition of the fill soil used to prepare the site of the Midland Plant — Units 1 and 2 is not of sufficient quality to assure that pre-loading techniques have permanently corrected soil settlement problems. The NRC has indicated that *random* fill dirt was used for backfill. The components of random fill can include loose rock, broken concrete, sand, silt, ashes, etc. all of which cannot be compacted through pre-loading procedures.

Warren Contention 2.B is also applicable to the BWSTs; it states:

Given the facts alleged in Contention 2.A [concerning an allegedly inadequate dewatering system], and considering also that the Saginaw Valley is built upon centuries of silt deposits, these

(Continued)

173. In October 1980, the Applicant conducted a proof load test of the BWSTs. It filled both tanks with water and, by means of surveys, monitored the behavior of the foundations and supporting fill materials. This proof test uncovered differential settlement between the valve pit and the ring wall foundation. As a result, on January 22, 1981, the Applicant reported a deficiency of the tank foundation to the NRC pursuant to 10 C.F.R. § 50.55(e). Structural analysis indicated that the allowable moment capacity for the dead load and the differential settlement condition was exceeded at several locations in the foundation structure. Examination at the locations where overstresses were calculated revealed visible cracking in the foundations of both BWSTs — a maximum crack width of 0.063 inch for Unit 1 and 0.035 inch for Unit 2 — at the juncture of each ring wall and the valve pit structures. Boos/Hanson, ff. Tr. 7173, at 1, 3; Hood, *et al.*, ff. Tr. 7444, at 9 and Attachs. 7-8.

174. The witnesses addressing the BWST problem provided divergent explanations for the cause of the BWST cracks. Mr. Alan J. Boos and Dr. Robert D. Hanson, on behalf of the Applicant, attributed the root cause of the cracks to a design error and not to soils compaction inadequacies. They explained that the original design of the BWST foundations included the load of two small tanks which were to be located on the top slab of each valve pit; but that, when the tanks were relocated to another area, the original design of the BWST foundations was not modified. During the proof load test, when each BWST was loaded with water, the weight of the water was transferred to the soil through the tank bottom and (partly) the ring foundations, causing greater settlement beneath the tank bottom and ring foundations than beneath the valve pits. They opined that, because of this uneven settlement, the valve pits rotated relative to the ring walls and induced bending moments which had not been considered in the original design. Boos/Hanson, ff. Tr. 7173, at 3; Tr. 7274-75, 7305 (Boos). Indeed, Mr. Boos deemed the failure to have considered bending moments in the original design as sufficient in itself to have produced a lesser degree of differential settlement, without regard to whether the small tanks had been left on the valve pits. Tr. 7260-63 (Boos).

175. Dr. Alfred J. Hendron, also testifying for the Applicant, likewise attributed the BWST cracks to design inadequacy, although he reached this conclusion on the basis of a different rationale. He explained that

highly permeable soils which underlie, in part, the diesel generator building and other class I structures may be adversely affected by the increased water levels producing liquefaction of these soils. The following will also be affected:

1) borated water tanks . . .

Prehearing Conference Order, dated October 24, 1980, Appendix at 9.

the primary settlements observed for the BWST (about 1.3 inches at the edge of the foundations) were not excessive, and that the structural cracks at the boundary between the valve pit and the ring wall indicated that the foundations were not really designed to take the distortions that they would get from the valve pits being very lightly loaded and the ring walls more heavily loaded. Tr. 7215 (Hendron). Mr. Boos concurred with Dr. Hendron's evaluation. Tr. 7216 (Boos).

176. In contrast, the NRC Staff attributed the primary cause of the BWST differential settlement, and the resultant cracking, to inadequately compacted backfill, rather than only to a design deficiency. SSER # 2, § 2.5.4.4.3 at p. 2-34; Tr. 7449 (Hood); Tr. 7451 (Kane). A Staff witness on this question, Mr. Joseph Kane, explained that the 1.3-inch settlement experienced at the Unit 1 BWST as a result of the proof load test was greater than he would have anticipated if the soil had been properly compacted. He also relied on an additional 1.1 inches of settlement of Unit 1 which had occurred prior to the proof load test, while the tank was empty, as well as results of the soils investigations, including the plate-load tests, as indications that the differential settlement stemmed from a soils-related problem. According to Mr. Kane, absent a soils problem the settlement prior to the load test would have been no more than about ¼ inch, roughly the amount of settlement actually experienced by Unit 2. Tr. 7494-96, 7510-11 (Kane); *see also* SSER # 2, § 2.5.4.5.2, at p. 2-41 (including FSAR references). Although not advanced for this purpose, the recognition by Mr. Boos (for the Applicant) of an area of "less stiff" soil in the vicinity of BWST 1 (Tr. 7944 (Boos)) supports the Staff view that soils problems were a prime cause of cracking in the BWSTs, at least at BWST 1.

177. Other Staff witnesses recognized that, in addition to soils problems, design problems represented another factor that might have contributed to the differential settlement and hence the cracking. Tr. 7481-82 (Singh); Tr. 16,589-91 (Landsman).

178. The most balanced — and, in our view (for reasons expressed *supra* at p. 102), the most persuasive — explanation of the BWST cracks was provided by another witness for the Applicant, Dr. Robert P. Kennedy, President of Structural Mechanical Associates, Inc. (SMA). In Dr. Kennedy's judgment, there were three causes of the cracking in the ring wall. First, from the settlement patterns, he believes the soils under the west end of BWST 1 had a pocket of softer material than under the east side of the tank or under BWST 2. *Cf.* Findings 170, 176, *supra*. The second cause was the design of the valve pits, which had low bearing pressures and hence to some extent acted like a snowshoe on snow and settled less than the rings. The resulting differential settlement

caused the largest stresses and the largest cracking in the vicinity of the valve pits. Finally, the ring walls were under-reinforced: had there been sufficient reinforcing steel in the ring walls, the load would have been spread and the differential settlement would not have occurred. Dr. Kennedy was unable to say which cause was the "primary" cause of the differential settlement, although he characterized the under-reinforcement of the ring walls as a "major cause." Tr. 7366-67 (Kennedy).

179. The Applicant and (subject to certain confirmatory items) the Staff have agreed upon a three-phase corrective action for the BWST foundation problems, consisting of (a) surcharging the valve pits and their surrounding areas with sand to reduce the residual differential settlement on the foundation; (b) constructing reinforcing ring beams around the periphery of the existing cracked beams; and (c) establishing a program for releveling the Unit 1 BWST. The first phase was completed by February 1982. The surcharge process served to consolidate the fill beneath the valve pit, thereby reducing the residual differential settlement over the 40-year life of the plant. Further, it had the additional effect of reducing ring wall distortion. A monitoring program was in place to monitor foundation settlement, concrete cracks and strain in the tanks during surcharge placement and removal. This monitoring did not reveal any unexpected changes or abnormal results. Boos/Hanson, ff. Tr. 7173, at 4-10, Fig. BWST-2 and Table 1; Tr. 7223 (Boos); Hood, *et al.*, ff. Tr. 7444, at 13-18; Tr. 7447-49 (Singh); Rinaldi/Matra, ff. Tr. 7537, at 9; Tr. 7538-45 (Rinaldi); SSER # 2, § 2.5.4.4.3, at p. 2-34.⁸³

180. Under the BWST corrective actions, a new ring beam, constructed of reinforced concrete with a minimum compressive strength of 4000 psi, would be added to each BWST foundation. The modified beams are designed to resist all imposed loading from the tank, including future bending induced by the predicted residual differential settlement between the ring wall and the valve pit described *infra* in Finding 181. Shear connectors would transfer the shear force from the existing ring wall to the newly constructed ring beam. Although the stiffness of the existing ring wall was taken into account in the design of the remedial

⁸³ After application of the surcharge, the Applicant noted a 5-mil crack in the valve pit wall which extended to the bottom of the roof slab of the valve pit. At the point where the crack touched the slab it was only 1 or 2 mils. The Applicant was unable to determine whether the crack occurred prior to, or as a result of, the surcharge. Tr. 7284-86 (Boos). However, since the crack underwent no change subsequent to its discovery, and due to its small magnitude it was deemed by the Applicant to be of no concern. Tr. 7286-90 (Boos). NRC Staff witness Darl Hood felt there was a "very high probability" that the Staff would have concurred with that finding. However, given the fact that a commitment had been made by the Applicant to inform the Staff of the propagation of cracks related to surcharging, he felt the crack should have been reported to the Staff. Tr. 7463-66 (Hood); and Hood, *et al.*, ff. Tr. 7444, Attach. 10.

measures, no credit was taken for any strength in the existing wall. Nevertheless, all cracks found in the existing ring exceeding 10 mils were to be repaired with compressive grout to avoid potential corrosion damage to the reinforcing steel in the existing ring. Boos/Hanson, ff. Tr. 7173, at 7-8, 12, 14, and Figs. BWST-4 and BWST-5; Tr. 7253-54 (Hanson); Tr. 7548 (Rinaldi).

181. Future settlement predictions used in designing the new ring beams were based on the data obtained from the full-scale load test of the existing foundation and soil, by extrapolating the settlement versus log-time curve for each settlement marker. Basing settlement predictions on the full-scale load test of the existing foundation is conservative because the modified BWST foundations will be stiffer and thus reduce future differential settlement. Moreover, the design procedure is conservative because no credit was taken for the substantial reduction in future differential settlement which predictably will be caused by the surcharge of the valve pits. Finally, the effect of soft soil under the southwest quadrant of the Unit 1 BWST has been considered in this design approach. The soil in that area has been compressed by the water load test and subsequent surcharge of the valve pit, and the extrapolation of settlement patterns used in designing the new ring beam implicitly takes this area into account. Boos/Hanson, ff. Tr. 7173, at 4, 7, 15; Tr. 7212-13, 7943-45 (Boos); Hood, *et al.*, ff. Tr. 7444, at 17.

182. The settlement values used by Bechtel in designing the new ring beams were independently confirmed by Dr. Hendron. Dr. Hendron also confirmed that the factor of safety against bearing capacity failure of the modified ring walls will be adequate and in excess of accepted normal practice for both long-term static, and for static-plus-earthquake, loadings. Dr. Hendron also derived the appropriate long-term soil stiffness values used in the static analyses of BWSTs. Although it was outside the scope of his prepared testimony, Dr. Hendron agreed with the range of short-term moduli used in the seismic analyses of the BWST foundations. Hendron, ff. Tr. 7186; Tr. 7207-08 (Hendron); Tr. 7214 (Boos).

183. The NRC Staff and its consultant, the Corps of Engineers, reviewed and approved the settlement values and other soil parameters used in the design of the ring beams. The NRC Staff's structural engineering witness, Mr. Frank Rinaldi, stated that the Applicant's proposal to add a new ring beam to the existing foundation was "in concept . . . structurally adequate," subject to a number of stated concerns. Hood, *et al.*, ff. Tr. 7444, at 14-16; Rinaldi/Matra, ff. Tr. 7537, at 9; Tr. 7538-45 (Rinaldi). By the conclusion of the evidentiary hearings on the BWSTs, these concerns had been reduced to three in number: (1)

whether Bechtel had used earthquake loads equal to 1.5 times the FSAR SSE along with ACI-349 as supplemented by Regulatory Guide 1.142 in evaluating the structural adequacy of the modified BWST foundations; (2) whether Bechtel had in fact checked all regions of the new ring beams for all the load combinations in ACI-349 as modified by Regulatory Guide 1.142; and (3) whether using 1.5 times FSAR SSE loads for the BWST gives greater loads than the SSRS. Each of these concerns was answered affirmatively by the Applicant's witnesses. *See* Tr. 7949-51 (Boos); Tr. 7278-80 (Hanson); Tr. 7388-89, 7395-98 (Kennedy). The NRC Staff ultimately resolved the first two concerns in a structural audit of Bechtel, as documented in SSER # 2, § 3.8.3.3, at 3-16 through 3-22. Final resolution of the third concern, as far as the Staff is concerned, awaits completion of a seismic margin review. However, the Staff finds "strong evidence" that the ring beam design based on 1.5 times FSAR SSE loads will be acceptable to it. *See* Rinaldi, ff. Tr. 12,080, at 8.

184. Upon completion of the reinforced ring beam,⁸⁴ the Unit 1 BWST would be releveled. Releveling of the empty tank was to include draining and venting the tank, mounting strain gages, raising the tank, leveling the existing ring wall, releveling the oil-sand layer below the bottom plate, installing asphalt-impregnated Celotex underneath the tanks and reattaching the tank to the foundation by anchor bolts. Analyses show that the Unit 2 BWST foundation has not undergone significant tilting or out-of-plane deflections and the metal tank can withstand future predicted settlement and the SSRS earthquake without being releveled. Tr. 7349 (Kennedy, Campbell); Tr. 7544-45 (Rinaldi); SSER # 2, § 3.8.3.3, at 3-21 to 3-22.

185. The BWST tanks (as distinguished from the BWST foundations) were evaluated by Dr. Kennedy and Mr. Robert D. Campbell of SMA for stresses incurred due to uneven support conditions resulting from differential settlement of the foundations. Examination of field measurement data established that the Unit 1 BWST tank had been exposed to more severe conditions and that verification of the integrity of that tank would unquestionably verify the integrity of the Unit 2 BWST. From the anchor bolt loading (determined by strain gaging the bolts) and the known weights of tank components, all loading conditions were known. The nonuniform support reactions and resulting tank wall

⁸⁴ From documents recently provided us and the parties (which are not in the evidentiary record), it appears that the ring beams were not completed at the time construction of the facility was suspended. I&E Rept. 84-25/26, Attachment 2 ("Soils Demobilization"), enclosure to letter from R.F. Warnick, NRC, to CPC, dated September 21, 1984.

stresses were computed utilizing a finite-element model and incorporating laboratory-determined properties of the Celotex on which the tank rests. The governing design codes are the ASME Boiler and Pressure Vessel Code, § III, Nuclear Power Plant Components, subsec. NC, 1974, supplemented by ASME Code Case 1607-1 to establish allowable stresses for conditions other than normal operation (infrequent events). Kennedy/Campbell, ff. Tr. 7345, at 2-3.⁸⁵

186. The results showed that normal operating stress limits of the governing design code were met, *with two exceptions*. First, the most highly loaded *bolt chair top plate* did not meet *normal operating* stress limits, although it did meet the *emergency* event loading criteria for an ASME Code Class 1 plate-and-shell-type component support. A subsequent dye penetrant examination of the top plate welds verified that no cracking was present. Careful visual inspections by Dr. Kennedy and Mr. Campbell did not indicate any visible deformation to any bolt chairs. Kennedy/Campbell, ff. Tr. 7345, at 3.⁸⁶ The other exception was that *local tank wall compressive stresses* did not meet normal operating stress limits. Again, the emergency-event buckling criterion was used to verify freedom from buckling. A buckling factor of safety of 2.46 was also calculated to demonstrate that a large margin existed for tank buckling. *Id.* at 3-4.⁸⁷ A visual examination of the tanks performed by Mr. Campbell while they were under their most highly stressed conditions also verified that no buckling was present. Thus, Dr. Kennedy and Mr. Campbell concluded that the uneven support which resulted from soil settlement had not resulted in any damage to the tanks. They also testified that the Unit 1 tank after releveling and the Unit 2 tank without releveling could withstand the future differential settlement predicted by the Applicant together with the SSRS earthquake without exceeding the Code-allowable stress level. Therefore, the safe operating life of the tanks had not been reduced. *Id.* at 4; Tr. 7348, 7351, 7431-34 (Kennedy).

⁸⁵ The ASME Code design rules do not specifically cover settlement-induced stresses. Therefore Dr. Kennedy and Mr. Campbell followed what they considered to be the intent of the Code in using the second level of stress in the Code ("service level C") applicable to plant emergency conditions or infrequent loading conditions, to assess the effect of settlement. At this level the Code recognizes that some permanent deformation is possible but that the equipment will remain serviceable. Kennedy/Campbell, ff. Tr. 7345, at 3; *see also* Tr. 7350-51, 7433-34 (Campbell, Kennedy).

⁸⁶ If there had been significant buckling, it could easily have been observed visually. Tr. 7429-30 (Kennedy). Ultrasonic and x-ray inspection methods are not applicable to this type of weld. Tr. 7430-31 (Campbell); *see also* Tr. 7568-69 (Rinaldi, Matra).

⁸⁷ The 2.46 buckling factor of safety was calculated by using a NASA-developed formula documented in NASA publication 8007, as opposed to the more conservative methods recommended by ASME Code. Using Code-recommended calculations, the BWST is 9% under Service Level C allowable stresses. However, Dr. Kennedy testified that the NASA formula is more appropriate for the nonuniform axial loading of the BWST than the method recommended by the Code, which assumes uniform axial compression. Tr. 7370-81 (Kennedy).

187. The NRC Staff reviewed the Applicant's evaluation of the current condition of the tanks and also concluded that the nonuniform support condition did not impose any unacceptable stresses on the tank components. Rinaldi/Matra, ff. Tr. 7537, at 5; Tr. 7565-69 (Rinaldi, Matra).

188. Subsequent to the construction of the new ring beam, two observation pits were to be provided for each BWST foundation at the high-stress locations. The new ring beams were to undergo monitoring for a period of at least 6 months after the tanks were initially filled with water. Upon completion of a 6-month monitoring period, a report evaluating the effect of any existing cracks would be submitted to the NRC. However, if during the monitoring period any crack were to reach 0.03 inch or larger, the tanks would be emptied and the condition evaluated. Boos/Hanson, ff. Tr. 7173, at 20-21 and Fig. BWST-2; Tr. 7562 (Rinaldi); SSER # 2, § 3.8.3.3, at p. 3-22. The Applicant has committed to providing a technical specification for long-term settlement monitoring should the plant be operated, and to providing FSAR documentation of the as-built conditions for the new ring beam foundations and releveing operations, once they are completed. During the operating life of the plant, the Applicant would utilize strain-gage monitoring in the area of interest, the transition zone where the high stresses occur, to demonstrate that the ring beam foundation is performing adequately. SSER # 2, § 2.5.4.4.3, at p. 2-35; Tr. 7176-78, 7320-21 (Boos); Tr. 7178-79 (Hanson).⁸⁸

189. Although Ms. Stamiris' Contention 4.C(c) raised legitimate questions about the effects on the BWSTs of dewatering, differential soil settlement and seismic loads, the Applicant has now adequately analyzed these effects in connection with its plans for the remedial surcharging of the valve pits, construction of new ring beams, and releveing BWST-1, measures which it has proposed and the Staff has accepted. The addition of new ring beams to the BWST foundations is based on a conservative prediction of future settlement which has been independently confirmed by Dr. Hendron and reviewed and approved by the NRC Staff and the Corps of Engineers. The prediction is conservative because it takes no credit for the effect of the water load test and of the surcharging of the valve pits, which will reduce future differential settlements. It is also conservative because the BWST foundations, as modified by the new

⁸⁸ Mr. Boos testified that in terms of developing a technique for future monitoring of the concrete foundation, the area of interest was small enough that traditional optical survey methods for determining displacements in the ring foundation would not suffice to detect the rotation of the concrete member, which is a reflection of the induced bending moments and stresses (Tr. 7176).

ring beam, will be stiffer than the old foundation and thus undergo less differential settlement than extrapolations of past settlement would indicate. The BWST tanks themselves have been shown to be unharmed by past differential settlement and able to withstand predicted future differential settlements without exceeding normal operating-service-level stresses.

190. In its prediction of future differential settlement for the BWSTs, the Applicant took into account possible dewatering effects. Rinaldi/Matra, ff. Tr. 7537, at 12; Boos/Hanson, ff. Tr. 7173, at Fig. BWST-8; Rinaldi, ff. Tr. 12,080, at 3.

191. The Applicant has also adequately analyzed the effect of potential seismic activity in developing its remedial soil measures for the BWSTs. The new ring beam interface shear connectors and new ring foundation are designed to resist resulting stress requirements without exceeding the allowable stress values and load combinations identified in ACI 318 and ACI 349-76, as supplemented by Reg. Guide 1.142. These criteria meet with Staff approval since they conform with requirements set forth in SRP § 3.8.4. Boos/Hanson, ff. Tr. 7173, at 11-12; SSER # 2, § 3.8.3.3, at 3-18 through 3-21.

192. At the time the remedial steps for the BWSTs were being initiated, the site-specific response spectra (SSRS) had not yet been developed. The Applicant, in order to proceed with the design of its proposed new foundation ring beams, adopted the load formula of 1.5 multiplied by the FSAR SSE. Dr. Kennedy testified that this procedure would result in higher stresses than the SSRS, which is equivalent to about 1.3 times the FSAR SSE. SSER # 2, § 3.7.2 at 3-2 to 3-3; Rinaldi, ff. Tr. 12,080, at 8; Tr. 6001-02, 7389 (Kennedy). In Finding 89, *supra*, the Board notes its approval of the seismic model of the BWST developed by Dr. Kennedy and accepted by the NRC Staff.

193. Although in our May 5, 1981 Prehearing Conference Order we deferred until subsequent stages of the OL proceeding the question of whether the structures as built conform to newly determined seismic criteria, preliminary evidence indicates that the BWST, as modified, would in fact meet such criteria. Dr. Kennedy testified that there is a substantial margin for the design of the tank and the foundation, taking into account both the predicted future differential settlement of the foundation and the SSRS. The Staff has not yet formally reviewed the results of the seismic margin review but, based on preliminary information provided by the Applicant, also reports "strong evidence" that the BWSTs comply with design and acceptance criteria acceptable to the Staff. Tr. 7395-99 (Kennedy); Rinaldi, ff. Tr. 12,080, at 8.

194. Dr. Richard Woods, a consultant for Bechtel appearing as a witness for the Applicant, evaluated the potential for seismic shakedown settlement at the Midland site. Although pockets of sand which have a potential for shakedown settlement exist at several site locations, Dr. Woods testified that the soil under the BWSTs exhibited no potential for such settlement. Moreover, the sand within the ring foundation has been compacted to a relative density greater than 80% for which no significant seismic shakedown settlement will occur. Woods, ff. Tr. 11,549, at 3-6. The Applicant has shown and the Staff agrees that the materials underneath the BWSTs are not subject to liquefaction. Woods, ff. Tr. 9745; SSER # 2, § 2.5.4.5.5, at 2-43 and 2-44. Intervenor Sharon Warren's Contention 2.B expressed concern for liquefaction adversely affecting the BWSTs. Mr. Kane testified that the Staff is satisfied that liquefaction is not a problem for the BWST structures. Tr. 9817. The Board agrees.

195. The Board concludes that the concerns set forth by Ms. Stamiris in Contention 4.C(c) have been adequately addressed in the remedial soil measures being taken for the BWSTs. The Applicant has shown and the Staff has verified that the remedial measures, assuming they are successfully completed, will provide reasonable assurance that the BWSTs will perform their intended safety functions throughout the operating life of the plant. Moreover, Staff-approved methods of monitoring the BWSTs for settlement, concrete cracking and strain provide additional assurance that any unanticipated future differential settlement would be detected and corrected before presenting any undue risk to the public health and safety. The details of the monitoring remain an open question, pending submission by the Applicant and approval by the Staff of a technical specification governing such monitoring. Our reasonable assurance finding is subject to the submission by the Applicant and approval by the Staff of an appropriate technical specification governing long-term settlement monitoring, together with additional FSAR documentation, as set forth in SSER # 2, § 2.5.4.4.3, at p. 2-35; § 2.5.4.6.3, at p. 2-52; and Table 2.8, at p. 2-53.⁸⁹

VI. DIESEL FUEL OIL TANKS

196. There are four Seismic Category I steel diesel fuel oil storage tanks at the Midland Nuclear Power Plant site. They are located to the southeast of the DGB and are buried approximately 6 feet underground.

⁸⁹ These conclusions are also dispositive of Warren Contention 1, insofar as it relates to the BWSTs.

The function of the emergency diesel fuel system is to supply fuel to the onsite diesel generators in case of loss of offsite power. Eight diesel fuel oil lines provide fuel oil supply and return between the diesel generators and the four buried diesel fuel oil storage tanks.

The diesel fuel oil storage tanks were designed and fabricated to the requirements of ASME Code, § III, Class 3 (1974). Their 3-foot-thick concrete foundations, which rest predominantly on a supporting base of medium stiff to medium dense sandy clay backfill material, were designed and fabricated to the requirements of ASME Code, § III, Class 3 (1974) and also, ACI 318-71. The tiedown is designed to the AISC-1971. The Staff has determined that the load combinations and acceptance criteria utilized by the Applicant in designing the four storage tanks meet the Staff's design requirements. Rinaldi/Matra, ff. Tr. 7537, at 10, 12, Attach. 4; Tr. 12,071-73 (Kane); Landers, *et al.*, ff. Tr. 7619, at 5-7; SER, § 1.12.10, at p. 1-25 (Staff Exh. 14).

197. Stamiris Contention 4.C(d), as amended, states as follows:

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:

* * *

- C. Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement, and seismic effects for these structures:

* * *

- d. Diesel Fuel Oil Storage Tanks.

Prehearing Conference Order, dated October 24, 1980, Appendix at 6-7, as supplemented by Ms. Stamiris' Answer to Applicant's Interrogatories, dated April 20, 1981. In addition, one of the contentions of Ms. Warren which the parties addressed (*see* Finding 41), claims that the diesel fuel oil tanks will be affected by liquefaction resulting from an allegedly inadequate dewatering system.⁹⁰

198. The Applicant undertook a program of measurement, analysis and monitoring to assure that the tanks could perform their intended functions throughout the operating life of the plant. The tanks had been installed approximately 2 years after the fill was placed, and therefore

⁹⁰ Warren Contention 2.B(2) states:

Given the facts alleged in Contention 2.A [concerning an allegedly inadequate dewatering system], and considering also that the Saginaw Valley is built upon centuries of silt deposits, these highly permeable soils which underlie, in part, the diesel generator building and other class I structures may be adversely affected by increased water levels producing liquefaction of these soils. The following will also be affected:

* * *

- 2) diesel fuel oil tanks.

Prehearing Conference Order dated October 24, 1980, Appendix at 9.

were isolated from the effects of the fill's initial settlement. In 1979, the Applicant surcharged the four tanks by filling them with water and monitored settlement for about an 8-month period. The Applicant's witnesses (Messrs. Donald Landers, Donald Lewis and James Meisenheimer) testified that the diesel fuel oil storage tanks will settle with the surrounding soil, as will the connecting pipes. Thus, the differential settlement between the pipes and the tanks would be small, and the nozzle loads due to settlement, insignificant. Rinaldi/Matra, ff. Tr. 7537, at 10; Rinaldi, ff. Tr. 12,080, at 5-6; Landers, *et al.*, ff. Tr. 7619, at 11.

199. NRC Staff witness Joseph Kane testified that, at the time of the hearing, the Staff was not concerned about the foundation stability of the four diesel fuel oil storage tanks. He stated that a total maximum settlement of a half an inch was the largest settlement recorded for the diesel fuel oil storage tanks. Following surcharging in 1979, the tanks experienced a maximum settlement of a quarter of an inch. An additional quarter-inch settlement occurred in late 1980 as a result of temporary dewatering conditions; however, when the ground water table was allowed to rebound, settlement rebounded one-tenth of an inch, to a total settlement of four-tenths of an inch. For the expected operating life of the plant, additional settlement of approximately half an inch was estimated. The NRC Staff, in recognizing and accepting the settlement values relating to the storage tanks, concluded that the results of the analysis and monitoring program performed by the Applicant indicated that the Staff did not anticipate any significant problem for these tanks or their pedestals resulting from differential settlement, and there was no reason for any structural concerns relating to the effects of differential soil settlement on the diesel fuel oil storage tanks. Tr. 12,071-73, 12,090-91 (Kane); Landers, *et al.*, ff. Tr. 7619, at 11; Rinaldi, ff. Tr. 12,080, at 5-6; Rinaldi/Matra, ff. Tr. 7537, at 12; SER, § 1.12.9, at p. 1-25. The Staff has recently raised questions, however, as to the continuing viability of its earlier conclusions on the stability of soils beneath the diesel fuel oil tanks. Kane Affidavit, dated December 21, 1984, submitted to Board and parties by letter dated December 21, 1984 (*see supra* pp. 38-39, 103-04).

200. The Applicant analyzed and evaluated the effects of dewatering, seismic events, and differential soil settlement on the diesel fuel oil storage tanks. It analyzed and monitored the tanks for possible effects caused by differential settlement of the soil supporting them. It found the tanks to be in an acceptable and functionally capable condition, leading the Staff to express its belief that, subject to an audit of the information, and to the outcome of the seismic margin review, any structural concerns regarding the fuel oil tanks which are represented in

Stamiris Contention 4.C(d) are without merit. The effect of dewatering on settlement of the tanks was taken into account. As stated *supra* in Finding 199, following dewatering, the tanks reached a maximum settlement of half an inch. When the ground water table was allowed to rebound to the full-scale recharge test, rebound settlement of one-tenth of an inch occurred. The Staff found these settlement values acceptable. Landers, *et al.*, ff. Tr. 7619, at 11, 35; Rinaldi, ff. Tr. 12,080, at 5-6; Rinaldi/Matra, ff. Tr. 7537, at 12; Tr. 12,071-73, 12,090-91 (Kane).

201. The Applicant also analyzed the fuel storage tanks for seismic-induced loads in conjunction with normal, thermal and differential settlement loads. In addition, it provided a reinforced concrete cover to resist the impact of postulated tornado missiles. As noted *supra* in Finding 196, the Staff determined that the load combinations and acceptance criteria used by Applicant to design and fabricate the tanks meet the Staff's design criteria. (Although the tanks were designed for the original seismic loads of the FSAR SSE (DBE), in the seismic margin review they were to be reevaluated using the site-specific response spectra.) Dr. Richard Woods evaluated the potential for seismic shakedown of loose sands at the Midland Plant. His analysis revealed that sands for which there is a potential of shakedown settlement, exist in a number of site locations. One boring performed in the diesel fuel oil storage tank area revealed the existence of loose sand. Dr. Woods testified that the maximum shakedown settlement which would occur based on evaluation of loose sands in this boring amounts to about 0.10 inch. These settlements do not present any hazard to the diesel fuel oil storage tanks. Rinaldi, ff. Tr. 12,080, at 6-8; Rinaldi/Matra, ff. Tr. 7537, at 10; Woods, ff. Tr. 11,549, at 7; Tr. 11,557-58 (Kane). However, information uncovered recently casts doubt on any conclusions based on borings beneath the diesel fuel oil tanks. *See supra* pp. 38-39, 103-04. We are making no findings at this time on the stability of soils beneath the diesel fuel oil tanks.

202. Dr. Woods also presented testimony regarding the potential for liquefaction at the buried diesel fuel oil storage tanks. He explained that during the initial liquefaction boring study, a loose sand pocket was discovered in one of the borings close to the storage tanks. Using an earthquake producing a peak ground acceleration of 0.19g and what he regarded as conservative assumptions (based on certain borings), Dr. Woods had concluded, and the Staff was satisfied, that no danger of liquefaction exists for the tanks. Tr. 9747-49 (Woods); Woods, ff. Tr. 9745, at 13-14, and Fig. L-3; Tr. 12,071-73 (Kane). However, the Board has recently been advised that the logs of borings relied upon to establish the conservatism of Dr. Woods' conclusions were erroneous and that

the analyses of liquefaction under the diesel fuel oil tanks must be regarded as inconclusive (*supra* pp. 38-39, 103-04). For these reasons, we are making no findings at this time with respect to liquefaction under the diesel fuel oil tanks.

203. The Board concludes that the outstanding open items regarding soils stability and liquefaction are significant enough to preclude our reaching any final conclusions with respect to Ms. Stamiris' Contention 4.C(d) or, to the extent it relates to liquefaction under the diesel fuel oil tanks, Warren Contention 2.B(2). We also are reaching no "reasonable assurance" conclusions with respect to those tanks.

VII. UNDERGROUND PIPING

A. Introduction

204. Two of Ms. Stamiris' OM contentions (Nos. 4.A(4) and 4.C(f)) relate to the technical (as distinguished from QA/QC) aspects of underground piping. They read:

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:

* * *

A. Preloading of the diesel generator building

* * *

- 4) may adversely affect underlying piping, conduits or nearby structures;⁹¹

* * *

C. Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement, and seismic effects for these structures:

* * *

- f. Related Underground Piping and Conduit.⁹²

Prehearing Conference Order, dated October 24, 1980, Appendix at 5-6, as supplemented by Ms. Stamiris' Answer to Applicant's Interrogatories, dated April 20, 1981. In addition, one of the contentions of Ms. Warren which the parties addressed (*see supra* note 41) questioned the stress produced by surcharging of the DGB on, *inter alia*, circulating water lines and fuel oil lines.⁹³

⁹¹ See *infra* Findings 293-305, for a discussion of the portions of Ms. Stamiris' contentions dealing with underground conduit. We are not dealing in this decision with the effect of the DGB surcharge on nearby structures.

⁹² See *supra* note 91.

⁹³ That contention (Number 3) states:

Pre-loading procedures undertaken by Consumers Power have induced stresses on the diesel generating building structure and have reduced the ability of this structure to perform its essen-

(Continued)

205. A concern for foundation stability of underground piping at the Midland Plant arose because the plant fill supporting these pipes was found to be inadequately compacted and settling under its own weight. Consequently, piping buried in the plant fill was settling with the fill. Observed settlements have not been uniform because of the highly variable soil fill conditions, differences in actual loadings, and also due to the varying foundation elevations of structures connected with underground piping. SER, § 1.12.10, at p. 1-25 (Staff Exh. 14); Kane, ff. Tr. 7752, at 1-2.

206. There are two categorizations for underground piping systems and components at the Midland facility: Seismic Category I and Non-seismic Category I. SER, § 1.12.10, at 1-25 to 1-26, and § 3.9.3.1, at 3-28 to 3-30; SSER # 2, Table 3.1, at p. 3-33 (Staff Exh. 14, Supp. 2). The Applicant and Staff have included in the first category those systems and components which they regard as "important to safety" and which are designed to withstand the effects of the earthquake forces applicable at the Midland site.⁹⁴ Those systems and components are reviewed to assure through analysis and, where appropriate, remedial measures and/or monitoring that they will perform their intended safety functions throughout the plant's projected service life. See, e.g., Tr. 7763 (Kane); Tr. 7931-32 (Chen). In contrast, the Nonseismic Category I items are reviewed to the extent necessary to assure that postulated failures would not have an adverse impact on nearby Seismic Category I structures or piping. SER, § 2.4.6.3, at 2-28 to 2-29; SSER # 2, § 2.4.6.3, at 2-5 to 2-6, and § 3.9.3.1.2, at p. 3-34; Tr. 3646-47, 3649 (Kane); Tr. 7825-26 (Hood).

B. Seismic Category I Underground Piping

(1) General

207. There are five types of buried Seismic Category I piping at the Midland Plant, ranging in size from 1 inch to 36 inches in diameter. These types are (1) service water system (SWS) lines; (2) diesel fuel oil

tial functions under that stress. Those remedial actions that have been taken have produced uneven settlement and caused inordinate stress on the structure and circulating water lines, fuel oil lines, and electrical conduit.

Prehearing Conference Order, dated October 24, 1980, Appendix at 9-10.

⁹⁴ We understand the Applicant and Staff to utilize the term "important to safety" as it appears in 10 C.F.R. Part 100, Appendix A. We are here using it similarly but are expressing no opinion as to the exact scope of such terminology. See BN 84-011, provided by the Staff to the Board and parties by Memorandum dated January 18, 1984; see also Tr. 3646-47 (Kane). See also note 12, *supra* p. 52.

For a discussion of the earthquake forces applicable to Seismic Category I items, see *supra* Findings 19-79.

lines; (3) borated water lines; (4) control room pressurization lines; and (5) penetration pressurization lines. SSER # 2, Table 3.1, at p. 3-33 (Staff Exh. 14, Supp. 2).

208. The smaller underground pipelines are seamless, while the 18-inch and larger-diameter pipes are seam-welded. These larger-diameter pipes are fabricated in nominal lengths ranging approximately from 4 to 40 feet, which are fitted together and welded. The welds are inspected and hydrostatically tested to assure integrity. Landers, *et al.*, ff. Tr. 7619, at 7.

209. All of the underground Seismic Category I pipelines at the Midland site rest on compacted backfill material. As a result of its discovery of insufficiently compacted fill material at a number of onsite locations and its investigation (in part through borings) of such fill conditions, the Applicant ascertained that the consistency of the fill at the location of buried piping can vary considerably in a vertical direction within a boring, and also laterally as evidenced by closely spaced borings. Settlements of buried piping were primarily a result of fill settling under its own weight; the piping itself adds little, if any, weight to the fill and hence has little impact on settlements. The Applicant also undertook internal profiling of some of the buried pipes to establish pipe deflection (settlement) profiles. The results of the profiling indicate that the pipe invert elevations⁹⁵ have maximum deviations from 6 to 21 inches below the originally intended elevations, with the majority in the range of 9-11 inches. In contrast, field installation procedures for the installation of the piping provided for a placement tolerance of ± 2 inches from the design invert of elevation. Even if credit is taken for placement tolerances, deviations in pipe elevations from design values of at least 4 to 19 inches occurred. Landers, *et al.*, ff. Tr. 7619, at 7-9, 13-14; SSER # 2.5.4.4.5, at p. 2-35, and § 1.12.10, at p. 1-25; Tr. 7658 (Meisenheimer); Tr. 7693 (Lewis); Tr. 7807 (Kane).

210. Inspection records would suggest that Seismic Category I piping was installed within the ± 2 -inch placement tolerance, inasmuch as no construction nonconformances related to this requirement were reported. However, lacking any profiles to verify post-installation locations, it is not known how much of the deviation in invert elevations is due to soil settlement alone. Although some of the deviation is likely the result of fabrication and installation, the Applicant and NRC Staff conducted

⁹⁵ As we understand it, "invert elevation" refers to the elevation at the bottom of the pipe below the pipe's central axis.

their analyses of underground piping on the assumption that all variations in design elevation are due to settlement. Chen/Hood, ff. Tr. 7762, at 6; Tr. 7693-95 (Lewis). One Staff witness questioned the conservatism of that approach (Tr. 7766 (Chen)). Others expressed reasons for requiring such post-placement profiles (Tr. 7904 (Kane, Hood)). In the Board's view, the analyses of piping would have been more accurate if post-placement pipe profiles had been prepared. In addition, such profiles could assist in the monitoring of future settlement (Tr. 7624 (Kane)). For that reason, we are providing that, if further placement or replacement of underground Seismic Category I piping were to be carried out, the Applicant must prepare as-built pipe profiles to verify the post-installation location of the pipes.

211. The Applicant compared depth profiles along pipelines with sub-surface conditions projected from adjacent exploration borings. Its direct testimony indicated that it could establish no correlation between lower profile areas and softer underlying fill areas or between higher profiles and stiffer underlying fill soils. Nor, according to its direct testimony, did the Applicant observe abrupt differential variations in pipeline profiles in areas where closely spaced borings indicate stiffer soils and softer soils adjacent to one another. Landers, *et al.*, ff. Tr. 7619, at 9. On the other hand, the Staff, in reviewing pipe settlement profiles, did detect such a correlation. It observed a general pattern where the major settlement of pipes occurred under the greatest surcharge loading. But one instance where the piping experienced smaller settlement in the surcharge area could be explained by recognizing that other pipes encased in concrete had put a discontinuity into the foundation support beneath the higher placed piping. Tr. 7902-03 (Kane). On cross-examination, one of the Applicant's witnesses acknowledged such a correlation (Tr. 7658 (Meisenheimer)). The Staff also explained that one reason it had requested development of soil profiles along the alignment of the underground piping was to identify the softer soil areas as evidenced by the low blowcounts recorded in the soil borings that had been completed. It used this information to determine where settlement markers should be installed. Tr. 9053, 9088, 9090 (Kane).

212. Records of the monitored settlement within the fill have been utilized to predict future settlement for buried pipes. A series of markers (Borros anchors) have been installed at nine locations in the vicinity of buried piping not influenced by surcharge loadings. Settlement readings for anchors that have been established at depths of 7 to 12 feet below the surface were used in the analysis, because this depth is representative of the depth of most buried pipes or utilities. Soil conditions at these locations are representative of the variable soil conditions encountered

throughout the fill. SSER # 2, at p. 2-36; Landers, *et al.*, ff. Tr. 7619, at 9.

213. Borros anchors BA 13, BA 14, and BA 34 were installed in December 1978. Settlement data have been taken on these anchors for over 5 years. Borros anchors BA 100 through BA 106 were installed in September 1979, and over 4½ years of settlement data exist for these anchors. As of the close of the record on underground piping, the plots of settlement versus log-time for each of these anchors formed straight lines which extrapolate to 2.0 to 2.5 inches of additional settlement occurring over the next 40 years. Based on these projections, the Applicant and the NRC Staff have concluded that a conservative estimate of future maximum settlement of buried piping or utilities is for not more than 3 inches of additional settlement to occur at any pipe location, provided only limited loads are placed over the piping. This estimate includes allowances for settlement due to both seismic shakedown and dewatering. SSER # 2, § 2.5.4.4.5, at p. 2-36; SER, § 1.12.10, at p. 1-25; Kane, ff. Tr. 7752, at 6; Landers, *et al.*, ff. Tr. 7619, at 10; Shunmugavel, ff. Tr. 12,016, at 6. As indicated in Findings 259, 262, *infra*, the 3-inch settlement estimate is to be considered as an acceptance criterion. The Applicant committed to providing a technical specification that would include control measures restricting placement of heavy loads over buried piping and conduits. In addition, were the plant to be operated, the technical specifications should include alert and action limits based on the foregoing acceptance criterion for settlement.

(2) Assurance of Serviceability

214. The various Seismic Category I underground pipes have been reviewed by the Applicant and Staff to assure their continued serviceability over the life of the facility. Remedial activities for each pipe depend upon the type of pipe, the conditions and timing in which it was initially installed, and the settlement and other measurements described previously. Among the remedial actions included for piping are replacement, rebedment, and reinstallation, which are defined as follows:

Replacement — the removal of existing buried pipe and the installation of new pipe.

Rebedding — the exposure of the existing buried pipe, removal of underlying soil, placement of new underlying fly ash concrete fill, realignment of the existing pipe, repairs to the pipe coating, and backfill around and over the pipe.

Reinstallation — the replacing and/or rebedding of piping.

Lewis, ff. Tr. 8868, at 9. We turn first to the criteria utilized to evaluate underground piping and then to the remedial actions which were planned to be utilized for each category of piping.

(a) *Criteria*

(i) Stress Analyses and Design Criteria

215. Section 3.9.3 of the Standard Review Plan (SRP) defines the design criteria and load combinations to be employed in the design of ASME Code Class 1, 2 and 3 items. Stresses in piping as a result of soil settlement are not addressed either by the SRP or the 1971 Edition of the ASME Code (with Addenda through Summer 1973), which generally governs the Midland facility. However, the 1977 Edition of the ASME Code addresses single deflection of a pipe through a discussion of "single nonrepeated anchor movement." SSER # 2, § 3.9.3.1.3, at p. 3-35; Tr. 7811 (Chen); Tr. 7815 (Hood); Landers, *et al.*, ff. Tr. 7619, at 23; *see also* 10 C.F.R. § 50.55a(d)(2).

216. To augment the SRP and the ASME Code, the Applicant initially proposed a design criterion of $3S_c$ (three times the allowable basic material stresses at minimum (cold) temperature, in psi) for its evaluation of the buried pipe. SSER # 2, § 3.9.3.1.3, at p. 3-35. Stress analyses based on the assumption that existing deviations from design configurations are due solely to differential settlement yielded stresses which in some cases exceeded the $3S_c$ criterion. *Ibid.*; Landers, *et al.*, ff. Tr. 7619, at 23-24; Chen/Hood, ff. Tr. 7762, at 8. Subsequently, to provide a greater margin of safety, the Applicant proposed a combination of the $3S_c$ criterion, additional design criteria, remedial action and monitoring to assure the safety and serviceability of the Seismic Category I underground piping. SSER # 2, § 3.9.3.1.3, at p. 3-35; Chen/Hood, ff. Tr. 7762, at 8-9.

(ii) Strength Criteria

217. These criteria are intended to provide assurance that the overall cross-sections of piping are capable of resisting the forces and movement due to all loads imposed upon the piping over the life of the plant. These loads include pressure, thermal expansion, overburden and traffic, soils settlement and seismic loads. SSER # 2, § 3.9.3.1.3, at 3-35 to 3-36; Chen/Hood ff. Tr. 7762, at 7.

218. For settlement stresses only, the $3S_c$ criterion is an acceptable strength criterion (SSER # 2, § 3.9.3.1.3, at p. 3-36). In cases where the $3S_c$ criterion could not be satisfied, however, the Applicant and the

NRC staff considered the effects of load combinations that could lead to catastrophic effects in a short amount of time in comparison to the proposed monitoring frequency. In particular, the Staff and the Applicant considered and made provisions for adequate margins of safety for the effects of settlement in conjunction with $1.5 \times$ FSAR SSE ground motion forces (i.e., using an input of $0.18g$ ground motion). The $1.5 \times$ FSAR response spectra envelopes the site-specific response spectra (SSRS) for purposes of the BC-TOP-4A analyses of buried piping. Tr. 8941-44 (Lewis).

219. With respect only to underground SWS piping to be reinstalled, the Applicant performed a dynamic seismic analysis based on the FSAR SSE earthquake ($0.12g$ ground motion). The Applicant committed to run a check analysis using BC-TOP-4A techniques and $1.5 \times$ FSAR SSE as input (Tr. 8942-43 (Lewis); Lewis, ff. Tr. 8868, Table 4, Enclosure 2, at Sheet 3, n.2). The Applicant was given permission to supplement the record to explain how the underground SWS piping to be installed meets current criteria (Tr. 8944). By affidavit dated January 21, 1983 (Enclosure E to Applicant's letter to Board dated February 3, 1983), Dr. Thiru Thiruvengadam of CPC demonstrated that input spectra used in the dynamic seismic analysis of the SWS piping to be reinstalled (which had earlier been analyzed against the FSAR SSE) in fact exceeds the current SSRS criteria. On November 2, 1983, the Staff filed an affidavit of Dr. Paul Chen indicating concurrence with Dr. Thiruvengadam's affidavit. (No other party has commented on either affidavit.)

220. In addition, overburden and vehicular load effects were assessed relative to the margins of safety for existing Code criteria (SSER # 2, § 3.9.3.1.3, at p. 3-36).

221. The following strength criteria have been found acceptable by the NRC Staff:

Criterion 1: $S_{ss} \leq 3S_c$

where S_{ss} = stresses due to differential soil settlement only.

In cases where Criterion 1 could not be satisfied, the following three criteria must be met:

Criterion 2: The total ovality due to a $1.5 \times$ FSAR SSE plus soils settlement must be less than the maximum allowable ovality permitted for the diameter-to-wall thickness ratio of the pipe.

Criterion 3: $S_{SL} + S_{o/b} \leq 1.5 S_h$

where S_{SL} = stress due to sustained loads, as defined in the ASME Code;

$S_{o/b}$ = stress due to overburden loads;

S_h = basic material stress allowable at operating temperature, in psi.

Criterion 4: $S_{OL} \leq 1.8 s_h$

where S_{OL} = stress due to occasional loads, as defined in the ASME Code, but also including bending or other stresses due to traffic loads.

(iii) Buckling Criteria

222. The buckling criteria discussed herein are intended to provide assurance that local buckling (which could lead to cracking in the pipe) and gross collapse (which could lead to loss of function of the pipe) would not occur throughout the life of the plant. Buckling data were obtained from theoretical and experimental sources available in the current technical literature. These data were reviewed in depth by the Staff and adapted for specifying buckling criteria for underground piping. For this type of piping, the criteria are expressed specifically in terms of ovality and strain criteria. Ovality of a pipe is defined as:

$$\text{Ovality} = (D_{\max} - D_{\min})/D$$

where D = outside diameter of unovalized pipe

D_{\max} = maximum outside diameter of ovalized pipe

D_{\min} = minimum outside diameter of ovalized pipe

Based on these data, the allowable ovality adopted for the underground piping over the life of the plant is 4% for pipe with a diameter-to-wall thickness (D/t) ratio of 69 and a factor of safety of 1.5. SSER # 2,

§ 3.9.3.1.3, at 3-36 and 3-37; Chen/Hood, ff. Tr. 7762, at 7; *see also* Landers, *et al.*, ff. Tr. 7619, at 16, 19, 21-25.

223. Where monitoring of pipe ovality was to be specified, the ovality would be determined by measuring pipe strains. A specific strain-to-ovality relationship was developed by the Applicant and approved by the Staff. *See* Lewis, ff. Tr. 8868, at 3 and Fig. 1; *see also* SSER # 2, § 3.9.3.1.3, at p. 3-37; Landers, *et al.*, ff. Tr. 7619, at 24-26. For pipes with a D/t ratio of less than 69, the permissible maximum ovality under this relationship is actually greater than 4%, but the Applicant agreed to the 4% limit. SSER # 2, § 3.9.3.1.3, at p. 3-37.

(iv) Minimum Rattlespace Criteria

224. A “rattlespace” is the gap opening between the exterior of a pipe and the wall of a building or other structure which the pipe penetrates. The minimum rattlespace criteria discussed herein are intended to provide assurance that both local and gross overstressing of the piping and gross overstressing or distortion of piping components or attached equipment would not occur due to loads which may be imposed or are postulated to occur during the life of the plant. Tr. 7892 (Hood); SSER # 2, § 3.9.3.1.3, at p. 3-36.

225. The clearance conditions of the piping at building or other structural penetrations are in part dependent on the proposed remedial actions for the associated piping in the plant fill (*see infra* Findings 227-250) and on the configuration of the piping at the penetrations. These conditions are therefore quite variable and have required case-by-case study for their resolution. SSER # 2, § 3.9.3.1.3 at 3-37 and 3-38.

226. In general, assurance that minimum rattlespace will be adequate over the projected life of the plant was provided by the analytical method set forth in § 3.9.3.1.3 of SSER # 2 with respect to the 36-inch SWPS pipe penetrations. This criterion requires that the minimum rattlespace shall be greater than or equal to 0.5 inch at all locations after taking into account variations in calculated pipe displacement resulting from predicted future settlement (*see supra* Finding 213) or the effects of a 1.5 x FSAR or an SSRS SSE (*see supra* Finding 219, and *infra* Finding 240). SSER # 2, § 3.9.3.1.3, at p. 3-38.

(b) Remedial Actions

(i) Service Water Piping

227. The SWS piping includes twenty-two lines, consisting of eight lines of 8-inch diameter, two 10-inch-diameter lines, eight 26-inch-diameter lines, and four 36-inch-diameter lines. These lines, constructed of ASME Code Class 3 SA-106 and SA-155 carbon steel piping, were to be used to supply water to various systems as needed under normal and accident conditions. SSER # 2, Table 3.1 and § 3.9.3.1.1, at p. 3-33.

228. All of the 26- and 36-inch-diameter SWS piping at the Midland plant (see *supra* Finding 227) was subjected to extensive profile and pipe ovalization measurement programs in November 1981. Profile data were obtained at 5-foot intervals along the pipe lengths and at welds, and are accurate to 1/16 inch. These 1981 data, which supersede the previously obtained 1979 data, which were accurate only to 1/4 inch, were furnished to the Staff in 1982. The data show that the piping was, on the average, approximately 5 inches below its design elevation, with deviations of up to 8 to 12 inches. The 1981 data also show that, in general, pipe ovalizations were between 1 and 1.5%, with a maximum of 3%. SSER # 2, § 3.9.3.1.1, at p. 3-33; see also Landers, *et al.*, ff. Tr. 7619, at 13-14.⁹⁶

229. All the 8- and 10-inch SWS piping is located in the vicinity of the DGB. These lines were installed before the soils settlement problem was recognized, and they were in place during the DGB surcharge program. The lines were profiled in 1979, and the data indicated that they were, on the average, 6 to 8 inches below their design elevation, with a maximum deviation of up to 21 inches. SSER # 2, § 3.9.3.1.1, at 3-33 to 3-34.

230. The two longest SWS lines that exhibited the greatest deviations are located north of the DGB between the DGB and the turbine building. These lines were rebbed after the removal of the DGB surcharge. In addition, pipe diameter verification has been conducted on 4-foot lines. The verification indicated that these lines are acceptable in accordance with American Waterworks Association (AWWA) requirements (i.e., less than 5% ovality). These rebbed and diameter-verified lines have been disconnected at the bolted connections at or near their DGB penetrations and have been recentered in their rattle-space annuli. SSER # 2, § 3.9.3.1.1, at p. 3-34.

231. The Applicant and Staff did not agree on the adequacy of the 36-inch-diameter SWS piping, but the Applicant, as discussed below,

⁹⁶ See SSER # 2, § 2.5.4.4.5, Fig. 2.11, for a diagram of the various SWS pipes.

agreed to replace this pipe. Following hearings in April 1982, it was determined that it was also necessary to rebed a portion of the buried 26-inch-diameter SWS piping as part of a fill replacement program to resolve potential liquefaction concerns in the area north and west of the SWPS. Because all the 36-inch-diameter SWS pipe is located in this area of potential liquefaction, it too was to be rebedded during replacement. Lewis, ff. Tr. 8868, at 8; see also Enclosure 2 to Applicant's letter dated March 16, 1982, serial 16269, attached as Reference 2 to the Lewis testimony.

232. The reinstallation program for SWS piping proposed by the Applicant and accepted by the NRC Staff included the reinstallation of the buried 36-inch-diameter SWS piping in the vicinity of the SWPS and the rebedding of the two buried 26-inch-diameter service water lines immediately north of the circulating water intake structure. The 36-inch lines which were to be replaced were the service water supply and return lines at the point of entry to and from the SWPS. Lewis, ff. Tr. 8868, at 10. The 26-inch pipes which were to be rebedded were service water supply and return lines to and from the DGB and turbine building. The lines proposed to be rebedded extended from the 36-inch lines to a point even with the southwest edge of the CWIS. *Id.* at 11.

233. The new fill material used in the reinstallation program to replace the potentially liquifiable fill in the area north of the SWPS and CWIS was to be a type of low-strength fly ash concrete similar to the material known by the brand name "K-KRETE." The properties of this new fill material would have been similar to those set forth in Table 3 to the testimony of Applicant's witness Donald F. Lewis (ff. Tr. 8868). These properties were to be verified by testing (*id.* at 11). This material was to be placed to a level of 1 foot above the top of the pipe. SSER # 2, § 2.5.4.4.5, at p. 2-36.

234. The existing 36-inch-diameter buried pipe would have been replaced with 36-inch-diameter welded ASME SA-672, Grade B-70, Class 20 pipe. The 0.625-inch nominal wall thickness would result in a D/t ratio of 57.6, considerably and acceptably reducing the potential for local buckling. SSER # 2, § 3.9.3.1.3, at p. 3-38; Lewis, ff. Tr. 8868, at 11.

235. The 36-inch pipe would be encased in a 6-inch-thick layer of a compressible polyethylene material known as "Ethafoam," which would create a transition that would eliminate concentrated shear strain to the piping caused by differential settlement (SSER # 2, § 2.5.4.4.5, at 2-36 to 2-37; § 3.9.3:1.3, at p. 3-39; Affidavit of Palanichamy Shunmugavel on Ethafoam, dated August 2, 1983, at 8). By so doing, the Ethafoam would minimize the effects of differential settlement.

236. The reinstallation of the designated SWS lines would have been coordinated with the SWPS underpinning. The excavation required to expose these lines and replace unsuitable fill would be contiguous with the excavation for the SWPS underpinning. Underground pipelines that would be exposed during excavation work would be left in place, and temporarily supported and protected to preclude damage. Precautions would include, as necessary, such measures as:

- a. shoring and bracing supporting fill;
- b. complete temporary support;
- c. staking utility locations prior to excavation; and
- d. hand excavation near utilities.

A list of structures, facilities, and utilities that might have been encountered or affected by the excavation is included in Table 5 to the testimony of Applicant's witness Donald F. Lewis. Lewis, ff. Tr. 8868, at 14 and Table 5.

237. Fill material within limits agreed to by the Applicant and the NRC Staff (*id.*, Table 4) would be excavated down to elevation 610 feet and replaced with a suitable material to minimize settlement and prevent liquefaction. Predicted future settlement, considering replacement of loose or soft fill material, was not expected to exceed 1.5 inches, a figure less than the 3.0 inches of settlement estimated for the existing fill. SSER # 2, at 2-36, 3-39; Lewis, ff. Tr. 6686, at 11.

238. The 26-inch pipe to be rebedded was, at a minimum, to have been exposed from the point where it connects to the 36-inch line to a point approximately even with the southwest edge of the CWIS. The existing 36-inch pipe to be replaced would have been cut from the point where it connects to the 26-inch pipe and at a point inside the SWPS near the penetration. Any 36-inch pipe which has already been replaced and temporarily covered would again have been exposed.⁹⁷ The soil beneath all the pipes, within the limits referenced *supra* in Finding 237, would have been removed and replaced with the fly ash concrete discussed *supra* in Finding 233. Before being rebedded, the pipe was to have been inspected to verify the integrity of the pipe and the external corrosion coating, and then encased in compressible material where applicable. Lewis, ff. Tr. 8868, at 15.

239. All pipe would have been fabricated and installed in accordance with design drawings and specifications and in accordance with the Work Authorization Procedure established as a result of our April 30, 1982

⁹⁷ Because of the Applicant's need for the 36-inch pipe in meeting its startup test schedules, portions of this pipe might have been replaced, and then temporarily backfilled for frost protection. See Lewis, ff. Tr. 8868, at 15.

Order, LBP-82-35, *supra*.⁹⁸ All material used to replace unsuitable fill and to backfill the excavation was planned to be placed in accordance with design drawings and specifications. Lewis, ff. Tr. 8868, at 15.

240. The Applicant has performed dynamic seismic analyses of the buried SWS piping which has been or will be reinstalled. These analyses, performed using Bechtel Associates' ME-010 computer code, analyzed the piping for appropriate ASME load combinations and certain single nonrepeated anchor movement. ASME Code Equations 8, 9, and 10 and Code Case 1606-1, which were utilized by Applicant in the analyses, address stresses due to design and peak pressure, weight and sustained loads (including overburden), seismic inertial loads, thermal expansion and seismic anchor movements. The ME-101 analysis⁹⁹ incorporated the FSAR SSE as input. As indicated *supra* in Finding 219, even though the FSAR SSE (0.12g ground motion) was used in this analysis, the input spectra are more conservative than the SSRS; moreover, a check analysis using approved BC-TOP-4A techniques and 1.5 x FSAR SSE as input was to be carried out. Lewis, ff. Tr. 8868, at 12-14 and Table 4; Affidavit of Thiru R. Thiruvengadam dated January 21, 1983 (Enclosure E to Applicant's Letter to Board, dated February 3, 1983). Finally, the Applicant had planned to include Seismic Category I underground piping in its seismic margin review. *See* Letter from Philip P. Steptoe (Applicant's counsel) to Board, dated February 3, 1983, Enclosure A.

(ii) Diesel Fuel Oil Lines

241. The diesel fuel oil lines include four 1½-inch-diameter pipes and four 2-inch-diameter ASME Code¹⁰⁰ Class 3 carbon steel pipes. These lines were to provide fuel oil supply and return between the emergency diesel generators and four buried fuel oil storage tanks located east of the condensate storage tanks. SSER # 2, Table 3.1 and § 3.9.3.1.1, at 3-33 and 3-34; Landers, *et al.*, ff. Tr. 7619, at 5, 7.

242. These lines were initially installed in June 1980, after completion of the DGB surcharge program. They were attached to unistrut support frames embedded in concrete piers, which are located at approximately 20-foot intervals. Both piping and supports are covered with approximately 2 feet of compacted fill and were to be provided with tornado-missile protection. SSER # 2, § 3.9.3.1.1, at p. 3-34.

⁹⁸ *See also* Bird/Wheeler, ff. Tr. 11,408, at 9.

⁹⁹ Bechtel computer program ME-101 is described in FSAR § 3.9.1.2.

¹⁰⁰ ASME Boiler and Pressure Vessel Code, § III (1980 Ed., with Addenda through Winter 1981).

243. The maximum settlement stress of the diesel fuel piping has been calculated assuming that the maximum value of 3 inches of predicted settlement was apportioned over a span of pipe corresponding to the maximum spacing between pipe footings. The highest calculated stress value was 18 ksi. This value is well within the allowable stress of 45 ksi for these lines under the 1977 ASME Code. Further, the pipes would settle with the diesel fuel oil storage tanks, and thus the differential settlement between the pipes and tanks would be small. Landers, *et al.*, ff. Tr. 7619, at 11.

244. Subject to the outcome of a seismic margin review (*see* Finding 240), the Licensing Board finds that this flexible small-diameter pipe in the diesel fuel lines could safely accommodate future plant fill settlement.¹⁰¹

(iii) Borated Water Piping

245. The borated water lines include four 18-inch pipes constructed of ASME SA-358, Grade 304 stainless steel and installed in accordance with ASME Code Class 2. They were to provide water from the borated water storage tanks (BWST) for normal functions, emergency volume and reactivity control and for such postulated accidents as a pipe break in the reactor coolant system. SSER # 2, Table 3.1 and § 3.9.3.1.1, at p. 3-34; Landers, *et al.*, ff. Tr. 7619, at 5-6, 7.

246. Profile data obtained in 1979 and 1981 show that these lines are below their design elevation by up to 2 inches, the maximum deviation allowed for under the construction tolerances. However, with the exception of the portions of the lines discussed below, the differential settlement effects for these lines have been evaluated, and the NRC Staff has found the effects of past and projected future settlement to be acceptable. SSER # 2, § 3.9.3.a.1, at p. 3-34.

247. The portions of the four 18-inch-diameter borated water lines from the BWST valve pits to the dike wall around the outdoor tanks were to be rebudded. These lines have been cut loose from the valve pits to isolate them from settlement caused by the surcharge of the valve pits, and have been refitted and recentered in the valve pit penetrations. Stress analyses based on the profile data for these lines

¹⁰¹ By copy of a letter from the Staff to CPC, dated June 20, 1984, we were informed that the Applicant had sought, and the Staff had approved, the removal and replacement of at least some (and possibly all) of the diesel fuel oil lines. As long as procedures prescribed by LBP-82-35, *supra*, were followed, and as long as SSRS criteria govern the analysis of new piping, we find no objection to this change of plans for corrective action.

satisfy the $3S_c$ criterion accepted by the Staff. However, monitoring programs were to be implemented at the ends of the piping to address rattlespace concerns. Pipe strain only would have been monitored at the valve pit penetrations. Pipe strain and minimum rattlespace dimension would have been monitored at the auxiliary building penetrations. The maximum additional ovality and minimum rattlespace dimension were to be limited to 4% and 0.5 inch, respectively, throughout the projected life of the plant. The current minimum rattlespace dimension at any penetration is 1-7/8 inches. SSER # 2, § 3.9.3.1.4, at p. 3-40; Landers, *et al.*, ff. Tr. 7619, at 12.

248. Subject to the outcome of a seismic margin review (*see* Finding 240), the Board agrees with the Applicant and Staff that the foregoing partial rebedding and recentering of borated water lines in conjunction with the proposed monitoring program for the BWSTs and the auxiliary building (including the rattlespace monitoring described above) would provide sufficient assurance of the continued serviceability of this piping.

(iv) Control Room Pressurization Lines

249. Piping in the control room pressurization system includes one 4-inch ASME Code Class 3 carbon steel pipe and one 1-inch ASME stainless steel pipe. This system would supply overpressurization air to the main control room from two tanks buried to the east of the auxiliary building, during postulated accidents such as releases of hazardous gases from offsite storage areas. SSER # 2, § 3.9.3.1.1, at p. 3-34, and Table 3.1; Landers, *et al.*, ff. Tr. 7619, at 6, 7; *see also* SSER # 2, § 2.6.4.4.5, Fig. 2.11.

250. These lines were installed in 1981, after major fill settlements had occurred and in a manner equivalent to that utilized for the rebedding of other piping. The future differential settlement effects were expected to be negligible. SSER # 2, § 3.9.3.1.1, at p. 3-34; Landers, *et al.*, ff. Tr. 7619, at 33. Therefore, subject to the outcome of a seismic margin review (*see* Finding 240), the Licensing Board finds that there would be reasonable assurance of continued serviceability of the pipes in this system.

(v) Penetration Pressurization Lines

251. The fifth type of Seismic Category I piping includes two 1-inch-diameter ASME Code Class 2 carbon steel penetration pressurization lines. These lines had not been installed as of November 1982 (the

month during which the latest hearings on underground piping were held). SSER # 2, § 3.9.3.1.1, at p. 3-34 and Table 3.1.

252. The majority of fill settlement would already have occurred before these pipes were to be installed. The effects of differential settlement therefore should be negligible. SSER # 2, § 3.9.3.1.1, at p. 3-34. Moreover, installation of these pipes would be governed by procedures instituted as a result of our April 30, 1982 Order, LBP-82-35, *supra*. Accordingly, and subject to the outcome of a seismic margin review (*see* Finding 240), we agree with the Applicant and Staff that there is reasonable assurance of the continued serviceability of these penetration pressurization lines.

(vi) The Monitoring Program

253. Effective monitoring of Seismic Category I piping, particularly SWS piping, is a necessary step for assuring that such piping would remain serviceable for the life of the facility in the face of the differential soil settlement conditions which have been present in the past and the lack of sufficient records to ascertain the exact amount of settlement caused by soil settlement and imperfect installation, respectively. *See supra* Finding 210. Both strain gage monitoring and vertical settlement monitoring were to be employed.

STRAIN-GAGE MONITORING

254. To ascertain the effect of future soil settlement, externally mounted strain gage instruments would be located at various points along the SWS system. The SWS piping was to be monitored by strain gages because it is the most critical piping in terms of its response to soil settlement, and because of the necessity of the strain measurements in computing ovality. SSER # 2, § 3.9.3.1.3, at p. 3-39; Landers, *et al.*, ff. Tr. 7619, at 33; Tr. 7673 (Lewis). The strain gages would be located at positions along the piping where the greatest settlement, and hence the most stress, would likely occur. The Applicant took the position that the maximum differential settlement along the longitudinal axis of buried piping would occur at anchor points, and that the maximum critical differential settlement expected along buried piping would be the difference between the future projected settlement of the building entered at the anchor locations and the maximum estimated settlement of the fill in which the pipeline is buried. Landers, *et al.*, ff. Tr. 7619, at 10. On the other hand, the Staff took the position that, due to the variable soil

properties, maximum differential settlement could occur at any point along the length of the piping — and particularly where local soft spots are adjacent to high spots, as where conduit is located beneath the pipe. Tr. 7765-66, 7864-65 (Chen). Since the Staff conservatively required strain and settlement monitors wherever it believed there could be a potential problem (based on its review of soil profiles prepared along the line of the underground piping), and because the Applicant agreed to those locations, the question is moot as to precisely where one would expect to find the maximum differential settlement. Tr. 9086, 9088-91 (Kane); SSER # 2, § 2.5.4.6.2, at p. 2-52, and § 3.9.3.1.3, at 3-39 to 3-40.

255. A curve derived theoretically would be used to determine the equivalent strains for the allowable ovality and the actual ovality data measured on the Midland 26-inch-diameter SWS piping. Allowable ovality for the pipe is 4%, which is equivalent to 0.0048 inch/inch strain and which includes an appropriate safety factor, as discussed *supra* in Findings 222-223. Using the curve, the ovalization data measured in the 26-inch-diameter pipe would be transformed to an equivalent strain. This equivalent strain value would then be subtracted from the allowable strain to determine the future maxima for the strain monitoring stations. Lewis, ff. Tr. 8868, at 4 and Fig. 1; Tr. 7637 (Lewis).

256. Table 1 to the Lewis testimony shows the measured ovality, corresponding meridional strain, and future allowable strain for all strain monitoring stations on the buried Midland Seismic Category I piping, as well as the number of gages for each station. The method used to calculate the future allowable strain would allow the pipe strain resulting from soil settlement occurring before the 1981 data to be accounted for at each station. The number of gages was determined by reviewing the pipe elevation profiles for abrupt inflection points and critical buckling zones. Each such station would include at least two gages, thus providing redundancy. The strain gages would be mounted 1 pipe diameter apart along the top line of each pipe. Lewis, ff. Tr. 8868, at 4, Fig. 1 and Table 1; Tr. 7736-37 (Lewis); Tr. 9023-25 (Kane, Chen).

257. The strain gages would be used, and would be necessary, throughout the life of the plant (as much as 40 years). Although the gages represent the “state of the art” in such equipment, existing records verify their effectiveness only for periods up to about 20 years. Moreover, within the scope of such records, problems have been raised concerning the reliability of those gages and the length of time they may be expected to provide reliable information. For example, certain gages failed to give accurate readings after about 3-5 years for reasons such as relaxation of the wire in the gages or movement of the anchors. For that

reason, the use of strain gages necessitates an adequate monitoring program for the gages themselves, which would extend throughout the period (i.e., plant life) when strain gages would be used and, as necessary or appropriate, requiring repair or replacement of the gages. (For further details, see *infra* Finding 263.) Tr. 7704-05, 7738-39 (Lewis); Tr. 7763-64, 7880-82 (Kane).

VERTICAL SETTLEMENT MONITORING

258. Vertical settlement markers were added to various monitoring stations to supplement the pipe strain gage measurements. These markers have been installed where loosely compacted soil may exist, based on borings taken throughout the plant site fill material, and where high future differential settlement could potentially occur due to underlying utilities. Figure 2 to the testimony of Mr. Lewis is a monitoring station location diagram for both strain gage monitors and settlement markers. Figure 3 to the Lewis testimony shows a typical pipe settlement marker which would be attached directly to the pipe. Lewis, ff. Tr. 8868, at 5, and Figs. 2 and 3; SSER # 2, § 2.5.4.6.2, at p. 2-52. We understand the locations of these markers to incorporate the locations determined by the Staff to be necessary, as set forth *supra* in Finding 211.

259. The vertical settlement measurements were to be based upon the initial installation survey of the markers. This survey would establish an elevation datum. Subsequent surveys would be compared against this datum to calculate the pipe movements. The differential vertical displacement from the initial datum to the current survey measurement would be used for comparison to the acceptance criterion discussed *infra* in Finding 262. This acceptance criterion is based on the prediction of 3 inches of predicted maximum future settlement (*supra* Finding 213). Lewis, ff. Tr. 8868, at 5.

260. The vertical settlement markers measure the absolute pipe settlement at each monitoring station, rather than the differential settlement between stations. If settlement at any one station reaches or exceeds the acceptance criterion discussed *infra* in Finding 262, an investigation would be called for under the proposed technical specifications. In addition, where any station reaches or exceeds an "alert level" of 75% of the 3-inch acceptance criterion, the NRC Staff is to be notified. *Ibid.* The combination of strain gages and settlement markers at each monitoring station, together with the foregoing alert-level reporting requirement, would ensure that differential settlement would be detected and proper actions taken before stresses exceed the allowable limits. Lewis, ff. Tr. 8868, at 5-6; Tr. 8869-72 (Lewis).

STRAIN AND SETTLEMENT MONITORING FREQUENCY

261. The proposed measuring frequency for the monitoring stations was the same for both strain gages and vertical settlement markers. Monitoring would commence after the gages and markers were installed and operational. The monitoring schedule that was proposed by the Applicant is as follows:

1. At least once each 30 days during the first 6 months of unit operation. The frequency will continue until observed settlement has stabilized at less than or equal to 0.10 inches from the previous reading.
2. When observed settlement stabilizes as discussed in (1), above, the monitoring frequency will decrease to at least once each 90 days during the first 5 years of plant operation for all stations. After the fifth year, the Applicant will file a report with the NRC on the need to continue monitoring of the field stations. This report will be based upon the evaluation of time history plots of the collected data.
3. After the fifth year of plant operation, anchor stations will be monitored on a yearly basis for the remaining plant operating life.
4. In the event of an unusual event, the Applicant will immediately monitor all stations.
5. In the event of a reportable occurrence, the Applicant will increase monitoring frequency as is determined necessary by the Applicant and the NRC.

Lewis, ff. Tr. 8868, at 6-7; Tr. 8873-75 (Lewis); SSER # 2, § 2.5.4.6.2, at p. 2-52.

PROPOSED TECHNICAL SPECIFICATION ACCEPTANCE CRITERIA AND ACTIONS

262. Under the Applicant's proposed technical specifications, if either the future allowable strain specified in Table 1 to the Lewis testimony or 75% of the 3-inch vertical settlement criterion were reached, this would constitute a reportable occurrence. Increased monitoring frequency would thereafter be required, the NRC would be notified of the occurrence and an engineering evaluation of the situation would be initiated. Supplemental reports to the NRC would follow the initial notification to describe the final resolution and actions. Such actions might include excavation of piping in the affected zone for visual examination and possible replacement or sleeving. Strain gages determined to be providing faulty data would be recalibrated or replaced within 90 days during the first 5 years of monitoring. Lewis, ff. Tr. 8868, at 5.

263. Based on our earlier findings, should plant operation be contemplated, the following guidelines should also be factored into license or permit requirements to be imposed by the Staff:

1. No monitoring schedule is proposed for the period between the commencement of monitoring (i.e., after gages and markers are installed and operational) and the commencement of unit operation. Since the degree of pipe settlement at any period of time is relevant, and since settlement resulting from defective installation, if any, would likely occur at an early date, the Applicant and Staff should agree upon an appropriate monitoring schedule for pipe settlement during the period between the commencement of monitoring and the initiation of unit operation.
2. To accommodate the usage of strain gages beyond the first five years of monitoring and throughout plant life, if necessary, the requirement for repair or replacement of gages which are determined to be providing faulty data (*see supra* Finding 262) should be supplemented by extending it for the life of the plant, on a schedule to be determined by the Staff.
3. The monitoring schedule proposed for the period of "plant" operation does not appear to take into account any extended period of time between the startup of Units 2 and 1, respectively. Nothing herein is to be taken to preclude the Staff, in the event a second unit were to be operated, from imposing additional monitoring requirements following the startup of the first unit, if appropriate.

RATTLESPACE MONITORING

264. To assure continuing adequate rattlepace clearance, the Applicant proposed monitoring the clearances of piping penetrations into buildings, but only where the pipes involved had not been rebudded and re-analyzed. As required by the minimum rattlepace criteria discussed *supra* in Findings 224-226, the soil settlement, seismic, and thermal displacements would be combined and compared to the available annular space to ensure at least a 0.5-inch safety margin. The Applicant proposed that the designated rattlespaces be monitored on a yearly basis for the first 5 years of plant operation, and that a determination then be made as to the necessity of continued monitoring. Lewis, ff. Tr. 8868, at 5; App. FOF, ¶ 380; *see also* FSAR, § 16, at p. 3/4.13-18. On the other hand, the Staff believes that the question of exactly which pipes should be monitored for rattlepace can be resolved as part of the Staff's review

of CPC's proposed technical specifications (Staff FOF, ¶ 395) and the Applicant offers no objection to this proposal (App. Reply FOF, ¶ 395). To the extent that the plants are to become operational, we will permit the Applicant and Staff to resolve this matter in the manner suggested by the Staff. In addition, with respect to the frequency of rattlespace monitoring, the technical specification should provide for annual monitoring throughout plant life, subject to modification after 5 years if requested by the Applicant and approved by the Staff (subject to normal requirements for effectuating a technical specification modification).

(vii) Laydown Loads and Safety-Grade Utilities

265. Load limits have been specified to prevent a surcharging effect resulting from laydown loads of long-term storage over buried safety-grade piping and conduits. Exclusion zones would be used to designate the affected safety-grade utility and the maximum allowable loads and time limits. The Applicant proposed technical specification limits based on an allowable surcharge settlement of 0.5 inch at a depth of 7 feet below the ground surface — the average buried pipe depth. Lewis, ff. Tr. 8868, at 7-8 and Table 2.

266. Based on questions raised by the Staff as to this proposal (Tr. 8999, 9011-12 (Kane)), we express no opinion at this time concerning the adequacy of the proposed technical specification limits. Should plant operation ever again be contemplated, the precise technical specification limits may be worked out by the Applicant and Staff during the Staff's review of proposed technical specifications, but the specifications must provide an adequate margin of safety for the heaviest loads postulated to occur over buried piping and conduits (in terms of both weight and, if appropriate, time within which loads might remain in place). Tr. 7909-11 (Kane). The control procedure to administer these technical specifications would be handled in conjunction with the plant operating procedures for controlling heavy loads inside the plant. Lewis, ff. Tr. 8868, at 8.

(viii) Freezeway Concerns

267. The Applicant committed to providing a plan for addressing a Staff concern about differential settlement that arises from a modification to Applicant's originally proposed freezeway crossing design. The freezeway is a temporary underground barrier of frozen earth created for construction purposes to minimize ground water flowing into the areas

where underpinning excavations for the control tower, electrical penetration areas, and the feedwater isolation valve pit are taking place. There is a potential for differential settlements where piping or conduit crosses the freezeway. The Applicant had planned to submit information that describes the crossing modification, details on surcharging the piping and conduit foundations during ground freezing, and the monitoring records on heave and/or settlement. Details on backfilling the excavations at the freezeway crossings would also have been provided by the Applicant. SSER # 2, § 2.5.4.4.5, at p. 2-36.

(c) *Corrosion*

268. As indicated earlier (Findings 245 and 249), there are two types of Seismic Category I underground piping which are composed of stainless steel: the borated water lines and one of the control room pressurization lines. The remainder of such piping is composed of carbon steel. *See also* Tr. 7832 (Hood). The Applicant initially relied to some extent on the use of these materials to resist potential corrosion. Tr. 7859-60 (Hood, *citing* § 9.21 of the FSAR, Rev. 30, dated October 1980, at 9.2-7). Nonetheless, pitting corrosion was discovered with respect to a portion of certain nonsafety stainless steel piping (Stamiris Exh. 35;¹⁰² Tr. 7683-86 (Lewis); Tr. 7827-28 (Hood); Lewis, ff. Tr. 8868, at 16-17.

269. At the Board's request the Staff presented an expert witness on corrosion. That witness was Dr. John R. Weeks, a Senior Metallurgist at Brookhaven National Laboratory, where he has been employed since 1953. His responsibilities include experimental investigations on the mechanisms of stress corrosion cracking and pitting corrosion of stainless steels. Weeks, ff. Tr. 9147. Dr. Weeks, who prepared and sponsored the section of the Staff's Safety Evaluation (SSER # 2, § 3.12) dealing with corrosion of underground piping, addressed potential corrosion in both stainless steel and carbon steel piping. Tr. 9148 (Weeks).

270. All carbon steel piping used in the service water and diesel fuel lines was to be protected from corrosion by a combination of a primer paint and a protective wrapping to provide electrical insulation as well as a physical barrier between the piping and the corrosive environment. There were procedures for both shop coating of piping and field coating of field welds to ensure that this piping would be protected from external corrosion. In addition, the piping has been 100% inspected by Bechtel

¹⁰² Stamiris Exh. 35 was admitted subject to the qualification that certain handwritten notes on the face of the document, which had not been authenticated, were not to be regarded as evidence (Tr. 7836-37).

for defects in the coating. Bechtel inspectors have determined that the coatings are acceptable. SSER # 2, § 3.12.1, at p. 3-42; Tr. 8877, 8882-84 (Lewis); *see also* Tr. 9394-95 (Weeks).

271. The buried pipe wrapping material consists of reinforced fiberglass followed by a layer of coal-tar-saturated felt paper wrap for the shop-coated material, and by a field-installed tape coat for the field-coated material. Both techniques are standard commercial practices for protecting carbon steel piping from ground water attack. Field installation and backfill techniques were carefully specified to minimize damage to the coatings. These procedures were also monitored by the Bechtel quality assurance department. Contrary to the claim of Ms. Stamiris, the pipe wrapping materials would not be subject to degradation due to differential settlement bending, inasmuch as they are inherently flexible and should not fail as a result of the amount of strain that might occur in the piping. Moreover, an independent check of the condition of the pipe wrappings would be possible when the 36-inch pipes are excavated and replaced before startup of the plant. *See* SSER # 2, § 3.12.1, at p. 3-42; Tr. 9146-49, 9159-60, 9209-12 (Weeks). The Board directs that this check be undertaken, to the extent that excavation were to occur following issuance of this Decision.¹⁰³

272. The entire Midland site was to be protected by a galvanic protection system designed to maintain all buried piping to a potential of 0.85 V negative to the copper/copper sulfate reference electrode. This is a standard industry practice intended to ensure that, should any defects develop in the protective coating of these pipes, localized corrosion would not occur. This galvanic protection system consists of an array of buried electrodes charged from a central rectifier, as well as zinc protective anodes that can be used both for controlling corrosion and for monitoring the effectiveness of the applied galvanic current protection system. SSER # 2, § 3.12.1, at p. 3-42; Tr. 9168 (Weeks); Tr. 9222-34 (Woodby).

273. The galvanic protection system, as originally installed, included approximately 120 buried anodes. At the request of the site geotechnical engineer, concrete was used as backfill material for the installation of approximately fourteen anodes located near the BWSTs and to the south of the DGB. This practice was discontinued soon after it started, however, and no further anodes were encased in concrete, because of a concern

¹⁰³ Since both the Applicant and Staff assert that we should give credit to this possibility of checking of the condition of the pipe wrappings, we are doing so but are directing that it be undertaken to the extent it is still feasible to do so.

that the concrete would insulate the anodes and diminish their effectiveness. In further response to this concern, the concrete-embedded anodes were tested and shown to be performing within acceptable limits. Tr. 9223-25, 9256 (Woodby).

274. Well-founded concerns do exist, however, about the ability of concrete-encased anodes to function in the future. One reason that the concrete-encased anodes have functioned well is the high porosity of the concrete (Tr. 9304 (R. Cook)). Should the concrete become dry, however, it would act as an insulator, thereby defeating the purpose of the anodes (Tr. 9225, 9256-57 (Woodby)). The satisfactory performance of the concrete-encased anodes can also be attributed to the fact that the resistivities of the soil and concrete are about equal. If the site were to be flooded with water of higher conductivity, the concrete-encased anodes might not be as effective. Tr. 9303 (Weeks). For these reasons, the Applicant had planned to abandon the concrete-encased anodes, even though they had been shown to operate properly. The Applicant would have replaced them with anodes placed in a material called "coke breeze," a byproduct of burning coal which would allow for adequate compaction and proper conductivity. Tr. 9226-27 (Woodby). Moreover, the Applicant had been upgrading the galvanic protection system by installing about 190 new anodes in addition to the approximately 106 that would continue to be in operation (Tr. 9223-27 (Woodby)).

275. The galvanic protection system has been in operation since November 1980. Readings were being taken from voltmeters located on the rectifiers of the system approximately every other day, and the entire system was inspected twice monthly. Tr. 9160 (Weeks); 9230-31, 9254-55 (Woodby); Tr. 10,601 (Hood). One potential concern about the system, raised by NRC resident inspector Ron Cook, was that it might promote corrosion. Dr. Weeks opined that the polarity of the DC current in the system would have to reverse to cause a corrosion problem (Tr. 9325 (Weeks)). We are not aware of a mechanism (and none is reflected in the record) by which such a reversal in polarity might occur.

276. Leaching tests on sand samples from the backfill used at the Midland site have shown only trace amounts of chlorides, and a pH greater than neutral (8.6 to 8.9). This combination should minimize the extent of corrosion that might occur should the galvanic protection system or the pipe wrappings not perform their job. Furthermore, corrosion effects on all underground piping at the Midland site would be minimized by the operation of the site dewatering system. This system, discussed *supra* at Findings 98-116, should keep ground water levels below the elevation of the buried piping. Moreover, it is not anticipated that any low-level radioactive waste contamination would lead to an increase

in external corrosion to buried pipe at the site. *See* SSER # 2, § 3.12.1, at p. 3-42; Tr. 9153, 9158, 9161-62, 9303-05 (Weeks).

277. Should the galvanic protection system become inoperative, and assuming there were flaws in the coating on carbon steel pipes, corrosion at such locations would not be serious for periods up to at least 6 months. This is because other elements of the corrosion protection system would still be in effect — i.e., the nonaggressive chemical properties of the fill, and the materials from which the piping is constructed. Buried piping at the Midland site is designed with a 1/16-inch corrosion allowance, and pitting depths would not exceed one-half this allowance in 6 months. SSER, # 2, § 3.12.2, at p. 3-43; *see also* Tr. 7744-45 (Landers); Tr. 9167, 9217, 9305-06 (Weeks); Tr. 10,602-03 (Hood). We note that, during plant construction, the galvanic protection system has periodically been shut down for extended periods of time. For example, the system was inoperative from February through August 1982. Tr. 9228-29 (Woodby). In July 1982, near the end of that period, excavation of a stainless steel line revealed no visible corrosion on that piece of piping (Tr. 9301 (Weeks)).

278. The pipe-coating materials, such as fiberglass wrap or a coal tar paper wrap, are inherently flexible and should not fail as a result of the amount of strain that might occur in the Midland site buried piping. The protective wraps can “give” within the maximum acceptable ovalization and strain limits set for the piping. *See supra* Findings 270, 271. Further, should flaws develop in the protective wrap, the galvanic protection system should prevent corrosion at such flaws. Therefore, assuming the system remains operative, it is not anticipated that significant localized corrosion of coated carbon steel piping would occur as a result of soils settlement. SSER # 2, § 3.12.2, at p. 3-42; Tr. 8903 (Lewis); Tr. 9217 (Weeks).

279. Buried stainless steel piping at the Midland site is not coated on the outside, but is protected from corrosion by the galvanic protection system. Following the discovery, during construction, of pitting in the Nonseismic Category I stainless steel piping from the condensate storage tanks (*see supra* Finding 268), two studies were performed to determine the causes of the pitting. In the first, which was undertaken in 1979, the Applicant’s consultant (Bechtel National, Inc.) examined this piping and concluded that the corrosion was a highly localized pitting, present on only one side of the piping. In view of the good soil chemistry at the Midland site, it is unlikely that this pitting would have been caused by interaction between the piping and the soil before the galvanic protection system was activated. However, the consultant could not determine the cause of the pitting but noted the lack of “known electrical sources” in

the vicinity of the corroded pipe sections. Stamiris Exh. 36. Subsequently, in a study dated January 26, 1981, the Applicant's consultant (Bechtel Group, Inc.) performed another study which suggested that these corrosion pits were caused by stray currents resulting from improper grounding during field welding of other components at the Midland site (Stamiris Exh. 37). The Staff believes this to be a likely explanation for the pitting. SSER # 2, § 3.11.3, at p. 3-43; Tr. 8878-79, 8886, 8904 (Lewis); Tr. 9385, 9434-35 (Weeks).

280. Although the recommendations of the two studies vary, it is significant that the experimental findings of the two studies were similar. Cf. Stamiris Exh. 37, at 2, with Stamiris Exh. 36; see also Tr. 9176 (Weeks). The different conclusions were attributed by Dr. Weeks to different investigators (including the contribution to the second report of a project engineer expert in corrosion matters) and to the discovery by the authors of the 1981 report of poor field welding procedures which could have given rise to the corrosion which was discovered. Tr. 9176, 9180 (Weeks); Stamiris Exh. 37, at 2, 7-10. Dr. Weeks also explained how electrical current could have caused the corrosion investigated in the first report (Tr. 9434-35). We find Dr. Weeks' reconciliation of the two reports to be credible. Further, Dr. Weeks utilized the two reports only for their discussion of the soil chemistry and the pitting corrosion. He also relied on other information in performing his review, and he formed his own independent conclusions. Tr. 9165-66, 9173-74, 9352-53, 9384-85 (Weeks). Moreover, the inspections of substantial portions of the remaining buried piping (which have been or were planned to be undertaken) provide the best assurance of the adequacy of protection against external corrosion of the buried piping. Tr. 9386 (Weeks); Tr. 9212-14, 9216 (R. Cook); Stamiris Exh. 38.

281. Construction personnel were advised to exercise greater care in assuring a firm grounding path exists when welding was taking place. Further, selected lengths of buried stainless steel piping in the BWST lines were being excavated and examined to determine the condition of the external surface of this piping. During the summer of 1982, all portions of the line that could be readily excavated were examined. The pipe came from the same area where at least one example of pitting had previously been found. During this inspection, no pitting was discovered. In addition, portions of the condensate storage lines have already been examined during the Applicant's investigation. The Applicant and the Staff have concluded that this proposed inspection followed by replacement of any defective piping will ensure the integrity of these systems. See SSER # 2, § 3.12.3, at p. 3-43; Tr. 8879-81 (Lewis); Tr. 9435, 9442 (Weeks). The Applicant and the Staff have also concluded

that the galvanic protection system now in place will help prevent any future external corrosion of stainless steel piping. See SSER # 2, § 3.12.3, at p. 3-43; Tr. 9160, 9168-69 (Weeks). Were the system to become inoperative and plant construction were later resumed, additional analysis of the corrosion of underground piping might be required.

C. Nonseismic Category I Piping

282. As set forth *supra* in Findings 90, 94, 97, if the Midland site permanent dewatering system lowers and maintains ground water levels below elevation 610 feet in the vicinity of the DGB and the railroad bay area of the auxiliary building, there will be no danger due to liquefaction at the site resulting from earthquakes equal to or smaller than the SSE.¹⁰⁴ At the Staff's request, the Applicant analyzed breaks in Nonseismic Category I underground piping to determine the effects of such breaks on the ability of the permanent dewatering system to maintain water levels below elevation 610 feet in these areas. SER, § 2.4.6.3, at 2-28 and 2-29.

283. Several Nonseismic Category I lines, called circulating water discharge lines (CWDL), are located to the east and west of the DGB, about 18 feet below the DGB's continuous reinforced concrete footings (SSER # 2, § 2.5.4.4.2, at p. 2-24; § 3.8.3.4, at p. 3-22; see FSAR Fig. 2.5-177 for the location of this piping). In this area, the dewatering system would normally control the ground water level to elevation 595 feet. The Applicant performed an analysis of a postulated failure of the Unit 2 CWDL (the largest Nonseismic Category I underground pipe near a critical structure). See Paris, ff. Tr. 9900, at 34; Tr. 9938-43 (Paris); SER, § 2.4.6.3, at p. 2-28. This analysis established that the ground water level would rise to elevation 607 feet over a period of approximately 3.3 days before the closest area dewatering well would automatically activate. Thereafter, operation of only one well would be sufficient to prevent ground water from rising significantly above elevation 610 feet. However, should all the area dewatering wells be inoperable at the time of the pipe break, the rising ground water would trigger the permanent dewatering monitoring system, resulting in appropriate actions under the proposed technical specifications. Moreover, since the top of the Unit 2 CWDL is at elevation 610 feet, ground water levels are not expected to rise significantly above this elevation as a result of a

¹⁰⁴ The potential for liquefaction in areas to the north and west of the SWPS is being dealt with by replacement of loose sands in those areas. See *supra* Findings 90, 95.

CWDL break. See SER, § 2.4.6.3, at 2-28 to 2-29; Tr. 9938-43 (Paris). See also discussion, *supra* Findings 110 and 112-113.

284. The Applicant also analyzed the Nonseismic Category I condensate storage lines (CSLs) for a postulated failure. These lines consist of the two 20-inch-diameter supply lines and two 6-inch-diameter return lines that run from the condensate storage tanks (CSTs) located near the southeast corner of the DGB, underneath the DGB to the condensers located in the turbine building. SER, § 2.4.6.3, at p. 2-29.¹⁰⁵

285. Prior to the placement of the DGB surcharge, the Applicant committed to monitoring the CSLs so as to evaluate pressures imposed on the line by the surcharge (Tr. 4404-06 (Kane); Tr. 2455-56 (Gallagher)). In addition, both CSLs were severed on the north side of the DGB at a point between the DGB and the turbine building so as to relieve stresses on the line and to the DGB due to settlement. (Some consideration was given to severing *both* ends of the CSLs, but apparently that course of action was not carried out.) See, e.g., Tr. 4199-4200 (Hood). As a result of its analysis, the Applicant has concluded, and the Staff concurs, that, if any of the CSLs were to break so that the entire liquid inventory of the affected CST were to drain out through the break and remain in the area directly beneath the DGB, the ground water would not exceed elevation 610 feet even if the area dewatering wells were not operational. See SER, § 2.4.6.3, at p. 2-29; SSER # 2, § 2.4.6.3, at p. 2-5; see also discussion, *supra* Finding 110.

286. The Applicant has also evaluated a postulated break in a dewatering system header line. In this event, inflow of water could exceed the capacity of the affected dewatering pumps, producing a rise in ground water in the immediate vicinity of the affected wells. The installation of flexible header diversion hoses and backup interceptor wells provides reasonable assurance that ground water levels will not rise above elevation 610 feet. See SSER # 2, § 2.4.6.3, at 2-5 to 2-6; see also *supra* Finding 110.

287. A break in the 66-inch concrete cooling pond blowdown line would have minimal impact on ground water levels because of the low-pressure delivery of this line. The dewatering system has sufficient capacity to remove the volume that would be introduced into the ground water due to a rupture in this line. SSER # 2, § 2.4.6.3, at p. 2-7; Paris, ff. Tr. 9900, at 33.

288. CPC advises that its letter to the Staff of March 16, 1982 (File 0485.16, Serial 16269, not introduced into evidence) identified a 10-foot

¹⁰⁵ See SSER # 2, Fig. 2.11 for the location of the CSL, designated 20"-IHDC-169, and the two CSTs. Figure 2.11, however, is inaccurate in that it indicates only one out of the four CSLs. Tr. 9123.

length of 48-inch-diameter line extending from the SWPS which, at the time, was classified by the Applicant as Seismic Category I (see App. FOF, ¶ 324, at 223 n.574). The Applicant later reclassified this portion of the 48-inch-diameter line as Nonseismic Category I. The NRC Staff concurred with the reclassification and agreed that failure of this 48-inch-diameter line would not cause a loss of essential SWS cooling. SSER # 2, § 9.2.1, at 9-1; see also *id.* § 3.9.3.1.1, at 3-32 to 3-33.

D. Conclusions with Respect to Underground Piping

289. The Licensing Board concludes that, although adequate analyses had not been completed at the time of the submission of Stamiris Contention No. 4.A(4) and Warren Contention 3, the Applicant has now adequately taken into account the effects of the preloading of the DGB on underlying piping. All pipes in the vicinity of the DGB have been analyzed for adverse effects due to the preload, and (assuming resumption of the project) conservative rattlespace monitoring requirements are to be required. Some piping, such as the diesel fuel oil lines, was not installed until *after* the preload, and thus was not subjected to preload stresses. Other piping, such as the condensate storage lines, had been installed prior to the preload but were severed so as to relieve stresses to the pipes and to the DGB.

290. The Licensing Board similarly concludes that, although Stamiris Contention No. 4.C(f) was to some extent meritorious at the time of its submission, the Applicant has now adequately evaluated the effects of differential settlement, dewatering-induced settlement and seismic settlement on buried piping. The Applicant and the NRC Staff have presented extensive testimony and numerous exhibits outlining the remedial actions and analyses which have been performed on the buried piping with respect to soils settlement. Moreover, the comprehensive monitoring program, which has been described *supra* in Findings 253-264, would provide additional assurance that Seismic Category I piping would continue to be safe throughout the operating life of the plant. In the event of plant operation, should settlement of Seismic Category I underground piping greater than predicted occur, the Applicant would be required to report such settlement and take corrective action prior to the point where settlement might affect the ability of that pipe to perform its intended function.

291. The Licensing Board further concludes that, under the programs described by the Applicant and Staff, there is reasonable assurance that the underground piping at the Midland site would be adequately protected from external corrosion. This conclusion is specifically subject to the

continued operation of the galvanic protection system; if the system were to become inoperative for extended periods, further analyses might be required.

292. Accordingly, the Licensing Board concludes that, so long as the proposed corrective actions (including replacement, rebedding, reinstallation, and monitoring, as appropriate) would be carried out satisfactorily (a question not considered in this Partial Initial Decision), there is reasonable assurance that Seismic Category I underground piping at the Midland site would be able to perform its intended functions and would not place undue risk on the public health and safety. Furthermore, there is reasonable assurance that postulated failures in Nonseismic Category I underground piping, were they to occur, would not adversely affect nearby Seismic Category I structures or piping.

VIII. ELECTRICAL DUCT BANKS AND CONDUITS

293. Stamiris Contention 4.C(f), as amended, states:

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:

* * *

C. Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement, and seismic effects for these structures:

* * *

f. Related Underground Piping and Conduit.

Prehearing Conference Order, dated October 24, 1980, Appendix at 5-6, as supplemented by Ms. Stamiris' Answer to Applicant's Interrogatories, dated April 20, 1981. Similar safety-related concerns were expressed by former Intervenor Sharon Warren in her Contention 3 (quoted *supra* at note 93). Insofar as they relate to the electrical duct banks and conduits, they will be addressed here.

294. Seismic Category I buried electrical duct banks at the Midland Plant run under the turbine building from the auxiliary building to the DGB and to the SWPS. Others run north from the auxiliary building to the borated water storage tanks and to the control room pressurization tanks. A third group runs from the emergency diesel fuel oil storage tanks to the DGB. The duct banks are buried at depths from 3 to 40 feet below grade level. Their dimensions vary from 18 x 19 inches to 74 x 20 inches. Each duct bank is rectangular in cross-section, constructed of concrete with a minimum thickness of 6 inches, possessing a minimum compressive strength of 3000 psi, with a nominal amount of grade 60

steel as reinforcement to avoid surface cracking. The steel is asserted to serve no structural purpose (*but see infra* Finding 304). Plastic or steel conduits, 2 to 4 inches in diameter, are placed inside the electrical duct banks. Electrical cables are then pulled through this conduit. The electrical cables are placed loosely in the conduits which are only partially filled by the cable volume. The electrical cables, which are ductile and capable of considerable stretching before breaking, are suitable for direct burial in wet and dry earth, and have a 40-year service life without considering the presence of the duct banks. Rinaldi/Matra, ff. Tr. 7537, at 11; Shunmugavel, ff. Tr. 12,016, at 1-4, Appendix A; Tr. 12,023-31 (Shunmugavel).

295. The function of the electrical duct banks is only to provide a space in the ground through which Seismic Category I electrical cable may be pulled. They are not required to provide a water-tight pressure boundary around the electrical cables, and cracking of the duct banks due to differential settlement or the leakage of water does not affect their design function. Therefore, although the duct banks are usually referred to as Seismic Category I, they serve no structural function; it really is the cables within the duct banks which are Category I. The Applicant has analyzed these duct banks for normal conditions, construction conditions, settlements, and seismic effects. In addition, the Applicant has given special consideration to the duct banks which temporarily restrained DGB settlement to ensure that they had not been damaged by this loading history (*see infra* Finding 303). Rinaldi/Matra, ff. Tr. 7537, at 11; Shunmugavel, ff. Tr. 12,016, at 1-2, Appendix A; Tr. 12,020-22 (Shunmugavel).

296. Based on the function of duct banks, Dr. Palanichamy Shunmugavel, the Applicant's witness, developed conservative acceptance criteria to overcome various problems — e.g., to avoid concentrated shear deformation large enough to cut or damage the electrical cables. These criteria specify allowable values of shear deformation for 2-, 3- and 4-inch conduits filled to maxima of 20, 56 and 51%, respectively. Maximum allowable longitudinal cable-pulling tension and maximum bend radii were also specified. Shunmugavel, ff. Tr. 12,016, at 3; Tr. 12,021-22, 12,033-35 (Shunmugavel).

297. Dr. Shunmugavel testified that, during normal operating conditions where the duct banks are buried in the earth, soil overburden, surcharge and live loads from surface traffic would be absorbed by duct bank concrete and distributed to the soil around and below the duct bank. He concluded that, as a result, the cables inside the duct banks and conduits would never see the effects of these loads. Dr. Shunmugavel further testified that the duct banks have the capacity to span dis-

tances up to 10 feet without any soil support. A cracked duct spanning a 10-foot gap might require some support; however voids are not expected beneath the duct banks during the life of the plant. Shunmugavel, ff. Tr. 12,016, at 2, 4; Tr. 12,027-35 (Shunmugavel).

298. Under construction conditions, the concrete duct banks are protected from nearby construction activity by the placement of sufficient earth cover over them. Notwithstanding such planned protection, however, on two separate occasions duct banks have been injured during construction because of drilling errors. These incidents have been extensively reviewed on this record, as part of the consideration of QA/management attitude issues (with which we are not dealing in this Decision).

The duct bank concrete and conduits protect the cable pathways from being obstructed by laitance (drippings of cement mixture or aggregate that can harden and form obstructions) and other trash from construction activity. To ensure that the electrical cable is protected when it is pulled through a duct, the duct is first cleaned and checked for continuity and obstructions by pulling a segmented hard-fiber-composition mandrel through it. Shunmugavel, ff. Tr. 12,016, at 2, 4 and Appendix A, Fig. 7-3; Tr. 12,023, 12,034 (Shunmugavel).

299. Where duct banks cross the freezeway constructed in conjunction with the installation of a dewatering system for the auxiliary building, the soil around and below the ducts has been removed in order to isolate the duct banks from the effects of freezing. Monitoring pits have also been installed. The portions of the ducts in the excavated pits were to be encircled with 6-inch-thick polyethylene planks and backfilled with fly-ash cement and compacted soils. The Staff has identified on page 2-36 of SSER # 2 the information required to be provided by the Applicant in regard to a modification of the originally proposed freezeway crossing design. The issue of duct banks crossing the freezeway was extensively covered during hearings in November and December 1983, in connection with an alleged violation of the Board's April 30, 1982 Order (LBP-82-35). That issue also is one of the QA/management attitude issues which are not being dealt with in this Decision. *See supra* p. 32.

Dr. Shunmugavel testified that during construction, when the present backfill was to be excavated and replaced in the area north of the SWPS, some of the duct banks in that area would be temporarily unsupported. These duct banks would then have been evaluated and temporary supports placed under them, if necessary, during the excavation process. Shunmugavel, ff. Tr. 12,016, at 5; Tr. 12,034 (Shunmugavel); SSER # 2, § 2.5.4.4.5, at p. 2-36 (second paragraph).

300. Dr. Shunmugavel also evaluated the integrity of the electrical duct banks and conduits under differential soil settlement conditions. He estimated that the maximum duct bank settlement from October 1978 through the year 2025 would be 3 inches, and also that this 3-inch maximum duct bank settlement would occur over a minimum distance of 25 feet. The 3-inch maximum duct bank settlement prediction takes into account secondary consolidation to the year 2025, settlement effects due to the temporary and permanent site dewatering systems, a 0.5-inch allowance for possible laydown loading and a 0.25-inch allowance for possible seismic shakedown settlement due to an earthquake with peak ground acceleration of 0.19g. The NRC Staff was in agreement with the estimates of differential soil settlement used in Dr. Shunmugavel's analysis.

A conservative evaluation performed by Dr. Shunmugavel based on the maximum allowable longitudinal cable strain of 0.333×10^{-3} indicated that the duct banks could actually tolerate up to 3 inches of differential settlement over as little as a 12-foot length. Based on this evaluation, the estimated maximum duct bank settlement of 3 inches over a 25-foot length during the plant's operating life could easily be accommodated.

Dr. Shunmugavel also testified that; except in one area, discussed *infra* in Finding 301, the electrical cables can accommodate the concentrated shear deformations which could result from the predicted differential soil settlement at various interfaces between the Midland Plant buildings and the duct banks. Shunmugavel, ff. Tr. 12,016, at 5-7; Tr. 12,028-29 (Shunmugavel); Tr. 12,075, 12,100 (Kane).

301. Results of Dr. Shunmugavel's evaluation indicate that there is a potential problem with concentrated shear deformations caused by differential interface settlements where seven duct banks enter the north wall of the SWPS. In addition, cables contained in one of these seven duct banks also exceed allowable concentrated shear deformations at the interface between the existing backfill material and the fly-ash cement mixture which will be used to replace certain liquefiable sands northwest of the SWPS.

To remedy this problem, a polyethylene called "Ethafoam" was to be wrapped around the duct banks in these areas to isolate them from the predicted concentrated shear deformations. The Ethafoam isolation would have occurred, subject to the NRC's work authorization procedure, at the same time the present backfill north of the SWPS was to be excavated and replaced with the fly-ash cement mixture. Dr. Shunmugavel testified that the 6-inch design thickness of the Ethafoam would be adequate to isolate the duct banks from the effects of shearing or any

other load resulting from laydown equipment or traffic. Staff witness Frank Rinaldi expressed general agreement with the testimony of Dr. Shunmugavel. Responding to a question from the Board, Mr. Rinaldi agreed that Ethafoam would retain enough insulating capacity, even after dead and live loads are considered, because of its limited compressibility and the spreading out of surface loads with depth below the surface. In response to Board questions concerning the characteristics and use of Ethafoam, Dr. Shunmugavel did not have the requested data at hand; the Applicant accordingly agreed to provide an affidavit supplementing the response elicited in the record. That affidavit, which was distributed to the Board and the parties on August 8, 1983, constitutes a full answer to the Board's questions and a useful addition to Dr. Shunmugavel's testimony. Since neither the Staff nor Ms. Stamiris has objected to this affidavit, through proposed findings or otherwise, we are treating it as an integral part of the record on this topic. Shunmugavel, ff. Tr. 12,016, at 7-8; Tr. 12,017-19, 12,025-31 (Shunmugavel); Tr. 12,040-41, 12,046-47 (Rinaldi); Affidavit of Dr. Shunmugavel Concerning the Use of Ethafoam at Midland, dated August 2, 1983 (transmitted to Board and parties on August 8, 1983).

302. Finally, Dr. Shunmugavel conducted a seismic evaluation of the Category I electrical duct banks and conduits at the Midland site. Seismic compression, shear and surface wave effects were included in the evaluation. Using 1.5 times the ground response spectra for the FSAR SSE, Dr. Shunmugavel concluded that the maximum values determined for these duct bank sections are well within the allowable acceptance criteria for strain and concentrated shear deformations.

Seismic interactions between the buildings and duct banks could occur if clearances along the axial direction between the duct banks and the buildings were not sufficient to accommodate maximum relative seismic motion. Dr. Shunmugavel evaluated these clearances using 1.5 x FSAR SSE and determined that there was no problem from such seismic interaction at Midland. As noted previously, the acceptability of designs made on this basis for Seismic Category I structures is contingent on the satisfactory completion of a seismic margin review. Shunmugavel, ff. Tr. 12,016, at 8-9; Tr. 12,017-18 (Shunmugavel); Tr. 7540, 7558, 12,130-31 (Rinaldi).

303. Four Seismic Category I duct banks enter the DGB from below. For a period of time in 1978 due to the greater-than-anticipated settlement of the DGB and inadequate clearances between the duct banks and the building footings, these duct banks supported part of the weight of the DGB. In November 1978, Applicant eliminated this load transfer by increasing the clearances at the vertical joints between the duct banks

and the footings. In May 1980, after the DGB surcharge program, all of the conduits in the duct banks were checked and no obstruction or discontinuity was encountered. The cables were pulled through and placed in those conduits in 1981.

The Applicant analyzed the DGB duct banks and concluded that this one-time loading condition has not affected their ultimate strength. Since the duct banks are not required to provide a watertight boundary around the cables, any cracking caused by this episode would not affect their design function. The Category I cables have not been affected because they were not in place until after the DGB was isolated from the duct banks and after the surcharge of the DGB. Shunmugavel, ff. Tr. 12,016, at 8 and Appendix A; Tr. 12,021 (Shunmugavel); Tr. 12,109-10 (Rinaldi).

304. The NRC Staff expressed agreement with the Applicant's analysis of duct banks and conduits. Mr. Rinaldi testified that the Staff believes that the Applicant has adequately taken into account all dead, live and seismic loads in its evaluation of Category I buried electrical duct banks, conduits and cable at the Midland site. In response to a Board question, he cited a number of conservative aspects of this duct bank design in support of the above Staff belief, including not relying on the steel reinforcement in fact used, providing for unsupported spans far greater than reasonably expectable, and the use of fly-ash lean concrete as a support mixture instead of soil.

In responding to a relevant portion of Stamiris Contention 4.C(f) and Warren Contention 3, Mr. Rinaldi summarized testimony given in February 1982 expressing satisfaction with plans for meeting initial Staff concerns about electrical duct banks, subject to adequate documentation. This documentation has since been thoroughly audited by one of the Staff's consultants at the office of the CPC architect-engineer to verify the previous conclusions, and was found to be acceptable. Rinaldi, ff. Tr. 12,080, at 2, 8-10; Tr. 7554, 12,042, 12,045-46, 12,117-18 (Rinaldi).

305. The Licensing Board concludes, based on the foregoing findings, that the Applicant has adequately resolved the concerns raised in Stamiris Contention 4.C(f) relating to the remedial soils measures taken or planned for Seismic Category I duct banks and conduit at the Midland site. The Board finds reasonable assurance that they are capable of performing their intended safety function over the projected lifetime of the plant. This conclusion is subject to satisfactory completion of the remedial work north of the Service Water Pump Structure described *supra* in Finding 301, as well as to the satisfactory outcome of a seismic margin review (see *supra* Finding 302).

IX. SLOPE STABILITY OF BAFFLE AND PERIMETER DIKES¹⁰⁶

306. The cooling pond enclosed within the perimeter dikes is a polygonal body of water approximately 880 acres in area, located south and east of the Midland Plant, which would have provided cooling water to the condensers during normal plant operation. The pond is bordered on the northeast by the Tittabawasee River. The pond design includes intake and outlet areas which are separated by a baffle dike to assure proper water circulation. The water level of the cooling pond during normal plant operation would be maintained at elevation 627 feet. The bottom of most of the cooling pond lies between elevations 605 and 610 feet.

The Emergency Cooling Water Reservoir (ECWR), located in the northeast corner of the cooling pond, is an area of the larger cooling pond which has been excavated in the natural soils to elevations ranging from 593 to 596 feet, below the original ground surface elevation of approximately 605 feet. The ECWR is classified Seismic Category I. In the event of the failure of the cooling pond perimeter dikes and the loss of the larger cooling pond reservoir, water for safe shutdown of the reactors and for mitigation of accident conditions is retained in the ECWR. The ECWR is designed to contain a sufficient volume of circulating water to cool the plant for a 30-day period without makeup. If the ECWR were used, return cooling water would be discharged to the ECWR through two 30-inch Seismic Category I reinforced concrete water pipes ("return pipes"). Hendron, ff. Tr. 3940, at 6-7, Figs. 1 and 2; Kane, ff. Tr. 3484, at 3; Tr. 3577-79 (Kane, Singh).

307. The ECWR is bounded on the southwest by the baffle dike, which separates the intake and outlet areas of the cooling pond. The ECWR area is bounded on the northeast by the upstream slope of the perimeter dike. The perimeter dike runs from the power block area down along the Tittabawasee River and extends into the cooling pond area. The Category I return pipes which drain into the ECWR exit from the SWPS and run along the southwest and northeast sides of the ECWR. On the southwest side, the return pipe runs along the base of and parallel to the slope of the baffle dike. On the northeast side, the

¹⁰⁶ The Staff would have us rely in part on SER §§ 2.5.6.1 through 2.5.6.7 (at 2-47 to 2-51) in our evaluation of the slope stability of the dikes. CPC objects, because of the lack of formal sponsorship of those sections and the consequent lack of a proper opportunity for cross-examination on their contents. We are noting these sections here since they are relevant and we find no area of conflict between them and our record. However, we do not depend on them to any significant extent in making our findings. See *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 365-68 (1983).

return pipe runs along a berm at the base of and parallel to the slope of the perimeter dike. The critical portions of the cooling pond dikes are those slopes adjacent to the ECWR which, if they moved, might deform these pipes. Where the perimeter dike separates the ECWR section of the cooling pond from the river it has been zoned and covered with an outer layer of riprap to reduce the action of river flow and river erosion and to ensure slope stability. To reduce water seepage into the perimeter dike from the river or the ECWR, a slurry trench tied into the impervious natural layer below the dike has been installed to prevent seepage into dike sands. Hendron, ff. Tr. 3940, at 7-8, Figs. 2, 5 and 6; Tr. 3526-27, 3529 (Kane).

308. The subsoils underneath the portions of the perimeter and baffle dikes adjacent to the ECWR consist of, from lower to higher elevations, dense water-bearing sands, a thick mantle of dense impervious glacial till, preconsolidated lacustrine clay, uniform silty sand, topsoil and surficial silt. The elevation of the surface of the glacial till is not uniform and pockets or layers of gravel, sand, silt and clays may lie between the glacial till and the preconsolidated lacustrine clay and topsoil. The presence of a layer of silty sand where glacial till had previously been assumed was confirmed by borings taken by Woodward Clyde Consultants (*see infra* Finding 312).

The topsoil and surficial silt were removed from beneath the entire dike embankment during the construction of the baffle and perimeter dikes. The soils composition of the baffle dike consists of both cohesive fill and some granular fill which has been designated in some reports as "random" fill, covered by layers of gravel and riprap. The composition of the perimeter dike consists of compacted cohesive fill, covered by layers of gravel, riprap, topsoil and seeding. Hendron, ff. Tr. 3940, at 13-15, 18, 22, Figs. 5 and 6; Singh, ff. Tr. 3488, at 5; Tr. 3496-97 (Singh).

309. Ms. Stamiris' Contention 4.B, as amended, raises several safety-related concerns, including one on cooling pond dikes. It states:

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:

* * *

- B. Slope stability of cooling pond dikes is not assured because they were built with the same soils and procedures [as the soils foundation for the DGB].¹⁰⁷

¹⁰⁷ The phrase "same soils and procedures" refers to Item A of Stamiris Contention 4 that alleges several soils and procedures problems at the diesel generator building.

Prehearing Conference Order dated October 24, 1980, Appendix at 5-6, as supplemented by Ms. Stamiris' Answer to Applicant's Interrogatories, dated April 20, 1981.

310. Safety-related concerns regarding the slope stability of the portions of the baffle and perimeter dikes adjacent to the ECWR originally arose due to the excess settlement of the DGB. When the NRC Staff realized that the settlement difficulties were attributable to inadequately compacted soils, the Staff reevaluated the construction of those portions of the baffle and perimeter dikes which could impinge upon the operation of the return pipes and the ECWR. The Staff's primary concern was whether the soils materials in those portions of the cooling pond dikes which could affect Seismic Category I equipment had sufficient shear strength properties to withstand the various loading conditions likely to be imposed on the dikes during plant operation.

Initial questions concerning the stability of these slopes were posed to CPC by the Staff through the Army Corps of Engineers. These included requests for a determination of the static factor of safety for the dike slopes which contain the two return pipes, a seismic analysis for these slopes, profiles across the dikes, and a discussion of the available shear strength data and the choice of shear strengths used in the stability analyses. In its November 1980, response, CPC identified the critical sections of the dike slopes, analyzed them for a static factor of safety and performed a pseudo-static analysis which indicated that the yield acceleration for the critical dike slopes exceeded the ground acceleration associated with the SSE. Kane, ff. Tr. 3484, at 2-3; Tr. 10,095, 10,105-07 (Hood); Hendron, ff. Tr. 3940, at 8-9, 17-18; Singh, ff. Tr. 3488, at 3-4.

311. The Army Corps of Engineers found CPC's answer to be not satisfactory in one respect: the Corps believed that the shear strength parameters used in Applicant's stability analyses might not be representative of actual dike soils conditions. In response, the Applicant contracted Woodward Clyde Consultants to perform a boring and sampling program of the portions of the baffle and perimeter dikes near the ECWR. The boring locations were selected by Army Corps of Engineer personnel, and were conducted by Woodward Clyde Consultants under the Army Corps' observation. The final results of the boring and sampling program were submitted to the Army Corps of Engineers and the NRC Staff in July 1981. On the basis of the boring samples and the previous CPC responses, the Army Corps of Engineers concluded that the fill material placed in the baffle and perimeter dikes exceeds its design parameters. Hendron, ff. Tr. 3940, at 9-10; Singh, ff. Tr. 3488, at 3-4.

312. The boring samples conducted by Woodward Clyde Consultants established the existence of a layer of silty sand below the dike where the presence of glacial till had been assumed. As a result, the Army Corps of Engineers could not reach a conclusion as to whether the stability of the slopes of the dikes adjacent to the ECWR would adversely affect the safe operation of the ECWR until the Applicant had demonstrated that the shear strength of the layer of silty sand equals or exceeds the parameters specified in the FSAR stability analysis. Dr. Alfred J. Hendron, a Professor at the University of Illinois, conducted an independent assessment on behalf of the Applicant to evaluate, among other things, the shear strength of the layer of silty sand. He concluded that the undrained shear strengths of this material are much stronger than the undrained shear strengths of the foundation clay. This estimate was confirmed by three triaxial tests conducted by Woodward Clyde Consultants on boring samples of this material.

Mr. Hari Singh, Staff witness from the Army Corps of Engineers, stated that Dr. Hendron's testimony establishes that the shear strength of the fine sand equals or exceeds previously specified soils strength parameters, and that he could therefore conclude that the slopes of the dike would remain stable under static loading conditions. Mr. Kane, another NRC Staff witness, concurred, testifying that the baffle and perimeter dikes' soils materials are no less resistant than the materials described in the PSAR. Singh, ff. Tr. 3488, at 5; Tr. 3489-94 (Singh); Staff Exh. 3; Hendron, ff. Tr. 3940, at 3-4, 22-23; Tr. 3960-61 (Hendron); Tr. 4140 (Kane).

313. Dr. Hendron's assessment evaluated the static factor of safety for the baffle and perimeter dikes adjacent to the ECWR. Further, Dr. Hendron evaluated the critical yield acceleration for these critical dike slopes under seismic loadings. Dr. Hendron also evaluated the stability of these critical dike slopes under the conditions of a rapid drawdown of the cooling pond water level from an elevation of 627 to 604 feet, in the extreme event that the perimeter dike would fail at some other location away from the ECWR. Mr. Singh testified that Dr. Hendron's analytical approach was in accordance with the accepted Army Corps of Engineers' manual and procedures.

Dr. Hendron's analyses evaluated the critical sections of the baffle and perimeter dikes and assumed the steepest slope. The critical portions of these dikes are the upstream slope of the northeast perimeter dike which inclines towards the ECWR and the northeast slope of the baffle dike which inclines northeast towards the ECWR. Movement in either of these slopes would tend to deform the return pipes and impair the operation of the ECWR.

The results of Dr. Hendron's analyses indicate that the soils materials in the critical portions of the baffle and perimeter dikes have sufficient shear strength and resistance to preclude lateral deformation of the dike slopes towards the ECWR. Hendron, ff. Tr. 3940, at 10-11, 17-21, 29-38 and Appendix A; Tr. 3942-51, 3987-95 (Hendron); Tr. 3655-58, 4114-19 (Singh).

314. The static factors of safety determined by Dr. Hendron for long-term stability in terms of "effective" stresses for the critical portions of the baffle and perimeter dikes are 2.18 and 2.66, respectively. These factors of safety greatly exceed the 1.5 factor of safety normally used in the design of dikes for nuclear power plants. They are conservatively calculated in that the effective cohesion for all materials is taken as zero, an effective angle of shearing resistance of 28.5° is used although measured values ranged from 28.5 to 35.0, and the shear strength parameters of the glacial till were taken equal to those of the foundation clays. Hendron, ff. Tr. 3940, at 17-25, 31-32; Tr. 3953-55, 3992-95 (Hendron); Tr. 3655-56 (Singh).

315. In the unlikely event that the perimeter dike were to fail at some location away from the ECWR, the rapid draining of cooling pond water into the Tittabawasee River could potentially cause the critical slopes of the baffle and perimeter dikes adjacent to the ECWR to slide. This phenomenon has been referred to as the "rapid drawdown."

Dr. Hendron performed two evaluations of dike stability for rapid drawdown of pond level from 627 to 604 feet. The first evaluation used values of undrained shear strength appropriate to cooling pond levels of 627 feet and yielded factors of safety for the critical portions of the baffle and perimeter dikes of 2.73 and 3.55, respectively. These values are significantly higher than the static long-term values noted, *supra*, because of negative pore pressure developing during shear.

Dr. Hendron then utilized a method accepted by the Army Corps of Engineers which is more conservative because it assumes that negative pore pressure will dissipate rapidly and cannot be counted on to increase the undrained shear strength. That this is a very severe assumption is reflected in the use of 1.0 as the minimum factor of safety for this case by the Army Corps of Engineers. This approach yielded factors of safety for the critical portions of the baffle and perimeter dikes of 1.34 and 1.50, respectively. Hendron, ff. Tr. 3940, at 33-35; Tr. 3946-51 (Hendron); Tr. 3517, 4114-17 (Singh).

Dr. Hendron concluded that the factors of safety obtained for this extreme condition are sufficient to assure the integrity of the return pipes during the improbable event of a rapid drawdown. Mr. Singh testified

that he had reviewed the drawdown analyses performed by Dr. Hendron, and that the more conservative analysis was performed in accordance with the Army Corps of Engineers manual and procedures. Messrs. Singh and Kane concurred with Dr. Hendron's conclusion that a factor of safety of 1.34 would be adequate to assure the stability of the critical portions of the baffle and perimeter dikes during a rapid drawdown of the cooling pond from the level of 627 feet. Hendron, ff. Tr. 3940, at 34-35; Tr. 3952-53 (Hendron); Tr. 3517, 3656-58, 4114-17 (Singh); Tr. 3649 (Kane).

316. The analyses performed by Dr. Hendron and the Army Corps of Engineers also assessed the stability of the baffle and perimeter dikes under the flooding conditions specified in the FSAR, i.e., with the Tittabawasee River raised to the level of 620 feet. However, these analyses did not address the flooding levels associated with the Probable Maximum Flood ("PMF") with the river level at 631 feet. This is an extreme condition dependent on a coincidence of events in upstream retention areas.

Although PMF questions are not related directly to the shear strength and properties of dike materials, and hence are peripheral to the OM contention under consideration, they have been extensively addressed on our record. In August 1981, Dr. Hendron testified that he felt no concern about dike stability during a PMF but that there might be concern about erosion and the need for rip-rap. Based on preliminary hydrological information, the Staff consultant, Mr. Singh, expressed concern that a PMF might breach the perimeter dike and thereby induce damage because of erosion. Staff witness Joseph Kane also noted that the outstanding design questions concerned the dike's capability to prevent and withstand wave runup. Messrs. Singh, Hendron and Kane further indicated that in their opinion the PMF should not cause dike stability problems in the vicinity of the ECWR and that erosion to the outside slope of the perimeter dike should not affect the operation of the ECWR and the return pipes. They indicated, however, that the acceptability of the dikes in respect to a PMF was still under study.

In November 1982, Staff witness Raymond Gonzales testified that, based on studies submitted by the Applicant, NRC was satisfied that any PMF overtopping would be minor and would not impact on the cooling pond dikes. To preclude possible dike damage by erosion, NRC would require a suitable dike inspection and maintenance program. Tr. 3962-63, 3966-69 (Hendron); Tr. 3575, 3639-40, 4117-21 (Singh); Tr. 3641-44, 3650-52, 4123-36 (Kane); Tr. 10,113-15, 10,121-28 (Gonzales).

317. Dr. Hendron also evaluated the stability of the critical portions of the baffle and perimeter dikes under seismic loadings. He did not evaluate the capability of the Category I water return pipes to withstand seismic action. However, CPC performed a dynamic seismic analysis which confirmed the capability of these pipes to withstand current seismic criteria.¹⁰⁸ This affidavit indicated that, although initially based on the FSAR SSE (0.12g), the actual seismic input used was conservatively chosen so as to encompass the requirements of the SSRS.

Dr. Hendron did assess the dynamic resistance of the dike slopes in terms of critical yield acceleration using an approach that has been accepted by the NRC Staff for demonstration of stability under dynamic loads. Using very conservative assumptions Dr. Hendron determined that the yield accelerations for the critical portions of the baffle and perimeter dikes are 0.54g and 0.61g, respectively, i.e., three times larger than the values required for a critical yield acceleration of 0.19g. Dr. Hendron also testified that liquefaction of the foundation materials under the baffle and perimeter dikes is not a problem. Thus the critical slopes of these dikes would not experience significant inelastic movement under the seismic loadings associated with the SSE. Hendron, ff. Tr. 3940, at 16-17, 22-23, 35-36 and Appendix A; Tr. 3955-61, 3984-92 (Hendron); Tr. 3658-59 (Kane).

318. The Licensing Board finds that the soils materials placed in the baffle and perimeter dikes exceed design parameters and have sufficient shear strength to withstand the loadings likely to be imposed on the dikes should the Midland facility be operated. The Board further finds that the slopes of the portions of the baffle and perimeter dikes adjacent to the ECWR would be stable under all anticipated static loadings, conditions of rapid drawdown of cooling pond water, and the seismic loadings associated with earthquakes far greater than the FSAR SSE or the SSRS earthquake. Accordingly, the Board concludes, contrary to Stamiris Contention 4.B, that there is reasonable assurance that the critical slopes of the baffle and perimeter dikes are stable and will not adversely affect the safe operation of the ECWR or impinge upon the integrity of the two Category I water return pipes. This conclusion assumes the applicability of a suitable dike inspection and maintenance program, as proposed by the Staff (Finding 316, *supra*).

¹⁰⁸ See Affidavit of Dr. Thiruvengadam, Enclosure E to Letter of February 3, 1983 from P.P. Steptoe (Applicant's counsel) to this Board.

Conclusions of Law

Based upon the foregoing Findings of Fact and upon consideration of the entire evidentiary record in these proceedings, including earlier rulings (such as LBP-82-35), the Board makes the following conclusions of law:

1. Although we have found many of the existing or proposed structures and soils remedial actions to be satisfactory (subject in some cases to certain technical specifications or conditions), any reasonable assurance conclusions bearing on the OL proceeding would also be subject to satisfactory execution of the remedial measures and satisfactory construction of the various facilities. Since each of these subjects must be subject to a further decision (and, in some cases, to further evidentiary hearings), and taking into account the present suspension of construction and questions concerning whether the project will ever be completed, we are declining at this time to express any conclusions of law, with respect to the OL proceeding.

2. With respect to the OM issues, we reiterate our conclusion (set forth in LBP-82-35) that the soils-related quality assurance deficiencies set forth in Part II and in Appendix A of the Modification Order were an adequate basis for the issuance of that Order.

3. For the reasons set forth in ¶ 1 of these conclusions, we are declining at this time to render a decision as to the extent to which the Modification Order should be sustained; except that the Modification Order shall continue in effect to the extent directed by LBP-82-35, pending further Order of this Board.

ORDER

On the basis of the foregoing Findings of Fact, Conclusions of Law and Opinion, and the entire record, it is, this 23rd day of January 1985, ORDERED:

1. The issues and contentions dealt with in this Decision are *resolved* to the extent set forth in this Decision and subject to the terms and conditions set forth herein.

2. CPC's motion for reconsideration of our Prehearing Conference Order dated May 5, 1981 (concerning use of backfitting procedures in the OL seismic review) is *denied*.

3. Requirements imposed by LBP-82-35 are *continued in effect*, pending further Order of this Board.

4. Jurisdiction is *retained*, pending issuance of a final Initial Decision in the OM proceeding, to entertain new information arising from the Dow-CPC litigation and significantly affecting issues covered by this Partial Initial Decision.

5. CPC's September 10, 1984 proposal, to the extent that it asserts that no further hearings be held at this time and that CPC file an additional report on the status of the project in 6 months, is *granted*; with the understanding that we be *informed* promptly of any significant developments (including but not limited to plans or proposals for the restart of construction). The foregoing project status report should be *filed* on or before April 1, 1985. Parties may respond within 10 days of service (15 days for the Staff). The Board's ruling on CPC's proposal that its current obligation to forward audit and nonconformance reports to the Board and parties be discontinued is *deferred*, pending our receipt and evaluation of a further report in early 1985 on this question. (In the interim, CPC need furnish the Board only one copy of such audit and nonconformance reports.)

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

sive brief *only*, regardless of the number of appellants' briefs filed. (See 10 C.F.R. § 2.762 (1984).)

THE ATOMIC SAFETY AND
LICENSING BOARD

Frederick P. Cowan
ADMINISTRATIVE JUDGE

Jerry Harbour
ADMINISTRATIVE JUDGE

Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE

[Appendices B and C have been omitted from this publication, but may be found in the NRC Public Document Room, 1717 H Street, NW, Washington, DC 20555.]

APPENDIX A

Soils-Related Contentions

Following is the text of the Intervenors' contentions which have been at issue in the soils-related hearings. These contentions include both those raising technical design issues (some of which are resolved in this Decision) and those involving QA/managerial attitude issues (not resolved by this Decision).

- I. *OM Contentions of Barbara Stamiris* (from Appendix to Prehearing Conference Order dated October 24, 1980, as modified by Stamiris Answers to Applicant's interrogatories, dated April 20, 1981; Contentions 6 and 7 from LBP-84-20, 19 NRC 1285, 1287 (1984)):
1. Consumers Power Company statements and responses to NRC regarding soil settlement issues reflect a less than complete and candid dedication to providing information relevant to health and safety standards with respect to resolving the soil settlement problems, as seen in:

- a) the material false statement in the FSAR (Order of Modification, Appendix B);
- b) the failure to provide information resolving geologic classification of the site which is pertinent to the seismic design input on soil settlement issues (Responses to FSAR Questions 361.4, 361.5, 361.7 and 362.9);
- d) the failure to provide adequate acceptance criteria for remedial actions in response to 10 C.F.R. § 50.54(f) requests (as set forth in part II of the Order of Modification);

and this managerial attitude necessitates stricter than usual regulatory supervision (ALAB-106) to assure appropriate implementation of the remedial steps required by the Order Modifying Construction Permits, dated December 6, 1979.

2. Consumers Power Company's financial and time schedule pressures have directly and adversely affected resolution of soil settlement issues, which constitutes a compromise of applicable health and safety regulations as demonstrated by:
 - a) the admission (in response to § 50.54(f) question #1 requesting identification of deficiencies which contributed to soil settlement problems) that the FSAR was submitted early due to forecasted OL intervention, before some of the material required to be included was available;
 - b) the choice of remedial actions being based in part on expediency, as noted in Consumers Power Company consultant R.B. Peck's statement of 8-10-79;
 - c) the practice of substituting materials for those originally specified for "commercial reasons" (NCR QF203) or expediency, as in the use of concrete in electrical duct banks (p. 23 Keppler Report) [March 22, 1979 Keppler Investigation Report conducted by Region III, Dec. 78-Jan. 79];
 - d) continued work on the diesel generator building while unresolved safety issues existed, which precluded thorough consideration of Option 2 Removal and Replacement Plan; and
 - e) [withdrawn by letter dated June 1, 1981]

3. Consumers Power Company has not implemented its Quality Assurance Program regarding soil settlement issues according to 10 C.F.R. Part 50, Appendix B regulations, and this represents a repeated pattern of quality assurance deficiency reflecting a managerial attitude inconsistent with implementation of Quality Assurance Regulations with respect to soil settlement problems, since reasonable assurance was given in past cases (ALAB-147, ALAB-106 and LBP-74-71) that proper quality assurance would ensue and it has not.

The Quality Assurance deficiencies regarding soil settlement include:

- a) 10 C.F.R. Part 50, Appendix B, Criteria III, V, X and XVI as set forth in the Order of Modification;
- b) 10 C.F.R. Part 50, Appendix B, additional criteria denoted by roman numerals below:
 - I. The Applicant has failed to assume responsibility for execution of the QA program through its failure to verify and review FSAR statements (pp. 6-8 and p. 21, Keppler Report) and through its reliance on final test results not in accordance with specified requirements (p. 16, Keppler Report);
 - II. The QA program was not carried out according to written policies, procedures and instructions, in that oral directions were relied upon and repeated deviations from policies occurred regarding compaction procedures (p. 9-14, Keppler Report);
 - VII. Control of purchased material has not been maintained, in that examination and testing of backfill materials did not occur in accordance with regulations (NCR QF29, NCR QF147);
 - IX. Control of non-destructive testing was not accomplished by qualified personnel using qualified procedures regarding
 - a) moisture control (Keppler Report p. 14-16; QA Request SD40, NCR QFS52, 172, 174 and 199);
 - b) compaction procedures (Keppler Report, p. 9; NCR QFS 68, 120 and 130); and
 - c) plant fill work (pp. 24 and 25, Keppler Report);
 - XI. Test programs did not incorporate requirements and acceptance limits adequately in the areas referenced in a, b and c above, and do not meet these requirements regarding soil settlement remedial actions;
 - XIII. Measures were not adequately established to prevent damage or deterioration of material regarding frost effects on compacted fill (pp. 16 and 17, Keppler Report);
 - XV. Measures were not taken to control non-conforming material in order to prevent the inadvertent use (NCR QF29 and QF127);
- c) the settlement of the Administration Building in 1977 should have served as a quality indicator, preventing the same inadequate procedures from occurring in the 1978 construction of the diesel generator building causing its eventual settlement.

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:
 - A. Preloading of the diesel generator building
 - 1) does not change the composition of the improper soils to meet the original PSAR specifications;
 - 2) does not preclude an unacceptable degree of further differential settlement of diesel generator building;
 - 3) does not allow proper evaluation of compaction procedures because of unknown locations of cohesionless soil pockets;
 - 4) may adversely affect underlying piping, conduits or nearby structures; and
 - 5) yields effects not scientifically isolated from the effects of a rise in cooling water and therefore not measured properly;
 - B. Slope stability of cooling pond dikes is not assured because they were built with the same improper soils and procedures [as the soils foundation for the DGB] (NCR QF172);
 - C. Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement, and seismic effects for these structures:
 - a. Auxiliary Building Electrical Penetration Areas and Feedwater Isolation Valve Pits
 - b. Service Water Intake Building [sic] and its Retaining Walls
 - c. Borated Water Storage Tanks
 - d. Diesel Fuel Oil Storage Tanks
 - e. Diesel Generator Building
 - f. Related Underground Piping and Conduit.
 - D. Permanent dewatering
 - 1) would change the water table, soil and seismic characteristics of the dewatered site from their originally approved PSAR characteristics — characteristics on which the safety and integrity of the plant were based, thereby necessitating a reevaluation of these characteristics for affected Category I structures;
 - 2) may cause an unacceptable degree of further settlement in safety-related structures due to the anticipated drawdown effect;
 - 3) to the extent subject to failure or degradation, would allow inadequate time in which to initiate shutdown, thereby necessitating reassessment of these times.

Therefore, unless all the issues set forth in this contention are adequately resolved, the licensee actions in question should not be considered an acceptable remediation of soil settlement problems.

5. [withdrawn by letter dated June 1, 1981]
6. Consumers misrepresented its time schedule for completion of the Midland plants to the NRC, including the NRC Staff and this Licensing Board. *See* paragraphs 20, 37, 39-48 [of initial Dow complaint against CPC, dated July 14, 1983].
7. Consumers used and relied on U.S. Testing test results to fulfill NRC regulatory requirements while knowing that these test results were invalid. *See* par. 24, 35 [of initial Dow complaint].

II. *OL Contention 24 of Mary Sinclair* (from statement of contentions dated October 31, 1978, as modified in accordance with *Special Prehearing Conference Order* dated February 26, 1979, at 8):

Serious questions have been raised concerning the ground stability of portions of the site [of the Midland facility]. At least one of the essential buildings of the reactor complex [the DGB] is reported sinking, and construction has been halted on that building. As a result of the serious and unresolved questions concerning ground stability, the findings required by 10 C.F.R. §§ 50.57(a)(3)m and 50.57(a)(6) cannot be made.

III. *OL Contention 2 of Wendell H. Marshall* (from supplemental statement of contentions dated October 31, 1978, as clarified by *Special Prehearing Conference Order* dated February 26, 1979, at 21):

Present geological conditions, according to newspaper accounts, is causing the settling of the [diesel] generator building at the Nuclear Power Plant site.

IV. *OM Contentions of Sharon K. Warren* (from Appendix to *Prehearing Conference Order* dated October 24, 1980):

1. The composition of the fill soil used to prepare the site of the Midland Plant — Units 1 and 2 is not of sufficient quality to assure that pre-loading techniques have permanently corrected soil settlement problems. The NRC has indicated that *random* fill dirt was used for backfill. The components of random fill can include loose rock, broken concrete, sand, silt, ashes, etc. all of which cannot be compacted through pre-loading procedures.
2. A. Because of the known seepage of water from the cooling pond into the fill soils in the power block area, permanent dewatering procedures being proposed by Consumers Power Company are inadequate, particularly in the event of increased water seepage, flooding, failure of

pumping systems and power outages. Under these conditions, Consumers cannot provide reasonable assurance that stated maximum levels can be maintained.

B. Given the facts alleged in Contention 2.A, and considering also that the Saginaw Valley is built upon centuries of silt deposits, these highly permeable soils which underlie, in part, the diesel generator building and other class I structures may be adversely affected by increased water levels producing liquefaction of these soils. The following will also be affected:

- 1) borated water tanks
- 2) diesel fuel oil tanks.

3. Pre-loading procedures undertaken by Consumers Power have induced stresses on the diesel generating building structure and have reduced the ability of this structure to perform its essential functions under that stress. Those remedial actions that have been taken have produced uneven settlement and caused inordinate stress on the structure and circulating water lines, fuel oil lines, and electrical conduit.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**John H Frye, III, Chairman
Dr. James H. Carpenter
Dr. Peter A. Morris**

In the Matter of

**Docket No. 40-2061-ML
(ASLBP No. 83-495-01-ML)**

**KERR-McGEE CHEMICAL
CORPORATION
(West Chicago Rare Earths
Facility)**

January 23, 1985

Licensing Board rules on petitions for reconsideration and clarification of its Memorandum and Order ruling on the admissibility of contentions (LBP-84-42, 20 NRC 1296). In response to Staff's motion, Licensing Board rules that Kerr-McGee's contention (which seeks a determination that its plan for permanently disposing of mill tailings at its West Chicago is acceptable) is an acceptable contention, that Staff's obligation to supplement the record on NEPA issues springs from the People's contention rather than Kerr-McGee's, that Staff must circulate a supplemental impact statement to accomplish this supplementation, and that the Board will not refer its ruling admitting Kerr-McGee's contention to an appeal board for interlocutory review. The Board denies the People's motion for reconsideration of its ruling removing references to Part 61 from one of their subcontentions on the ground that Part 61 is inapplicable and grants their motion for reconsideration of the denial of another subcontention which seeks to require Staff to respond to certain comments on the DES.

**ATOMIC ENERGY ACT: DENIAL OF APPLICATION
RULES OF PRACTICE: DENIAL OF APPLICATION
ADMINISTRATIVE PROCEDURE ACT: DENIAL OF
APPLICATION**

Under the Administrative Procedure Act, the Atomic Energy Act, and the Commission's Rules of Practice, an application cannot be denied without stating reasons for the denial. These reasons must indicate why the application does not comply with the statute and regulations under which it is filed. *SEC v. Chenery Corp.*, 318 U.S. 80, 94; 87 L. Ed. 626, 636 (1943); *Commonwealth Edison Co.* (Byron Nuclear Power Station, Units 1 and 2), ALAB-770, 19 NRC 1163 (1984); 5 U.S.C. § 555(e); 10 C.F.R. § 2.103(b).

**NEPA: RECIRCULATION OF AN ENVIRONMENTAL
IMPACT STATEMENT**

Where an FES disregards broad areas of environmental impact or fails to apprise the public of the nature of the proposed action and its expected consequences, recirculation of the statement is necessary.

RULES OF PRACTICE: REFERRAL OF RULING

Admission of a contention which will require further Staff review does not result in unusual delay which justifies referral for interlocutory review. *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 464 (1982), *rev'd on other grounds*, CLI-83-19, 17 NRC 1041 (1983).

**MEMORANDUM AND ORDER
(Ruling on Motions for Reconsideration)**

In LBP-84-42, 20 NRC 1296 (1984) we ruled on the admissibility of contentions and defined the scope of this proceeding. The NRC Staff and the People of the State of Illinois¹ seek relief with respect to those rulings. Staff moved for reconsideration, clarification or referral to the

¹The People and the Illinois Department of Nuclear Safety have intervened in this proceeding. Hereinafter they are collectively referred to as "the People."

Appeal Board on November 16, and the People moved for reconsideration on November 2. Kerr-McGee opposes both motions but suggests that some clarification may be appropriate. Staff opposes a portion of the People's motion and supports a portion. The People oppose the Staff's motion. We deal with Staff's motion first.

STAFF'S MOTION

Before discussing Staff's motion in detail, some background is necessary. Kerr-McGee has filed an application for a license amendment which would permit it to permanently dispose of thorium mill tailings generated at its West Chicago Rare Earths Facility in a disposal cell located on site. Staff reviewed this application and published a Final Environmental Statement (FES) in which it concluded that, rather than permanent disposal, onsite storage in a similar disposal cell should be approved and a decision on permanent disposal deferred until several years of monitoring data had been accumulated. Petitions to intervene were invited. The People responded to this invitation and filed a contention (AG-1) which attacked the FES on the ground, *inter alia*, that it constituted an illegal segmentation of an overall plan to permanently dispose of these tailings on site. Although it did not request a hearing, Kerr-McGee filed a contention (KM-1) in which it asserts that its plan for onsite disposal should be approved now.

It should be noted that the FES is an unusual document. The various alternatives were not evaluated to the point of a final Staff conclusion for the reason stated on page 1-6 that "the Staff has no basis on which to evaluate the applicant's proposal for use of the site as a disposal site." Staff was in this unusual position because of two factors. The U.S. Environmental Protection Agency (EPA) standards governing disposal required by the Uranium Mill Tailings and Radiation Control Act (UMTRCA) had not been published in final form and the NRC criteria for mill tailings disposal (10 C.F.R. Part 40, Appendix A) had been in part temporarily suspended by congressional action. Because Staff had no basis for evaluating other alternatives, in its view the only available option at that time was Alternative III, onsite storage in a safe manner.

The situation dramatically changed after Staff issued its FES. EPA's standards were promulgated² and the temporary suspension of Appendix A expired. The Commission initiated rulemaking to bring Appendix A

² 40 C.F.R. Part 192, promulgated on October 7, 1983, 48 Fed. Reg. 45,926.

into conformity with the EPA standards.³ Staff now has a basis for evaluating alternatives.

As noted above, the People's Contention AG-1 challenged the FES on the ground that it constituted an illegal segmentation of an overall plan for permanent onsite disposal. All parties agreed that this and other issues raised by Contention AG-1 should be decided on briefs. Additionally, the admissibility of Contention KM-1 was extensively briefed.

In LBP-84-42 we ruled on the legal issues presented in these briefs. We agreed with the People that the FES illegally segments the overall plan to dispose of these tailings and admitted Kerr-McGee's contention over Staff's objection. Staff seeks reconsideration of our ruling admitting Contention KM-1, and clarification with respect to the obligation to supplement its environmental and safety reviews in connection with both Contentions KM-1 and AG-1. In the event we order Staff to supplement the record on the safety and environmental aspects of Kerr-McGee's proposal for permanent disposal, Staff requests that we refer our ruling on Contention KM-1 to the Appeal Board for prompt decision.

Admissibility of Contention KM-1

In LBP-84-42, we agreed with Staff that Kerr-McGee had indeed waived its right to cause a hearing to be held on its application. However, we disagreed with Staff that that waiver precluded Kerr-McGee from filing a contention urging that its application be approved and that such a contention was outside the scope of this proceeding as defined by the Commission. In its motion, Staff takes the position that we erred in these two respects.

Staff does not contest our ruling insofar as it stands for the proposition that an applicant, as a party to an adjudicatory hearing held at the request of another, may file contentions that are within the scope of the proceeding. As we understand Staff's position, it is founded on Staff's view that it had denied Kerr-McGee's application. Thus, Staff argues that Kerr-McGee, having waived its right to challenge Staff's denial of its application by requesting a hearing, may not now pursue such a contention unless it is within the scope of the hearing as defined by the People's contentions. In Staff's view, Contention KM-1 is not within that scope. Staff's position is best summed up in the following paragraphs from pages 4-5 of its motion.

³ See 49 Fed. Reg. 46,418, 46,425 (Nov. 26, 1984).

It is true that an applicant will be admitted as a party without first requesting a hearing, instituted at the request of another party, that may affect its interests. The Staff does not dispute that an applicant may raise issues, in the form of contentions or otherwise, that are within the scope of a proceeding requested by another party. It does not follow, however, that an applicant may also avoid the consequences of waiving its hearing rights by submitting contentions that expand the scope of the proceeding to include the very issue on which a hearing was waived.

By admitting Kerr-McGee's Contention 1, the Board has, in effect, overruled the Staff's denial of the Kerr-McGee proposal without that denial having been properly placed in issue before the Board. Indeed, in holding that Kerr-McGee waived its right to initiate a hearing on the denial of its proposal, the Board should have recognized that Kerr-McGee had forfeited its right to file contentions that would initiate a review of that denial.

There are sound public policy reasons for reaching this result. Kerr-McGee participated in numerous iterations with the Staff over its proposal. It knew in detail the Staff's position, and, but for the Illinois intervention, was willing to accept it. That Kerr-McGee did not itself request a hearing is conclusive evidence of that fact. Applicants should be held fully accountable for the consequences of their considered acts. Kerr-McGee did not ask for a hearing. Consequently, in view of Board's correct ruling that waiver does obtain in NRC adjudicatory proceedings, Kerr-McGee should be held to have accepted the Staff's conclusion and should be bound by it.

Kerr-McGee opposes Staff's request for reconsideration of this ruling. Kerr-McGee points out that, because the Environmental Protection Agency's standards applicable to its proposal were not published until after its opportunity to request a hearing had expired, it could not have filed such a request along with Contention KM-1 within that period. But, even if Contention KM-1 could have been filed along with a timely request for hearing, Kerr-McGee goes on to point out that, in the course of briefing this issue originally, Staff took the position that Contention KM-1 could have been litigated within the scope of the matters raised by the People, and attacks Staff's reading of the Commission's delegation as too narrow.⁴

The People also oppose this aspect of Staff's motions. They take issue with Staff's assertion that it denied Kerr-McGee's application. Their position is best summed up in the following excerpts from pages 6-8 of their December 13 response.

In short, the subject matter of this proceeding is Kerr-McGee's application and the petitions concerning it, together with Staff recommendations and the FES. Under Sec. 189 and the NRC's rules this is true regardless whether Kerr-McGee requested a hearing or filed contentions and regardless what the Staff's FES may recommend.

⁴ Kerr-McGee's December 13 Response at 2-5.

Finally, it should be pointed out that even if Kerr-McGee had itself applied for an amendment authorizing onsite storage, the scope of the proceeding would have to include the impacts of, and legal requirements associated with, permanent onsite disposal. This is because the FES acknowledges that once the wastes are buried on site they will likely remain there forever (FES at 1-8). In light of this acknowledgment, the hearing requirement of Sec. 189 would be violated if the hearing were limited to short-term issues.

* * *

For all these reasons, whatever theoretical questions the Staff's motion may raise, *in practical terms* they have no bearing on this proceeding. No matter how you cut it, whether under the AEA or NEPA, the proceeding must address permanent disposal of the wastes.

Staff's position is premised in part on the proposition that it denied Kerr-McGee's application and that, in order to preserve its right to challenge that denial, Kerr-McGee was obligated to request a hearing. We did not in LBP-84-42 view Staff's action on Kerr-McGee's application as a denial. If that action does constitute a denial, Staff's position that Kerr-McGee waived its right to challenge it has considerable force. For this reason, we asked Staff to provide specific citations to its denial, whether its denial required a determination that the West Chicago site is not suitable for permanent disposal of the tailings, and whether Staff had made such a determination.

Staff responded to these questions on January 3. Staff takes the position that it denied the application at pages 1-3 to 1-9 of the FES and that that denial was memorialized in the Commission's June 7, 1983, notice of opportunity for hearing.⁵ Staff notes that it stated in the FES that it had selected Alternative III as the preferred alternative and that that alternative was the only currently acceptable alternative.

Staff goes on to argue that its denial of Kerr-McGee's application does not require a Staff determination that the West Chicago site is unsuitable on the ground that NEPA does not require such a finding, but rather a finding whether there are environmentally preferable alternatives to that put forth in the application. In that event, Staff argues that it must take whatever steps it can to see to it that that alternative is implemented. Staff states that it has made no determination as to the suitability of this site for permanent disposal.

We must reject this position. It is clear to us that Staff did not deny Kerr-McGee's application. Rather, Staff sought to defer it. At page 1-2 of the FES the Staff states that "[u]nder Alternative III, the decision on ultimate disposal of the radioactive wastes would be deferred." In Part

⁵ 48 Fed. Reg. 26,381.

VI of the same chapter of the FES (p. 1-8) Staff outlines the conditions under which licensed storage on site would be terminated. This statement clearly implies to us that the Kerr-McGee's application has not been denied, but rather has been deferred because of the lack of regulatory standards under which it could be judged (*see* FES at p. 1-6).

Whatever the merits of Staff's argument that NEPA does not require it to reject the West Chicago site in order to deny Kerr-McGee's proposal may be, it misses the mark. Under the Atomic Energy Act and the most basic principals of jurisprudence, Staff may not deny this application without stating reasons. Yet Staff has made no determination with regard to the suitability of this site and is prepared to approve storage in a disposal cell proposed by Kerr-McGee for permanent disposal in full recognition of the fact that once storage is implemented, removal to another site is unlikely. This does not smack of application denial, and we are unable to find any language in the FES which does.

The simple fact is that, in order to deny the application, Staff must state some reasons. Not to do so is the epitome of arbitrary and capricious action. Yet, because of the lack of regulatory standards, no reasons could be given. For this reason, Staff had no choice but to defer, as it has done in the FES, its determination with respect to this application. *SEC v. Chenery Corp.*, 318 U.S. 80, 94; 87 L. Ed. 626, 636 (1943); *Commonwealth Edison Co.* (Byron Nuclear Power Station, Units 1 and 2), ALAB-770, 19 NRC 1163, 1168-69 (1984); 5 U.S.C. § 555(e).

Indeed, this result is required by the Commission's regulations. Section 2.103(b) of 10 C.F.R. provides that, before the Director of Nuclear Material Safety and Safeguards may deny an application, he must find that the application does not comply with the requirements of the Atomic Energy Act and the Commission's regulations. Here, because no such finding was or could have been made, no denial could issue.⁶

Before leaving this topic, we are compelled to add the observation that, had Staff reached a determination that the West Chicago site was unsuitable for permanent disposal, Kerr-McGee might well have requested a hearing. Instead, in these circumstances where it appeared from the FES that there was at least a substantial probability that that site would ultimately be approved, there is little apparent reason why Kerr-McGee should follow that course. Those circumstances dramatically changed when the People, perceiving that Staff would ultimately ap-

⁶ Moreover, we are compelled to note that a denial of Kerr-McGee's application might have had some unintended results. Kerr-McGee's license, STA-583, has an expiration date of August 31, 1979. This license remains in effect by virtue of Kerr-McGee's July 25, 1979, application for renewal. If this is the application Staff claims to have denied, then that denial would have the result of terminating Kerr-McGee's license. We doubt that Staff would wish such a result.

prove onsite disposal, requested a hearing in order to seek a determination that this site was not suitable as a repository for the tailings. At that point, the issue of site suitability was clearly presented for the first time and Kerr-McGee moved to protect its interest in obtaining approval. These are not circumstances which give rise to a waiver of Kerr-McGee's right to contest a Staff denial of its application.

Moreover, the People's contentions brought Kerr-McGee's contention clearly within the scope of the proceeding. Even were we to accept Staff's position on application denial, which we do not, the existence of Contentions AG-1 and AG-2 would require that Contention KM-1 be accepted.⁷

For the foregoing reasons, we deny Staff's motion for reconsideration, and move to its motion for clarification.

Clarification of LBP-84-42

In its request for clarification of our rulings in LBP-84-42, Staff notes that the admission of Contention KM-1 requires that permanent disposal of these tailings be considered now. Staff then states that we did not find the FES inadequate to support Alternative III, although it notes that our "decision could be read as finding the FES inadequate to support Alternative III with regard to serial segmentation and the need for a cost-benefit analysis."⁸ Staff goes on to assert its right to continue to support Alternative III and defend its "denial" of Kerr-McGee's application, and states:

Accordingly, the Staff does not bear the primary burden of demonstrating in this proceeding, the suitability of the West Chicago site for permanent disposal. Similarly, the Staff has no burden of demonstrating the superiority of any alternative disposal site. The primary evidentiary burden on the acceptability of an alternative for licensing is on the advocate of the alternative.⁹

Staff then concludes this portion of its request for clarification with the assertion that, if Kerr-McGee wishes to trigger a new Staff review of its proposal, it should file a new application, which would permit Staff to recover the cost of that review in license fees.

⁷ Because of this result, we need not address Staff's argument that an applicant which has waived its right to request a hearing may not file contentions which are outside the scope of those filed by an intervening party.

⁸ Staff's Motion at 8 n.2.

⁹ *Id.* at 8-9.

In the second part of its request for clarification, Staff repeats its position with respect to its obligations set forth in the first part. It then assumes for the sake of argument that some deficiencies in the FES are not attributable to the admission of Contention KM-1, but rather to Contention AG-1. Under this assumption, Staff requests clarification in three areas.

First, Staff states that under LBP-84-42, it is for it to assess the extent to which long-term environmental impacts require further treatment and whether this may be accomplished in testimony.

Second, Staff states that it need not undertake any additional review of alternative sites unless it is determined after hearing that Kerr-McGee's alternative site investigation generated insufficient information to permit the required "hard look." Staff notes that the People are free to develop in this proceeding any alternative sites they wish considered.

Third, Staff may assess for itself what needs to be considered in the cost-benefit balance and whether that may be accomplished in testimony.

In its response to the Staff's motion for clarification, Kerr-McGee notes that Staff believes that its additional obligations stem from the admission of Contention KM-1. Kerr-McGee points out that Staff's obligation, if any, to supplement the record on NEPA issues stems from the admission of Contention AG-1. Kerr-McGee, while noting its inability to determine what portions of LBP-84-42 Staff considers ambiguous, states its belief that it is appropriate for us to provide guidance to the extent we find Staff's interpretation of its obligations to be incorrect.

The People take strong issue with the Staff's position that any deficiencies in the FES may be cured through testimony rather than by requiring the issuance of a supplemental environmental statement for comment prior to hearing. The People maintain that the defects in the FES are not of a minor nature and therefore may not be corrected at hearing, relying on *Public Service Co. of Oklahoma* (Black Fox Station, Units 1 and 2), ALAB-573, 10 NRC 775, 785-87 (1979); *Florida Power & Light Co.* (Turkey Point Nuclear Generating Station, Units 3 and 4), ALAB-660, 14 NRC 987, 1014 (1981); and *Boston Edison Co.* (Pilgrim Nuclear Generating Station, Unit 2), ALAB-479, 7 NRC 774 (1978).

As to what the supplemental EIS should cover, the People stand by their letter to Staff counsel of October 30, 1984.¹⁰ In that letter they take the following positions with respect to Contention AG-1:

¹⁰ That letter is attached to Staff's motion.

1. AG-1(b) — long-term impacts of onsite disposal — requires the Staff to consider:
 - a) specific measures for excluding humans over the long-term;
 - b) long-term maintenance and monitoring, its cost, and its funding;
 - c) long-term reliability of the disposal cell;
 - d) long-term radiological impacts on children; and
 - e) the likelihood and effects of settlement on the disposal cell.
2. AG-1(d) — cost-benefit balance — requires Staff to compare the above factors along with economic and socioeconomic factors for West Chicago and alternatives. With respect to alternate sites (AG-1(c)), the People expect that Staff will not limit its consideration to those sites identified by Kerr-McGee, but will consider other sites as well and will require sufficiently detailed information on these sites to make the analysis credible. The People read the FES as a decision to defer detailed analysis of alternatives, and suggest that, if this is so, the alternate site question must be freshly addressed. To this end, the People offer the assistance of various state agencies.
3. AG-1(g) — consistency of Kerr-McGee's proposal with applicable Federal and State policies — the Staff should address the Illinois ground water protection standards, Illinois' policy on the siting of long-term radioactive waste disposal facilities, and the requirements of the Uranium Mill Tailings Radiation Control Act and Appendix A to 10 C.F.R. Part 40.

In their response to Staff's motion, the People reiterate their position that under NEPA, the Staff must perform the alternate site analysis and may not rely on information generated by Kerr-McGee for that purpose. The People rely on *Pilgrim*, ALAB-479, *supra*, 7 NRC at 794, for this point.

The first point to be addressed is Staff's assumption that the deficiencies in the FES (segmentation and the need for a cost-benefit analysis) which were identified in LBP-84-42 are solely related to Contention KM-1. That is not the case. First, Contention KM-1 asserts that Kerr-McGee's proposal meets the standards of UMTRCA and EPA's regulations promulgated under it. It does not assert that the Staff's NEPA analysis has been inadequate and, in fact, Kerr-McGee defended that analysis in briefing Contention AG-1.

Second, Contention AG-1 clearly raises the issue of segmentation and lack of a cost-benefit balance. It was in connection with Contention AG-1 that we held that NEPA requires Staff to consider permanent onsite disposal now. Thus Contention AG-1 serves to force a NEPA consideration of permanent onsite disposal, while Contention KM-1 forces an evaluation of Kerr-McGee's proposal under UMTRCA. Staff's assumption that our NEPA ruling was tied to Contention KM-1 is incorrect; that ruling would have been made in response to Contention AG-1 had Kerr-McGee refrained from advancing Contention KM-1.

Staff is thus similarly incorrect in its assumption that we did not find the FES inadequate to support Alternative III. We specifically found that Alternative III was but one step toward the goal of permanent disposal and that the FES strongly indicated that once Alternative III were implemented, Staff would approve permanent onsite disposal.¹¹ Consequently, we held that NEPA and certain of the CEQ regulations which have been adopted by the Commission required that permanent onsite disposal be considered in connection with Alternative III.

Thus Staff is incorrect in its assumption that we did not require it to support or oppose Kerr-McGee's proposal. We did require Staff to take a position on that proposal. By admitting Contention KM-1, we required Staff to take a position under UMTRCA and by our ruling on Contention AG-1, we required Staff to perform an environmental review of Kerr-McGee's proposal.

Nevertheless, we are compelled to observe that Staff is legally free to pursue Alternative III if it wishes, although we can perceive no practical reason for doing so.¹² We have held that Kerr-McGee's application is still pending before the Staff and that, even if that application were no longer pending, Staff's preferred alternative requires a NEPA consideration of permanent disposal. Consequently Staff will have to consider and conclude whether it will approve permanent onsite disposal at West Chicago. If Staff concludes that Kerr-McGee's proposal is acceptable, there appears to us to be no practical reason for it to continue to support Alternative III. Should Staff conclude that Kerr-McGee's proposal is unacceptable, perhaps Alternative III might assume slightly more practicality. However, even in that situation, we do not believe it to be a sensible alternative because:

First, the cost of storage at West Chicago and subsequent removal to another site is regarded as prohibitive by the Staff;¹³

Second, the FES reveals that there is currently no compelling reason why storage in an engineered cell is necessary for the short term. The FES indicates that radioactive materials are not leaking into the aquifer¹⁴ and that airborne emissions are not excessive;¹⁵ and

¹¹ LBP-84-42, *supra*, 20 NRC at 1316.

¹² In answer to our query as to which reasons exist to continue to advocate Alternative III if permanent disposal must be considered now under NEPA, Staff responded on January 3 by indicating that, in light of all the circumstances, Staff considers Alternative III a prudent course.

¹³ See LBP-84-42, *supra*, 20 NRC at 1309.

¹⁴ FES, § 5.6.2.1, at p. 5-11.

¹⁵ FES, Table 5.5, at p. 5-28.

Third, as we indicated in LBP-84-42 (20 NRC at 1304-05), we do not perceive any regulatory restraint under Alternative I which would be avoided by Alternative III.

Nonetheless, while we see nothing to be gained by continuing to pursue Alternative III, Staff is of course free to show us that our conclusion in this regard is in error.

We agree with Staff that we have no authority to direct it in the performance of its independent regulatory and review functions. But we do have authority to pass on the adequacy of Staff's review when it is properly challenged. That is the course which we have followed here. By admitting Contentions KM-1 and AG-1, we have concluded that Staff must determine the acceptability of Kerr-McGee's application under UMTRCA and review it under NEPA. While we agree with Staff that we cannot dictate the timing of its review or the conclusion it should reach, we must reaffirm our right to pass on the adequacy and legality of its actions when they are, as here, properly challenged under procedures established by the Commission. The fact that our rulings require additional Staff effort does not impinge on Staff's independence.

Staff's request for clarification with respect to long-term environmental impacts, alternate sites, and cost-benefit balancing under NEPA essentially asserts that Staff may determine for itself first, how much supplementation of the FES is necessary, and second, whether that supplementation may be done in testimony or whether a supplemental impact statement is necessary.¹⁶ We agree with the first proposition but not the second. It is for Staff to determine in the first instance how much supplementation is necessary and to defend its position with evidence. We may not decide this matter in advance of receiving that evidence along with Kerr-McGee's and the People's evidence. However, we do note that Staff has made no determination under UMTRCA and has not reviewed permanent onsite disposal under NEPA.

The People's letter advises Staff of the People's position on the NEPA issues. Staff should take this position into account in making its determination and be aware that it will have to defend its decisions

¹⁶ We wish to note that, while we cannot direct Staff in precisely how it goes about its business, it would appear useful, as a practical matter, for Staff to undertake its supplementation of this FES only after Staff has determined whether it will approve Kerr-McGee's proposal under UMTRCA. Should Staff make an adverse determination, its NEPA review, to the extent it is not duplicative of the UMTRCA review, would be meaningless. Should Staff elect to support Kerr-McGee under UMTRCA, and should that view not prevail at hearing, Staff's NEPA review would similarly be meaningless. We recognize that there is a great deal of overlap to Staff's NEPA and UMTRCA reviews, so that any additional work to accomplish the NEPA review may be small once the UMTRCA review is complete. Nonetheless, a NEPA review is meaningless if Kerr-McGee's proposal does not meet UMTRCA standards.

accordingly. Staff must remember that its NEPA evaluation is of permanent onsite disposal, and its assessment of the supplementation necessary must be made in that context.

The People have made it clear that they do not consider Kerr-McGee's alternative site inquiry adequate and have offered technical assistance to the Staff in making its evaluation. While without the benefit of an evidentiary presentation we cannot conclude, as the People do, that Kerr-McGee's inquiry is inadequate and that, under NEPA, Staff may not rely on data generated by Kerr-McGee,¹⁷ we must note that the People have clearly raised these issues and have offered technical assistance. It thus may turn out to be inappropriate for Staff to limit its alternative site analysis solely to data generated by Kerr-McGee. *Ibid.*; *Pilgrim*, ALAB-479, *supra*, 7 NRC at 780-81.

Staff's decision whether to proceed by way of testimony or a supplemental impact statement is on a different footing. The People take the position that at least a supplemental impact statement must be prepared and circulated for comment prior to hearing. In LBP-84-42, we did not directly address this point. On further consideration, we agree with the People. The fact that we have held that NEPA demands that permanent onsite disposal be considered now dictates this result. This omission alone is of sufficient magnitude to require circulation of a supplemental impact statement prior to hearing. Appeal Boards have noted that if an FES disregards broad areas of environmental impact or fails to apprise the public of the nature of the proposed action and its expected consequences, recirculation of the FES may be necessary. *Turkey Point*, ALAB-660, *supra*, 14 NRC at 1014; *Black Fox*, ALAB-573, *supra*, 10 NRC at 786. Staff's failure to consider permanent onsite disposal constitutes disregard of a broad environmental impact which will require circulation of a supplemental statement or recirculation of an amended FES in order to advise the public of the nature of the proposal and its expected consequences.

Referral to an Appeal Board

Staff requests that, in the event we order it to supplement the record on the UMTRCA and NEPA considerations incident to Kerr-McGee's application, we refer our ruling on Contention KM-1 to the Appeal

¹⁷ We reaffirm our conclusion in LBP-84-42 that Staff may, in the absence of some demonstrated reason not to, rely on information generated by Applicants. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 524-25 (1977); 10 C.F.R. §§ 51.45 (b) and (c) and 51.60.

Board. Staff asserts that if it must engage in such supplementation, the delay and expense entailed would be detrimental to the public interest. Staff argues that if the People's view of the NEPA questions prevails, the proceeding could be delayed for as long as 2 years and considerable expense incurred. Staff points out that this expense could not be recovered from Kerr-McGee¹⁸ and would result in immediate and irreparable harm to Staff as a result. Staff argues that the public interest would be served by a prompt resolution of this proceeding which would settle the question of the disposition of Kerr-McGee's tailings. Staff concludes by arguing that our ruling will infringe on its exercise of its independent responsibilities.

Both Kerr-McGee and the People oppose a referral. Kerr-McGee correctly points out that, to the extent Staff must supplement the FES, referral of our ruling on Contention KM-1 would in no way alleviate Staff's problems. Further, Kerr-McGee anticipates that such supplementation need not be extensive and anticipates being called on to assist in the effort. Moreover, Kerr-McGee argues that Staff's obligations to supplement the record are in no way an intrusion on its independent responsibilities.

The People maintain that interlocutory review, as a practical matter, can have no effect on the scope of the proceeding, that Staff does not contest our finding on illegal segmentation and that it is that finding which results in the necessity for supplementation on NEPA issues, and that there has been no persuasive showing that unusual delay or expense will result from our rulings.

We deny the request for referral. We agree with Staff that the public interest demands a resolution of the problem presented by Kerr-McGee's application. We part company with Staff in its thinking that a referral of our ruling on Contention KM-1 will somehow further that public interest. To the contrary, we think such a referral would needlessly delay such a resolution by diverting the parties' efforts from the issue — permanent disposal of these tailings. Both Kerr-McGee and the People are anxious to resolve that issue. Any delay occasioned by the necessity for Staff to engage in further reviews, while unfortunate, is not unusual.¹⁹ Rather, it is essential to the resolution of the issue and therefore in the public interest.

¹⁸ In response to our inquiry on this point, Staff indicated that Kerr-McGee paid the full fee applicable at the time its application was submitted and that Commission policy forbids the retroactive assessment of the currently applicable fees. The present fees are based on the cost of processing an application and were adopted after submission of Kerr-McGee's application.

¹⁹ *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 464 (1982), *rev'd in part on other grounds*, CLI-83-19, 17 NRC 1041 (1983).

It is also unfortunate that Staff may not bill Kerr-McGee for the costs incurred in its reviews, but that fact cannot control the disposition of the issues here presented. Staff must nonetheless discharge its responsibilities under UMRCA and NEPA.

Finally, we note that Staff's obligations under NEPA would in no way be affected by interlocutory review of the admission of Contention KM-1. To that extent, Staff's request for referral could not alleviate its problems. Nor do our rulings infringe on Staff's independent responsibilities. Both Kerr-McGee and the People have challenged Staff's actions in accord with the procedures established by the Commission. If we were to agree with Staff on this point, we would effectively preclude those challenges and deny to Kerr-McGee and the People that which the Commission has granted them. We have no authority to take that action.

THE PEOPLE'S MOTION

The People have moved for reconsideration or clarification of our rulings on Contentions AG-1(g) and (h). They raise two points in connection with Contention AG-1(g). On the first of these, Illinois ground water standards, the People state:

This contention alleges that the FES fails to consider applicable federal, state, and local policies, including Illinois' groundwater protection standards. In its ruling on this contention, the Board states:

We admitted this contention in our February 24 Prehearing Conference Order (pp. 7-8) on condition that the People demonstrate that Kerr-McGee is subject to these requirements and on our finding that we are competent to enforce them. The applicability of these requirements is the subject of litigation in the courts of Illinois. Thus, the first condition has not yet been satisfied.

Board decision, pp. 48-9, n.84. To the extent that the Board has held that applicability of State laws governing nonradiological hazards remains an open question, the People respectively disagree.

Unfortunately, the People have quoted our ruling on Contention AG-2(g). We admitted Contention AG-1(g) as filed after eliminating its references to Part 61. Consequently this portion of the motion is denied.

Kerr-McGee and the People are engaged in a continuing debate with regard to the applicability of the Illinois ground water standards.²⁰ Much

²⁰ See Kerr-McGee's Response of December 13, 1984, at 10-14; People's Reply to Kerr-McGee's Response of January 4, 1985, at 1-3.

of this debate centers on the question of Federal preemption of the Illinois standards. Both Kerr-McGee and the People cite various Federal and Illinois court decisions in support of their preemption arguments.

Our ruling on Contention AG-2(g) quoted by the People²¹ was based on the assumption that the People are seeking to enforce the Illinois ground water standards in *People of the State of Illinois v. Kerr-McGee Chemical Corp.*, No. 80 CH 298 (18th Judicial Circuit of Illinois), and that Kerr-McGee was resisting. Thus unless that litigation is resolved favorably to the People, the ground water standards will not be applicable to Kerr-McGee. We will discuss this matter with the parties in more detail at the next prehearing conference. In the interim, we would appreciate Kerr-McGee and the People providing us with copies of the complaint, answer, and Memorandum of Opinion dated March 21, 1984, in the above case.

Kerr-McGee notes that we have not been consistent in our rulings on Contentions AG-1(g) and -2(g). That is correct. AG-1(g) asserts that the Staff must consider the Illinois ground water standards in its environmental review. That contention was admitted because, regardless of their applicability to Kerr-McGee, Staff must indeed touch on these standards even if it simply pauses to note that they are not applicable (should that turn out to be the case). AG-2(g), on the other hand, states Kerr-McGee must demonstrate that its disposal cell will not violate these ground water standards. In our view, such a demonstration should not be required if the standards are not applicable. Hence, this contention was treated differently.

We noted in LBP-84-42²² that Kerr-McGee and the People had agreed that this contention should be interpreted to require Kerr-McGee to show that it had complied with these requirements (assuming they are applicable) prior to license authorization. Staff points out that this may not be necessary.²³ We will also explore this matter at the next prehearing conference.

The People's second point with respect to Contention AG-1(g) concerns 10 C.F.R. Part 61. As filed, that contention asserted that Staff has ignored the guidance provided by Part 61. Because Part 61 is not applicable to this proceeding, we struck this assertion in the contention.

The People argue that the underlying policies of Part 61, which pertains to land disposal of radioactive waste, are relevant to this proceeding

²¹ LBP-84-42, 20 NRC at 1325 n.84.

²² *Ibid.*

²³ Staff's November 20, 1984 Response to the People's Motion at 2.

and that Appendix A to Part 40 expresses the same policies. Consequently, the People believe that the Staff should consider Part 61 in the FES. Kerr-McGee and Staff oppose.

This part of the People's motion is denied. Part 61 is not applicable to this proceeding, and consequently there is no obligation compelling Staff to consider it in the FES. This is not to say, however, that Part 61 might not furnish some indication of the Commission's intent should that intent not be explicitly set out in Part 40. All parties remain free to look to Part 61 (and any other relevant material) in attempting to reconcile ambiguities in Part 40.

Kerr-McGee correctly points out that we did not strike references to Part 61 in Contentions AG-2(u) and (w). This was an oversight. Those references are also stricken.

The People object to our denial of Contention AG-1(h). This contention asserted that Staff has not adequately responded to comments on the DES concerning alternate sites, the rationale for rejecting offsite disposal, and long-term environmental impacts. Because we had admitted contentions on all these points, we rejected Contention AG-1(h) as redundant.

The People argue that, because a supplemental impact statement must be circulated, Staff should respond to these comments and they point out that, by adopting Alternative III, Staff postponed a close analysis of these points. Kerr-McGee and Staff oppose, arguing that the hearing record offers the appropriate vehicle to correct any deficiencies in this regard.

The People's motion is granted. Staff has not considered permanent onsite disposal in the FES, and apparently as a consequence, felt it unnecessary to respond to these comments. We have held that Staff's failure to consider permanent onsite disposal requires that a supplemental impact statement be circulated. Staff should respond to the comments in question along with its response to the comments on the supplemental impact statement.

SUMMARY

For the convenience of the parties, we summarize our rulings below.

1. Staff's motion for reconsideration of the admission of Contention KM-1 is denied because:

- (a) Staff did not deny Kerr-McGee's application; and
- (b) Contention KM-1 is within the scope of the matters raised by Contentions AG-1 and -2.

2. The deficiencies which we found in the FES are related to Contention AG-1:

- (a) The FES is inadequate to support Alternative III because of its failure to consider permanent onsite disposal; and
- (b) Contention KM-1 requires Staff to review Kerr-McGee's disposal plan under UMTRCA.

3. Although we can see no practical reason for Staff to continue to pursue Alternative III, Staff is free to attempt to demonstrate that our conclusion in this regard is incorrect.

4. It is for Staff to determine in the first instance how much supplementation to the FES is necessary to comply with NEPA. In making this determination:

- (a) Staff should take the People's position into account and realize that it will have to defend its conclusions at hearing; and
- (b) Staff should realize that its NEPA review of permanent onsite disposal at West Chicago is meaningless if West Chicago does not meet UMTRCA standards.

5. Staff must circulate a supplement to the FES, evaluating permanent onsite disposal at West Chicago, for public comment. When Staff responds to those public comments, it must also respond to previous comments on the DES identified in Contention AG-1(h) (*see* item 8, below).

6. Staff's request for referral of our ruling admitting Contention KM-1 to an appeal board is denied.

7. The People's motion for reconsideration of our ruling on Contention AG-1(g) is denied. At the next prehearing conference in this proceeding, we wish the parties to address the question of the applicability of the Illinois ground water standards to Kerr-McGee's proposal and Staff's position that, even if these standards are applicable, we need not delay licensing action on Kerr-McGee's proposal pending compliance with them.

8. The People's motion for reconsideration of our ruling on Contention AG-1(h) is granted and that contention is admitted. In responding to public comments on the supplement to the FES, Staff must also respond to the comments identified in this contention. (*See* item 5, above.)

Order

In consideration of the foregoing, it is, this 23rd day of January 1985,
ORDERED

1. Staff's motion for reconsideration of our ruling admitting Contention KM-1 or for referral to the Appeal Board is denied;

2. Staff's motion for clarification is granted consistent with the views expressed herein;

3. The People's motion for reconsideration of our rulings on Contention AG-1(g) is denied and the references to 10 C.F.R. Part 61 in Contentions AG-2(v) and (w) are stricken; and

4. The People's motion for reconsideration of our ruling denying the admission of Contention AG-1(h) is granted and that contention is admitted.

ATOMIC SAFETY AND LICENSING BOARD

**Dr. James H. Carpenter
ADMINISTRATIVE JUDGE**

**Dr. Peter A. Morris
ADMINISTRATIVE JUDGE**

**John H Frye, III, Chairman
ADMINISTRATIVE JUDGE**

**Bethesda, Maryland
January 23, 1985**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION

Harold R. Denton, Director

In the Matter of

**Docket Nos. 50-289
50-320
50-219
(10 C.F.R. § 2.206)**

**GENERAL PUBLIC UTILITIES NUCLEAR
CORPORATION**

**(Three Mile Island Nuclear Station,
Units 1 and 2)**

**(Oyster Creek Nuclear Generating
Station)**

January 15, 1985

The Director of the Office of Nuclear Reactor Regulation denies a petition submitted by Joanne Doroshow on behalf of the Three Mile Island Alert, Inc., and other named Petitioners requesting action with respect to the Three Mile Island Nuclear Station (TMI) Units 1 and 2 and the Oyster Creek Nuclear Generating Station.

RULES OF PRACTICE: SHOW CAUSE PROCEEDING

Where the Commission has before it the Petitioners' allegations in another proceeding, it is inappropriate to use 10 C.F.R. § 2.206 procedures to initiate a show cause proceeding.

DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206

INTRODUCTION

By Petition dated August 13, 1984, Joanne Doroshow, on behalf of Three Mile Island Alert, Inc. (TMIA), and others¹ requested that the Nuclear Regulatory Commission revoke the licenses of General Public Utilities Nuclear Corporation (GPUN) to operate Three Mile Island Nuclear Station (TMI) Units 1 and 2 and the Oyster Creek Nuclear Generating Station. As the basis for this request, Petitioners assert that GPUN lacks the requisite character to safely operate a nuclear reactor. Specifically, Petitioners allege that management's past record indicates defects in "foresight, judgment, perception, resolve, integrity and values" which reflect negatively upon its present ability to demonstrate the qualities of character required for an NRC license holder.

In accordance with usual NRC practice, the Petition was referred to the Staff for appropriate action in accordance with 10 C.F.R. § 2.206. A notice was published that the Petition was under consideration. 49 Fed. Reg. 35,447 (Sept. 7, 1984). On August 22, 1984, Petitioners filed supplemental pages to replace certain pages to the Petition, and on October 1, 1984, filed additional sections to supplement the Appendix to the Petition. On October 12, 1984, the Licensee filed its response to the Petition. The Staff has completed its evaluation of the Petition and, for the reasons stated in this Decision, the Petitioners' request is denied.

DISCUSSION

Petitioners' Allegations with Regard to TMI Unit 1

Petitioners assert a number of factual circumstances in support of their request that the license of GPUN to operate TMI Unit 1 be revoked, including that, essentially, Metropolitan Edison Company, GPUN and all GPU subsidiaries are one company and were run since before the accident by the same individuals. As such, Petitioners allege that public health and safety require that the Licensee show that its past

¹ Additional Petitioners are Peter C. Wambach, State Representative, 103d Legislative District, Commonwealth of Pennsylvania; John Shumaker, State Senator, 15th District, Commonwealth of Pennsylvania; Pat Sordill, Essex County Women's International League for Peace and Freedom; Alan Swenson, SANE; A. Jane Perkins, Harrisburg City Council; Larry J. Hochendoner, County Commissioner, Dauphin County, Pennsylvania; Judith Marlow, Safe Energy Alternatives Alliance, Dr. D.K. Cinquemani, Essex SEA Alliance, and Louise Bradford, TMIA.

record of wrong-doing is unrelated to fundamental character flaws inherent within the company. The Staff has already considered the issues raised by the Petition. Virtually no new information or argument is presented by the Petitioners which has not been fully considered by the Staff in its analysis of the issues. See "TMI-1 Restart: An Evaluation of the Licensee's Management Integrity as It Affects Restart of Three Mile Island Nuclear Station, Unit 1, Docket 50-289," NUREG-0680, Supp. No. 5 (July 1984); NUREG-0680, Supp. No. 4 (October 1983), and NUREG-1020LD (September 1983). See also NRC Staff's Reply to Other Parties' Comments in Response to CLI-84-18, October 29, 1984; NRC Staff's Brief in Response to CLI-84-18, October 9, 1984, and NRC Staff's Comments on the Commission's January 20, 1984 List of Integrity Issues in Restart Proceeding, February 21, 1984.² Based upon its assessment, the Staff has concluded that GPUN can operate TMI Unit 1 without undue risk to the health and safety of the public and that these issues do not raise a bar to restart of TMI Unit 1.

Apart from the Staff's view of the substance of the Petitioners' allegations, another consideration leads me to deny Petitioners' request that the license of GPUN to operate TMI Unit 1 be revoked. The Commission itself has before it the question of whether further hearings are warranted on such matters as are covered in NUREG-0680, Supp. No. 5. See Commission Order, CLI-84-18, 20 NRC 808, 809 (1984). In fact, most of Petitioners' allegations have been incorporated in TMIA's response to the Commission's Order.³ In view of the pending question before the Commission of the need for further hearings, it is inappropriate for me to initiate show cause proceedings in response to Petitioners' request. See *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-6, 13 NRC 443 (1981); *Consolidated*

² As indicated in NRC Staff's Reply to Other Parties' Comments in Response to CLI-84-18, at 3 n.2, some new information, not previously considered by the Staff prior to the issuance of NUREG-0680, Supp. No. 5, was cited in the Petition. The new information consisted of I&E Inspection Report 50-289/84-12, dated August 14, 1984; Attachment B of the Petition, concerning allegations of Licensee's use of unqualified welders; Attachment C of the Petition concerning a rebuttal of Staff's conclusions on the Parks/King/Gischel issue, and the Special Report of GPU's Reconstituted OARP Review Committee. In the Staff's Reply to Other Parties' Comments in Response to CLI-84-18, the Staff stated that it considered this material and found that it did not modify the Staff's position on any of the issues concerning restart and that the information, either separately or in conjunction with other available information, did not raise a significant safety issue.

³ The Staff reviewed TMIA's response to CLI-84-18, including those portions of the Petition which were incorporated in TMIA's response (as well as those portions of the Petition incorporated in the Union of Concerned Scientists' response to CLI-84-18), and found no reason therein to change the Staff's previous position on the issues. See NRC Staff's Reply to Other Parties' Comments in Response to CLI-84-18, October 29, 1984; see also NRC Staff's Brief in Response to CLI-84-18, October 9, 1984.

Edison Co. of New York (Indian Point, Units 1, 2 and 3), CLI-75-8, 2 NRC 173 (1975). Petitioners' request as it relates to TMI Unit 1 is therefore denied.

Petitioners' Allegations with Regard to TMI Unit 2

As a basis for action with regard to TMI Unit 2, Petitioners make essentially the same argument as they do with regard to TMI Unit 1 that the Licensee has demonstrated such defects of character as to mandate revocation of its license to operate this facility. Specifically, Petitioners assert as a basis for action with regard to TMI Unit 2 a number of contentions relating to the Licensee's management of cleanup operations at the TMI-2 facility.

The Staff has considered the deficiencies in the TMI-2 cleanup operations raised by the OI investigation (OI Report dated September 1, 1983, Allegations Regarding Safety-Related Modifications and QA Procedures, H-83-002, and OI Report dated May 18, 1984, Allegations Regarding Discrimination for Raising Safety-Related Concerns, H-83-002) and referred to in the Petition. The violations were found individually to be of minor safety significance. Enforcement action was taken on these matters.⁴ The Staff's recent reconsideration of its position regarding the results of the previous OI investigation on the polar crane may result in the earlier enforcement action being modified. In addition, the Staff is currently reviewing the technical implications of newly discovered "unlike kind" brake modifications made by the Licensee on the polar crane.⁵

The Staff has also completed an extensive Performance Appraisal Inspection which reviewed the Licensee's Quality Assurance program, safety review functions, design changes, maintenance, facility operations, corrective action systems and training. The Staff had determined, based on the results of this inspection, that the Licensee is performing adequately in each of these areas. *See* Performance Appraisal Inspection 50-320/84-08 (May 15, 1984). For these reasons, Petitioners' request for revocation of the license for TMI Unit 2 is denied.

⁴ A Notice of Violation, Severity Level IV, was issued February 3, 1984. Letter from Richard DeYoung to P.R. Clark, President, GPUN (EA 83-89).

⁵ Letters from Bernard J. Snyder, Program Director, TMI Program Office, Office of Nuclear Reactor Regulation (NRR) to F.R. Standerfer, Vice President/Director, TMI Unit 2 (October 9, 1984 and October 18, 1984).

Petitioners' Allegations with Regard to Oyster Creek Nuclear Generating Station

Petitioners assert as a basis for their request for action with regard to Oyster Creek that there is a nexus between management of Oyster Creek and TMI Units 1 and 2 such that Licensee's poor record regarding its management of TMI Units 1 and 2 can reasonably be viewed as arising from defects of character also affecting safe operation of the Oyster Creek facility. In addition, Petitioners express concern regarding Edward G. Wallace. Mr. Wallace is currently Manager of the Expanded Safety Systems Facility Project at Oyster Creek. While Manager of Licensing of TMI in 1979, Mr. Wallace drafted a "dishonest" response to a Notice of Violation (NOV) issued by NRC after the accident.

The Staff has evaluated Met-Ed's response to the NOV with respect to current GPUN management integrity and concluded that there is reasonable assurance that GPUN can operate TMI-1 with no undue risk to public health and safety. The Staff's review of circumstances surrounding the response to the NOV is contained in NUREG-0680, Supplement No. 5, at 8-15 through 8-22. As a separate matter, the Staff is considering what enforcement action, if any, is appropriate regarding the Licensee's response to the NOV. Petitioners are correct that Mr. Wallace was involved in preparing the response to the NOV and is currently in a "technical" management position with respect to Oyster Creek. However, Mr. Wallace is not involved in any way in the on-line operation of the Oyster Creek facility. His role is that of an offsite project manager and his current work (e.g., project management of the Expanded Safety Systems Facility) is subject to extensive review by GPUN management as required by 10 C.F.R. § 50.59. Moreover, Mr. Wallace was candid and cooperative during the OI investigation of this matter. For these reasons, the Staff finds that there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with no undue risk to public health and safety with Mr. Wallace in his present management position.

The Licensee's response to the NOV is relevant to proceedings concerning the restart of TMI-1; however, the Staff has argued before the Commission that it is not material to a restart decision and that further hearings on this matter should not be required. The Petitioners have filed their views with the Commission as part of the TMI-1 Restart Proceeding (*see* TMIA Response to Commission Order of September 11, 1984, dated October 9, 1984 and TMIA Reply Comments to NRC Staff's Brief in Response to CLI-84-18, dated October 29, 1984). If the record is subject to reopening for further hearings and the TMI-1 Restart

Proceeding dictates a different result with respect to Mr. Wallace, appropriate action will be taken at that time.

Additionally, Petitioners argue that Oyster Creek has a notably poor record in its own right. As a basis for this allegation, the Petitioners allege that Oyster Creek was so poorly run that it had to be shut down for maintenance work since early 1983, that results of a study undertaken by Rohrer, Hibler and Replogle, Inc. (RHR) show that training is still inadequate, and that the results of a study by Basic Energy Technology Associates, Inc. (BETA) show that plant maintenance at Oyster Creek has not yet reached the point where required equipment reliability can be reasonably assumed.

With regard to the shutdown of Oyster Creek, the outage was not, as Petitioners allege, due to a poor operating record. Rather, the extended shutdown was a pre-planned outage to accomplish plant maintenance and modification activities. These activities involved preventive and corrective maintenance, surveillance testing and inspection, and engineering and installation of improved design features. The nature and extent of the activities had been planned and integrated in a systematic manner. Due to the extent of the outage, the Staff recognized the need to assess the condition of the plant and operators prior to the resumption of licensed operations. The results of such assessment are discussed in a memorandum dated September 28, 1984, from the Regional Administrator of Region I to the Directors of the Office of Inspection and Enforcement and the Office of Nuclear Reactor Regulation. A copy of the memorandum is being provided to Petitioners with this Decision. The Staff has determined that during the outage the Licensee has taken action to improve the physical plant and confirm through testing the adequacy of existing plant conditions, that these actions are indicative of a responsible Licensee, and that the results are not indicative of a poorly run facility.

Special inspections were performed (*see* Inspection Report No. 50-219/84-06) with respect to maintenance to review organizational structure, administrative controls, organizational interfaces, completed safety-related work packages, and preventive maintenance. Extensive corrective and preventive maintenance was satisfactorily performed during the outage. Prior to resumption of power operations, appropriate surveillance testing was performed to assure conformance with the technical specifications. The Staff is satisfied that the technical specifications are adequate for monitoring required equipment reliability and determining whether or not the plant can operate with degraded equipment.

With regard to Petitioners' allegations based on their review of the BETA and RHR reports, the Staff has specifically reviewed training, maintenance, and adherence to procedures at Oyster Creek in order to independently assess Licensee performance in these areas. The results of the Staff's efforts with respect to the BETA and RHR reports are documented in Inspection Report No. 50-219/84-06. The review and inspections focused on the current staff and plant systems and procedures. The Staff's efforts were geared towards obtaining a better understanding of current attitudes and conditions as exhibited by current performance.

With regard to procedures and adherence to procedures, the Staff has specifically examined, during 1983 and 1984, policies governing plant operations. As discussed in the Staff's assessment memorandum and its referenced reports, policies are widely distributed and generally well understood by plant operators and supervisors. Procedures have been found to be technically adequate and capable of being properly implemented. Licensee's management has demonstrated a strong commitment at Oyster Creek to adherence to procedures and requirements. Accordingly, the Petitioners' allegations do not provide an adequate basis for initiating show cause proceedings to revoke the Oyster Creek license.

CONCLUSION

Based upon the foregoing discussion and the information contained in the referenced documentation, I have concluded that no adequate basis exists for revocation of GPUN's license to operate TMI Unit 1 or Oyster Creek or to maintain TMI Unit 2. Accordingly, the Petitioners' request has been denied. A copy of this decision will be filed with the Secretary for the Commission's review in accordance with 10 C.F.R. § 2.206(c) of the Commission's regulations.

Harold R. Denton, Director
Office of Nuclear Reactor
Regulation

Dated at Bethesda, Maryland,
this 15th day of January 1985.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION

Harold R. Denton, Director

In the Matter of

Docket No. 50-295
(10 C.F.R. § 2.206)

COMMONWEALTH EDISON COMPANY
(Zion Station, Unit 1)

January 23, 1985

The Director of the Office of Nuclear Reactor Regulation grants in part and denies in part a Petition by Edward Gogol alleging inadequacies in the containment integrated leak rate test performed in 1981 at Zion Nuclear Power Station, Unit 1. The Petition sought a variety of relief including immediate NRC action to deal with the threat raised by the alleged inadequate leak rate test of the Zion Unit 1 facility and the completion of an adequate and properly supervised retesting of the facility. Petitioner also requested copies of all documents collected by either the licensee or the NRC in the course of the retest.

TECHNICAL ISSUE DISCUSSED: CONTAINMENT LEAK RATE TESTING

Discrepancies in the Containment Integrated Leak Rate Test (CILRT) for the Zion Nuclear Power Station, Unit 1 required retesting of the facility to demonstrate compliance with 10 C.F.R. Part 50, Appendix J.

RULES OF PRACTICE: ORDERS

It is not necessary for the NRC to issue orders in response to a petition pursuant to 10 C.F.R. 2.206 when the licensee agrees to take remedial measures similar to those requested by the petition.

DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206

On June 5, 1984, Mr. Edward Gogol filed on behalf of Citizens Against Nuclear Power a Petition for Emergency Relief (Petition). The Petition contended that the Commonwealth Edison Company's (CECo) document "Zion Unit 1 Reactor Containment Building Integrated Leak Rate Test Report," dated April 24, 1981, revealed that repeated efforts were made to obtain a satisfactory verification test to validate the performance and reliability of the basic test performed on March 12, 1981, at Zion Nuclear Power Station, Unit 1. The Affidavit of Dr. Zinovy V. Reytblatt, attached to the Petition, contended that these repeated efforts to obtain a satisfactory verification test demonstrated that the basic test had been deficient. Consequently, it was alleged that the American National Standards Institute ANSI N45.4-1972 specified in Appendix J to 10 C.F.R. Part 50 was not met and, accordingly, Zion Nuclear Power Station, Unit 1 was in noncompliance with the Commission's regulations regarding containment leak rate testing. Based on the above allegation, the Petition requested the following relief: (1) that the NRC act immediately to remove the threat posed by this situation; (2) that the NRC immediately order CECo to perform a scientifically valid Containment Integrated Leak Rate Test on Zion Nuclear Power Station, Unit 1; (3) that the NRC supervise and review this test, and certify both that this test is scientifically valid and performed in accordance with ANSI N45.4-1972; (4) that a copy of all documents containing actual test data, test logs, calculations, graphs, etc., collected by CECo or the NRC in the course of this test or its review, be provided on a timely basis to the Petitioner; and (5) that if (1) through (4) are not or cannot be accomplished, that Zion Nuclear Power Station, Unit 1 operating license be suspended. The request for documents was reiterated in Mr. Gogol's letter of August 6, 1984.

As a result of the Petition, the NRC Region III Office investigated the various allegations contained in the Petition. The regional inspectors performed a special inspection of the 1981 and 1983 Containment Integrated Leak Rate Tests (CILRT) performed for the Zion Nuclear Power Station, Unit 1.

The inspection identified discrepancies in the above-mentioned CILRTs and, on July 19, 1984, the Region III Office notified CECo that Zion Nuclear Power Station, Unit 1 was not in compliance with Appendix J to 10 C.F.R. Part 50 and the Zion Nuclear Power Station, Unit 1 Technical Specifications. A copy of the Region's notification was sent to Mr. Gogol as an enclosure to the Director's letter to him, dated July 30,

1984, acknowledging receipt of the Petition. The Inspection Reports documenting the Region III Office's inspection findings (50-295/84-11 and 50-305/84-11) were also sent to Mr. Gogol, along with twenty-seven other documents in NRC's possession relevant to the CILRTs performed at Zion Nuclear Station, Unit 1, by letter dated September 27, 1984.

Upon notification by the Region III Office, CECo voluntarily shut down Zion Nuclear Power Station, Unit 1 and performed a valid CILRT, portions of which were witnessed by Region III inspectors. The results of that inspection are also contained in Inspection Reports 50-295/84-11 and 50-304/84-11.

The CILRT showed Zion Nuclear Power Station, Unit 1 containment integrity. Consequently, Zion Nuclear Power Station, Unit 1 containment has been demonstrated to be in compliance with Commission regulations in 10 C.F.R. Part 50, Appendix J.

To the extent that the Petition sought immediate NRC action to remove any threat posed by unacceptable CILRTs at Zion Nuclear Power Station, Unit 1, such actions were taken and the relief requested by the Petition was granted. To the extent that the Petition sought NRC review of the CILRT conducted at Zion Unit 1 and copies of all documents in the possession of the NRC regarding that CILRT, those portions of the Petition have also been granted.

The remainder of the Petition is denied. It was not necessary for the NRC to issue an order in this matter, because CECo agreed to take remedial measures similar to those requested upon notification that the plant did not comply with Appendix J. *See Rochester Gas and Electric Corp.* (R.E. Ginna Nuclear Power Plant), DD-82-3, 15 NRC 1348, 1357-58 (1982). Nor is it appropriate for the NRC to supervise a CILRT or certify its validity. Compliance with NRC regulations is the responsibility of the Licensee. The NRC did review the test, and this review provides reasonable assurance that the Commission's regulations are met. Consequently, there is no cause to suspend the operating license for Zion Nuclear Power Station, Unit No. 1.

To the extent the Petition sought documents collected by CECo but not in the possession of the NRC, the request is denied for the same reasons I stated in an earlier Director's Decision on a Petition filed by Mr. Gogol which requested similar relief.¹ As noted there, to honor such a request would impose substantial burdens and costs on the NRC without a clear corresponding benefit. Section 2.206 does not provide a means for general discovery of documentation in the possession of Commission

¹ *Commonwealth Edison Co.* (LaSalle County Station, Units 1 and 2), DD-84-6, 19 NRC 891, 895-96 (1984).

licensees. See *Texas Utilities Generating Co.* (Comanche Peak Steam Electric Station, Units 1 and 2), DD-83-11, 18 NRC 293, 295 (1983).

For the reasons stated in this Decision, the Petitioner's request for action pursuant to 10 C.F.R. § 2.206 has been granted in part and denied in part. As provided by 10 C.F.R. § 2.206(c), a copy of this Decision will be filed with the Secretary for the Commission's review.

Harold R. Denton, Director
Office of Nuclear Reactor
Regulation

Dated at Bethesda, Maryland,
this 23rd day of January 1985.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

In the Matter of

Docket No. 50-322-OL-4
(Low Power)

LONG ISLAND LIGHTING
COMPANY
(Shoreham Nuclear Power
Station)

February 12, 1985

Upon review of the Licensing Board's October 29, 1984 decision (LBP-84-45, 20 NRC 1343) granting Applicant's request for an exemption from the requirements of 10 C.F.R. Part 50, Appendix A, General Design Criterion 17 and authorizing certain low-power testing, the Commission allows that decision to become effective.

OPERATING LICENSE: LOW-POWER LICENSE
(PREREQUISITE FINDINGS)

Under its regulations at 10 C.F.R. § 50.47(d), the Commission may issue a low-power operating license to a facility, notwithstanding the absence of either NRC or Federal Emergency Management Agency (FEMA) approval of the facility's offsite emergency plan and without a predictive finding of reasonable assurance that a full-power license will eventually issue, so long as the prerequisites for a low-power license are met. *Long Island Lighting Co.* (Shoreham Nuclear Power Station), CLI-83-17, 17 NRC 1032, 1034 (1983).

NUCLEAR REGULATORY COMMISSION: IMMEDIATE EFFECTIVENESS REVIEW (EXEMPTION FROM REGULATIONS)

In conducting its review for effectiveness purposes of a Licensing Board decision authorizing an exemption from General Design Criterion (GDC) 17 (10 C.F.R. Part 50, Appendix A), the Commission will place special weight on equitable considerations. These considerations include the safety significance of full compliance with GDC 17 at the power levels involved, the public interest in full compliance, the intrinsic value to early discovery of problems during low-power testing, the length and cost of the whole licensing proceeding, and the good-faith efforts of the applicant to comply fully with GDC 17.

NUCLEAR REGULATORY COMMISSION: RESPONSIBILITIES UNDER ATOMIC ENERGY ACT

In considering a request for exemption under 10 C.F.R. § 50.12, the views of a State or local government are not entitled to conclusive weight on the ground that they represent the "public interest." Congress charged the NRC with licensing and regulating nuclear power safety, and the Commission cannot delegate this responsibility by treating State or local government views on the issues as conclusive.

MEMORANDUM AND ORDER

The Commission has decided to allow the Atomic Safety and Licensing Board's October 29, 1984 decision (LBP-84-45, 20 NRC 1343) to become effective. That decision grants LILCO's request for an exemption from General Design Criterion (GDC) 17 (10 C.F.R. Part 50, Appendix A), limited to Phases III and IV of LILCO's low-power testing program. The Commission's decision to allow the Board's decision to become effective is based on the record of the proceeding before the Board, on the Board's decision, and on the various comments on this matter that have been filed with and orally argued to the Commission by the parties. In its review of these materials the Commission found the following to be important for the limited purpose of this effectiveness review.

1. The Commission's Order in CLI-84-8, 19 NRC 1154 (1984) directed LILCO to discuss its basis for concluding that, for the low

power levels associated with Phases III and IV, operation with its alternate AC power system would be as safe as it would have been with a fully qualified onsite AC power system. The Board appears to have correctly applied this instruction. The Board identified certain areas of specific comparison where components of LILCO's alternate AC system may have lesser safety margins than corresponding components of the permanent system. However, as we read the Board's decision, the alternate system has sufficient redundancy, capacity, testability, and reliability to supply emergency power for low-power operation of the Shoreham unit.¹ More specifically, the Board found adequate assurance that the enhanced system can supply sufficient power well within the time it would be needed in the event of a concurrent LOCA and loss of offsite power to preclude a peak cladding temperature of 2200°F, fuel cladding rupture, and any danger to the public. Further, given the low accident probabilities involved, Suffolk County's probabilistic risk analysis, even if accepted for purposes of our analysis, tends to confirm rather than contradict the essential safety equivalence of LILCO's alternate AC system.

2. The Commission placed special weight on several equitable considerations in its limited review. Most important, the record shows that the safety significance of full compliance with GDC 17 in the special circumstances of this case, and at the power levels associated with Phases III and IV, is small. The corresponding public interest in full compliance is diminished. The Commission also considered the intrinsic value to early discovery of problems during low-power testing, the unusual length and cost of this whole licensing proceeding, the fact that the GDC 17 compliance issue arose late in the review process when the plant was almost complete, and LILCO's good-faith efforts to comply

¹ After the Board rendered its decision, the Staff notified the Board, the parties and the Commission that subsequent review of the alternate AC power system had identified a potential failure mode that could impact both parts of the system. Board Notification (BN) 85-009. The Staff further advised that it and the Licensee had agreed on a resolution of this problem. Although Suffolk County appeared to concede in oral argument before the Commission that the proposed resolution appeared to satisfactorily cure the identified problem, Suffolk wondered whether it might cause a loss of flexibility in feeding vital loads. In its written submissions, Suffolk also argued that the proposed solution would require feeding bus 11 via the Wildwood substation, which is about 1 mile from the Shoreham site.

The Commission has reviewed the Staff/Licensee resolution based on the information available, and finds that it adequately addresses the identified problem. We do not consider bus 11 to be important to safety, because it serves nonvital loads, and we place no reliance on the alternate routing of gas turbine power through Wildwood and bus 11 in concluding that the proposed resolution is adequate. The Commission concludes that there is no regulatory or safety requirement for the purported flexibility cited by Suffolk. Any safety benefit of such flexibility is minuscule and speculative. Moreover, based on our preliminary review, the Commission concludes that the information transmitted in BN-85-009 does not substantively change the basis for the Board's decision, and thus that the Board's findings on safety remain valid. The Staff should assure that procedures and training in the use of the alternate system, as modified by the BN, are adequate before the plant commences Phases III and IV operation.

fully with GDC 17. The Commission is also mindful that LILCO's request for low-power authorization came while NRC practice and policy in the granting of exemptions was in a period of transition, and LILCO was confronted with some uncertainty regarding how noncompliances with GDC 17 were to be reviewed and resolved.

3. In order to simplify its limited review for effectiveness purposes of the equitable considerations set forth by the Licensing Board, the Commission assumed for purposes of analysis that Suffolk County may be correct that Shoreham's generating capacity may not be needed to ensure reliable electrical energy supply for some time (as long as 10 years). Further, the Commission considered what Suffolk asserts to be LILCO's negligence in bringing on itself the need for the exemption. Even if Suffolk is correct, we believe that LILCO's recent good-faith efforts to cure the problems outweigh or balance any possible past negligence. Also, to simplify the limited review, the Commission gave no weight to any asserted economic advantages or disadvantages to LILCO or its ratepayers associated with grant of the exemption, where these assertions were premised on assumptions that full-power licensing would or would not be authorized in the future, and gave no weight to any "favorable signal" to financial markets. Nonetheless, in the Commission's view, the balance of equities set forth in ¶ 2 favors the granting of an exemption.²

4. The Commission has previously rejected the suggestion in this proceeding that a low-power license should not be issued where there is no reasonable assurance that a full-power license will ever be used. CLI-83-17, 17 NRC 1032, 1034 (1983); CLI-84-9, 19 NRC 1323, 1327 (1984). In doing so, the Commission found that 10 C.F.R. § 50.47(d) of its regulations established unqualified authorization for it to issue a low-power license in the absence of either NRC or FEMA approval of an off-site emergency plan and without the need for a predictive finding of reasonable assurance that a full-power license will eventually issue, so long as the prerequisites for a low-power license are met. CLI-83-17, *supra*, 17 NRC at 1034. Accordingly, in the context of this low-power proceeding, the Commission declined to speculate on whether offsite emergency

² The State and County argue that because 10 C.F.R. § 50.12(a) requires a "public interest" finding, and because they represent the public interest, that we essentially should afford their views conclusive weight. Congress charged the NRC with licensing and regulating nuclear power safety, and the Commission cannot delegate this responsibility by treating State or County views on the issues as conclusive. Moreover, the safety and equitable considerations supporting the Commission's decision in this case are within the special knowledge and expertise of the Commission since they arise directly from the conduct of NRC's own licensing process. These considerations bear directly on the national interest in effective and efficient nuclear safety regulation.

planning issues would be resolved satisfactorily for purposes of a full-power license. In any contested full-power proceeding, there is uncertainty over the outcome of full-power licensing issues; nevertheless, 10 C.F.R. § 50.57 authorizes the issuance of a low-power license even though such uncertainty might exist. Indeed, the interjection of such doubts into the low-power proceeding could create a limited full-power hearing before issuance of the low-power license. Such a procedure for a low-power license would have little to commend it. *Id.*, 17 NRC at 1034.

The State and County's position regarding public interest considerations appears to be predicated, to some extent at least, on the belief that Shoreham will never be allowed to operate in excess of 5% power. Thus, according to their theory, the plant's fuel will be used for no beneficial purpose because the plant will never be able to achieve its intended purpose. This is largely based on their speculation on the outcome of the NRC adjudication and of the New York State court litigation concerning offsite emergency planning issues. Reliance on such speculation for public interest determination purposes being considered here is unfounded, and is rejected for the same reasons found in CLI-83-17, and in CLI-84-9, to wit: the Commission's authority to issue a low-power license does not depend on a predictive finding of reasonable assurance that a full-power license will eventually issue; the interjection of speculation on such matters into the low-power licensing process would render it essentially meaningless.

5. The Commission understands that contentions related to physical security were disallowed. If there are no issues in controversy, the substantive findings in this matter should be made by NRC Staff rather than by the Licensing Board.

6. The foregoing is entirely without prejudice to pending appeals before the Atomic Safety and Licensing Appeal Board. Moreover, the grant of the exemption, and authorization of Phases III and IV of low-power testing, is entirely without prejudice to ongoing reviews and hearings related to low- or full-power authorization.

To allow for the orderly processing of any request for expedited judicial review, this Order shall not become effective until 5 p.m., Eastern Standard Time, on February 13, 1985. If such a request is filed prior to that time, the effectiveness of this Order shall be delayed until 5 p.m., E.S.T., on February 19, 1985.

Commissioner Asselstine disapproved this order, and his separate views are attached. The additional views of Chairman Palladino and Commissioners Roberts, Bernthal and Zech are also attached.

It is so ORDERED.

For the Commission

SAMUEL J. CHILK
Secretary of the Commission

Dated at Washington, D.C.,
this 12th day of February 1985.

SEPARATE VIEWS OF COMMISSIONER ASSELSTINE

Exemptions to the NRC's licensing requirements should not be granted lightly. A person seeking a waiver of our rules and regulations bears a heavy burden in showing that he is entitled to such a waiver. To provide otherwise would lead to the evisceration of our rules and to a patchwork of regulatory standards. LILCO has not met its burden in this case, and should not be given an exemption to the requirements of General Design Criterion (GDC) 17.

An operating license limited to 5% of rated power is of limited utility to the operator of a boiling water reactor (BWR) such as Shoreham. Little testing can be accomplished at that power level that cannot also be completed without taking the reactor beyond cold criticality. To do substantial testing of a BWR plant the operators must be able to take the plant to 20% or more of rated power. Thus, LILCO's assertion that there will be substantial benefits to having a 5% license 3 months before a final determination about the qualification of Shoreham's emergency diesels is made carries little weight. The real benefits cited by LILCO would come only from full-power operation, something which, given the emergency planning controversy, may not occur for quite some time, if ever.

Moreover, the other equities cited by LILCO and the Licensing Board do not support granting an exemption. The costs, length and complexity of the Shoreham litigation should not properly be a consideration in determining whether to grant an exemption to a Commission safety requirement. Nor is the fact that the facility is otherwise physically complete a justification for granting an exemption to a Commission safety requirement. The requirement in GDC 17 that a plant have a fully qualified onsite source of emergency AC power is not an insignificant safety

requirement; it should not, therefore, be modified without compelling reasons for doing so.

The essential question presented by LILCO's exemption request becomes then: should the Commission waive one of its safety requirements so that a licensee with financial problems can "send a signal" to Wall Street? I believe not. The Commission should not be in the business of relaxing its licensing requirements merely because a particular licensee is having financial difficulties.

I cannot, therefore, agree with the Commission's decision to grant LILCO an exemption to the requirements of GDC 17 and thereby grant LILCO a license to operate at up to 5% of power. LILCO has presented no good reason to relax the requirements of GDC 17, and there appears to be no practical benefit to be gained from allowing operation at 5% power at this time.

**ADDITIONAL VIEWS OF CHAIRMAN PALLADINO,
COMMISSIONERS ROBERTS, BERNTHAL AND ZECH
ON SHOREHAM**

In spite of the fact that the majority opinion states that we "gave no weight to any 'favorable signal' to financial markets" in balancing the equities related to the granting of the exemption requested by LILCO, our dissenting colleague implies that we did. Thus, he once again impugns the motives of those of us with whom he disagrees. Such action beclouds the important issues involved in this decision, and thereby detracts from public understanding of the Shoreham proceeding.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech

In the Matter of

Docket No. 50-289-SP
(Restart)

METROPOLITAN EDISON COMPANY,
et al.
(Three Mile Island Nuclear
Station, Unit 1)

February 25, 1985

The Commission determines that the Licensing Board should issue decisions on two issues on which hearings have been completed. The Commission further determines that no further hearings are warranted within the restart proceeding. The Commission, however, institutes a new proceeding to consider what action should be taken concerning individuals possibly involved in falsification of leak rate data at Unit 2. On another matter involving a condition of restart imposed by the Appeal Board that a specified Licensee employee will have no supervisory responsibilities over the training of nonlicensed personnel, the Commission offers the employee the opportunity to request a hearing on whether that condition should be imposed.

RULES OF PRACTICE: REOPENING OF PROCEEDINGS

The traditional standard to determine a motion to reopen a record considers whether: (1) the motion is timely; (2) it addresses significant safety (or environmental) issues; and (3) it might have led to a different

result had the newly proffered material been considered initially. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-598, 11 NRC 876, 879 (1980).

RULES OF PRACTICE: RESPONSIBILITIES OF PARTIES

When directed by the Commission to address specific matters in a licensing proceeding, the parties have an obligation to comply with the direction. Any clear disregard for the Commission's order will be subject to appropriate sanction.

RULES OF PRACTICE: REOPENING OF PROCEEDINGS

The traditional standard for reopening applies in determining whether a record should be reopened on the basis of new information. The standard does not apply where the issue is whether the record should be reopened because of an inadequate record.

RULES OF PRACTICE: STANDING TO INTERVENE

Any interested person with the requisite standing may seek to intervene in a § 189a licensing proceeding. To establish standing, an individual must at a minimum show (1) the action being challenged could cause injury in fact to that individual, and (2) such injury is within the zone of interests protected by the Atomic Energy Act. *See, e.g., Portland General Electric Co.* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610 (1976).

RULES OF PRACTICE: STANDING TO INTERVENE

It is unresolved in the courts whether an individual who suffers economic injury as a result of a board's decision to bar him from working in a certain job would be within the zone of interests protected by the Atomic Energy Act. *See, e.g., Consumers Power Co.* (Palisades Nuclear Power Facility), ALAB-670, 15 NRC 493, 506 (1982) (concurring opinion of Mr. Rosenthal), *vacated as moot*, CLI-82-18, 16 NRC 50 (1982).

DUE PROCESS: OPPORTUNITY FOR HEARING

The Due Process Clause of the Fifth Amendment prohibits a federal agency from depriving an individual of liberty or property interests without providing that individual an opportunity for a hearing. Individuals in-

directly affected by government action may not have any hearing rights. See *O'Bannon v. Town Court Nursing Center*, 447 U.S. 773 (1980).

DUE PROCESS: LIBERTY INTEREST

A person's liberty interest is implicated where a person's good name, reputation, honor or integrity is at stake because of what the government is doing to him, or where the government's action imposed a stigma or other disability that forecloses his freedom to take advantage of other employment opportunities. *Board of Regents v. Roth*, 408 U.S. 564, 573 (1972).

DUE PROCESS: LIBERTY INTEREST

Merely making a discharged employee less attractive for employment is not a deprivation of liberty. See, e.g., *Johnson v. University of Pittsburgh*, 435 F. Supp. 1328 (W.D. Pa. 1977).

DUE PROCESS: PROPERTY INTEREST

To have a property interest in a benefit, a person clearly must have more than an abstract need or desire for it, and more than a unilateral expectation of it. He must, instead, have a legitimate claim of entitlement to it. *Roth, supra*, 408 U.S. at 577.

DUE PROCESS: PROPERTY INTEREST

The government may not prevent an individual from working in his chosen profession without providing him notice and an opportunity to request a hearing, see, e.g., *Orr v. Trinter*, 444 F.2d 128 (6th Cir.), cert. denied, 408 U.S. 943 (1971), although there is no hearing requirement where the only thing at stake is a specific job with no claim of entitlement. See *Cafeteria and Restaurant Workers Union v. McElroy*, 367 U.S. 886 (1961).

ENERGY REORGANIZATION ACT: EMPLOYEE PROTECTION

The Energy Reorganization Act of 1974 (42 U.S.C. § 5851) and the Commission's regulations (10 C.F.R. § 50.7) protect employees from discrimination for raising health and safety issues.

MEMORANDUM AND ORDER

Introduction

The Commission on September 11, 1984, took review of the following issues: (1) whether further hearings are warranted on the three issues which the Appeal Board in ALAB-772, 19 NRC 1193 (1984), remanded to the Licensing Board;¹ (2) whether the Appeal Board in ALAB-772 had the legal authority to require as a condition of restart that Charles Husted, who was not a party to the proceeding, "have no supervisory responsibilities insofar as the training of non-licensed personnel is concerned" (*id.* at 1224); (3) whether in light of recent developments the record still needs to be reopened to consider leak rate falsifications at Three Mile Island, Unit 2 (TMI-2) (the "Hartman allegations"), as directed by the Appeal Board in ALAB-738, 18 NRC 177 (1983), and, if not, whether there should be a hearing on the Hartman allegations separate from the restart proceeding in order to allow the matter to be fully aired;² and (4) whether any of the information addressed in NUREG-0680, Supp. No. 5, "An Evaluation of the Licensee's Management Integrity as It Affects Restart of Three Mile Island Nuclear Station Unit 1, Docket 50-289" (July 1984) ("Supp. No. 5"), requires further reopening of the record. CLI-84-18, 20 NRC 808.

The Commission specified that the parties should apply the traditional standards for reopening a record in commenting on whether any new information requires reopening.³ The Commission also directed the parties, if they believed further hearings were required, to address what the scope of those hearings should be, and to "designate the specified disputed issues of fact material to a restart decision by the Commission on which further evidence must be produced and . . . provide their most

¹ Those three issues were the adequacy of Licensee's training program, the truthfulness of a May 9, 1979 telegram that Herman Dieckamp, General Public Utilities (GPU) President, sent to Congressman Udall, and leak rate test practices at Three Mile Island, Unit 1 (TMI-1).

² The falsifications at TMI-2 occurred when Metropolitan Edison Company (Met. Ed.) operated the TMI facility. As a result of a corporate reorganization subsequent to the accident, General Public Utilities Nuclear Corp. replaced Met. Ed. as licensee. Hence both companies will be referenced in the discussion of the Hartman allegations.

³ The traditional standards for reopening a record to consider new information are: (1) Is the motion timely; (2) does it address significant safety (or environmental) issues; and (3) might a different result have been reached had the newly proffered material been considered initially. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-598, 11 NRC 876, 879 (1980).

UCS asserted that the traditional standards for reopening did not apply where the Appeal Board reopened because of an inadequate record. The Commission agrees, and, accordingly, in CLI-84-18 directed the parties to apply the traditional standards for reopening only on new information.

substantial factual and technical bases for their position on each such issue." *Id.* at 809.⁴

The Commonwealth of Pennsylvania, the Union of Concerned Scientists (UCS), Three Mile Island Alert (TMIA), the Aamodts, General Public Utilities Nuclear (Licensee or GPUN), and the NRC Staff submitted briefs in response to the Commission's order. The Commonwealth, UCS, TMIA and the Aamodts argued that further hearings were required on specific matters.⁵ The NRC Staff maintained that no further hearings were required, although "it may be in the public interest for the Commission, as a matter of discretion, to allow the Licensing Board to conduct a hearing on the training issue which was remanded by the Appeal Board in ALAB-772. . . ." Licensee opposed any further hearings.

Before discussing the merits of the issues, some mention of the quality of the parties' responses is in order. The NRC Staff ignored questions specifically put to it in the Commission's order. Of the intervenors, only UCS made any attempt to comply both with the Commission's order to apply the traditional standard for reopening and to specify the disputed issues of material fact warranting a hearing.⁶ The comments filed by the Commonwealth and the Aamodts were so deficient in this regard that they were of little value to the Commission. TMIA set out its view of the facts (largely through incorporating its October 1, 1984 petition under 10 C.F.R. § 2.206) without any discussion of whether the standards for reopening had been met, thus eliminating in large part the usefulness of its comments.

The Commission will not tolerate such clear disregard for its orders in the future. The Commission will take appropriate action should the Staff again engage in such flagrant disregard of its responsibilities to the

⁴ The Commission also finds the UCS arguments that the Commission improperly took review and imposed an improper standard on the parties to be without merit. Clearly the Commission has the authority to decide the issues to be adjudicated in this special proceeding. Just as clearly the Commission can require the parties to put forward their best case in order to justify further hearings. This does not amount, as UCS claims, to an adjudication on the merits, but rather to an attempt fairly to judge whether further hearings should be held.

⁵ TMIA also argued that "the premise behind the Commission order is fundamentally in error" [sic], because "these issues can not [sic] be compartmentalized into discrete items as the Commission order presumes." TMIA Comments at 1, 2. The Commission disagrees with TMIA's assertion. Whether there was one or many past improper acts, the issue today is whether adequate remedial steps have been taken to provide reasonable assurance that the plant can be operated safely. Any improper acts would need to be considered in the aggregate only if they still posed a current significant safety concern.

⁶ However, a response to two UCS comments is in order. UCS asserted in its filing that the Commission has ignored earlier filings by the parties, and that the Commission had earlier determined that management integrity issues can be separated from a restart decision. Both assertions are erroneous. The Commission has considered each set of comments as they are filed. The only Commission decision on management integrity was that certain investigations did not have to be completed prior to a restart decision because they did not raise significant enough concerns to warrant delaying a decision. The Commission has never stated that the issue of management integrity can be separated from a restart decision.

Commission. With regard to the other parties, nonresponsive pleadings may be rejected, and parties which consistently ignore Commission directives may be found to be in default. *Statement of Policy on Conduct of Licensing Proceedings*, CLI-81-8, 13 NRC 452, 454 (1981).

Summary and Conclusion

With regard to the merits of the issues before it, the evidentiary hearings on the training and Dieckamp mailgram issues have been completed, and the Licensing Board should issue its decisions on those issues. After considering the other issues raised by the parties, the Commission finds that no further hearings are warranted in the restart proceeding. However, the Commission has decided to institute a new proceeding to consider what action to take concerning those individuals possibly involved in the TMI-2 leak rate falsifications, except for those individuals who were identified as not involved by the statement of the United States Attorney at the sentencing hearing of Metropolitan Edison Company, or those already reviewed and found not to be implicated by the NRC's Office of Investigations (OI) in its TMI-1 leak rate investigation. In addition, the Commission has decided that Husted should be given an opportunity to request a hearing on the Appeal Board's condition regarding his employment.

The Commission will discuss below whether each individual issue raised warrants reopening. Before turning to the issues before it, however, the Commission wishes to note at the outset that in this Order it is expressing no view on whether the reopened proceedings must be completed prior to a decision whether to lift the immediate effectiveness of the 1979 shutdown orders. The Commission will be addressing this issue separately in the immediate future.

I. TRAINING AND DIECKAMP MAILGRAM ISSUES

A. Background

The Appeal Board in ALAB-772 found the evidentiary record inadequate in two areas. The first concerned the adequacy of Licensee's licensed operator training program. The Appeal Board found that the Licensing Board in its Third Partial Initial Decision failed to give adequate consideration to the effect of the so-called "cheating incidents" on the Licensing Board's earlier favorable conclusions regarding Licensee's training program. The Appeal Board, noting its view that the generally

positive testimony given by the Operator Accelerated Retraining Program (OARP) Review Committee and Licensee's other independent consultants "was of decisional significance to the Board's initial, equally positive judgment on licensee's training program," remanded to the Licensing Board to hear from the OARP Review Committee again, this time taking into account the impact of the cheating incidents. The Appeal Board noted that by requiring additional hearings it was "further prolonging a proceeding that appears to have no end." The Appeal Board found, however, that a further hearing was required in order to "decide the pivotal issue of the adequacy of training at TMI-1 . . ." 19 NRC at 1236-37.

The second remanded issue involved a May 9, 1979 mailgram from Herman Dieckamp, GPU President, to Congressman Udall and to Commissioner Gilinsky. The mailgram stated "there is no evidence that anyone interpreted the 'Pressure Spike' and the spray initiation in terms of reactor core damage at the time of the spike nor that anyone withheld any information."⁷ There are conflicting statements as to how several employees interpreted the spike at the time it occurred, and Licensee did not report the spike until a day or two after it occurred.

Although no party pursued this matter, the Appeal Board held that the Licensing Board, which had decided not to pursue the matter beyond relying on Staff's investigation, should have pursued the matter on its own. The Appeal Board found that Dieckamp "is still a high level 'presence' at GPU Nuclear," and that it is important not to leave this matter "dangling." 19 NRC at 1267-68.

B. Parties' Comments

The Commonwealth, TMIA, UCS and the Aamodts all argued that the record should be reopened on the adequacy of Licensee's operator training program. TMIA also argued that hearings are warranted on the Dieckamp mailgram issue. Licensee opposed hearings on both issues. The NRC Staff maintained that hearings are not required on either issue, but it might be in the public interest for the Commission, as a matter of discretion, to allow the Licensing Board to conduct a hearing on the training issue.

⁷ The "pressure spike" refers to the sudden increase in containment pressure during the accident from about 3 to 28 psig, followed by a rapid decrease to 4 psig. The spike was due to the burning or explosion of hydrogen, which can be symptomatic of core damage.

C. Analysis

The restart proceeding, which is being held in response to the TMI-2 accident, is perhaps unique in the degree to which it has examined Licensee's fitness, and in the degree of public interest in its outcome. More importantly, the evidentiary hearings on these two issues have been completed, and the parties are currently preparing proposed findings of fact and conclusions of law.

The Commission has determined that it will as a matter of policy allow the Licensing Board to render a decision on these two issues. The training issue is one of the central issues in the proceeding, and the Commission believes that the matters raised by the Appeal Board concerning the adequacy of the training program should be addressed by the Licensing Board. With regard to the Dieckamp mailgram, Dieckamp retains a high-level position within Licensee's parent organization, and the Commission has decided that any lingering questions on this issue also should be addressed by the Licensing Board.

The Commission emphasizes, however, that its decision is based on public policy considerations, including the public policy value in having these issues ventilated in a forum accessible to the public and the fact that the evidentiary hearings on these two issues have been completed. The Commission accordingly need not decide whether these hearings are legally required.

Finally, the Commission notes with approval the Licensing Board's decision to complete the hearings on the training and Dieckamp mailgram issues before beginning formal discovery on leak rate falsification issues. The Commission, finding that the training issue is more significant than the mailgram issue, directs the Board to give priority attention to the training issue, and to issue a decision on the training issue first, if working on the mailgram issue would delay issuance of the training decision. If the Board is able to give the Commission its ultimate conclusion on the training issue and the essence of its supporting rationale at any appreciable time (e.g., a week or more) before its complete partial initial decision on the issue, the Commission requests the Board to do so.

II. TMI-2 LEAK RATE TESTING PRACTICES

A. Background

Harold Hartman, a control room operator at TMI-2 prior to the accident, alleged that leak rate tests, which were used to assess whether primary system leakage surpassed technical specification limits, were purposely manipulated and records of such tests falsified or destroyed at

TMI-2 prior to the accident to cover up the fact that over an extended period of time the results of the tests exceeded technical specification limits.⁸ Hartman specifically alleged that shift supervision was aware of such improper conduct.⁹ After a preliminary investigation into these allegations, the NRC in April 1980 referred the matter to the Department of Justice (DOJ) for criminal investigation and halted its own investigation.

The only evidence relating to the Hartman allegations which was provided to the Licensing Board was contained in two supplementary safety evaluation reports prepared by the NRC Staff. Both referenced the Hartman allegations, noting that DOJ was investigating the matter and that the NRC inquiry had been suspended.¹⁰

The Licensing Board in its First Partial Initial Decision, covering the management issues, noted the limited information on the matter, and stated that “[s]ubject to [the DOJ investigation] . . . we find no deficiencies in the corporate or plant management . . . that have not been corrected and which must be corrected before there is reasonable assurance that Unit 1 can be operated safely.” LBP-81-32, 14 NRC 381, 557 (1981).

After Hartman testified in the *GPU v. Babcock and Wilcox (B&W)* litigation,¹¹ the Aamodts and TMIA requested the Appeal Board to reopen the record on the Hartman allegations. In ALAB-738 the Appeal Board ordered the record reopened and referred the allegations to the Licensing Board for further hearings. 18 NRC 177 (1983). The Appeal Board,

⁸ The technical specifications at TMI-1 and -2 establish a maximum rate of 1 gallon per minute (gpm) for unidentified leakage from the reactor coolant system. Tests to measure leakage must be taken at set intervals and, if the specified rate is exceeded and cannot be limited within 4 hours, the plant must be shut down.

⁹ Hartman alleged other violations of regulatory requirements besides TMI-2 leak rate falsification. For instance, he alleged that during a startup a rate inhibit alarm was received, but the Shift Supervisor directed actions in violation of procedures. He also alleged, among other things, that a request to shut down TMI-2 for reactor coolant system leakage repairs was denied. These matters were not addressed by the Appeal Board in ALAB-738. See note 16, *infra*.

¹⁰ NUREG-0680, Supp. No. 1, stated that the allegations regarding falsification of leak rate data at TMI-2 were being investigated by the Justice Department, and that “[t]he allegations raised concerns regarding the principles of compliance with operating procedures and management philosophy and actions. . . . We can draw no conclusion on this item pending the completion of the . . . investigation[.]” Supp. No. 2 stated “completion of the investigation could turn up information which is related to past management practices,” and that the NRC would resume its investigation after DOJ completed its investigation. Supp. No. 2 concluded that “on the basis of information thus far obtained . . . there appears to be no direct connection with the Unit 2 accident.”

¹¹ GPU sued B&W in the United States District Court for the Southern District of New York (80 Civ. 1683(RO)), claiming that B&W should be held liable for causing the TMI-2 accident. That lawsuit was settled after nearly 3 months of trial. Much of the information developed in that trial appeared to relate to Licensee’s management competence and integrity, and hence appeared relevant to the restart proceeding. Accordingly, the Commission directed the NRC Staff to review the trial material, and provided the parties to the restart proceeding an opportunity to comment both on the material and on Staff’s review, NUREG-1020, “*GPU v. B&W* Lawsuit Review and Its Effect on TMI-1” (September 1983).

noting that the matter had lain dormant until revived by an examination by the *B&W* trial record, held that the Hartman allegations raised significant safety issues. The Appeal Board stated that alleged violations of technical specifications, noncompliance with proper operating procedures, and destruction and falsification of records at Unit 2 before the TMI-2 accident — all assertedly under the auspices of at least first-level management — had serious implications for any proposed restart of Unit 1. The Appeal Board also noted that the Hartman allegations fell within the scope of issues that the Commission directed be resolved through the hearing process, and that it could not make a final judgment on Licensee's management competence and integrity without developing a record on the Hartman allegations.¹²

In response to various then-unresolved issues, including the Hartman allegations, Licensee on June 10, 1983, committed to several organizational changes. Licensee committed to reassign personnel, with the exception of the Manager of Operations, Michael Ross, such that no individual licensed to operate TMI-2 prior to the accident would work in an operational position at TMI-1. Licensee also committed to place degreed engineers on shift to provide operational quality assurance coverage on a full-time basis until the open issues were resolved. Further, Licensee stated that until the open issues were effectively resolved, it would reassign personnel "such that those functions which provide an overview assessment, analysis, or audit of plant activities . . . will contain only personnel with no pre-accident involvement as exempt Met Ed employees at TMI-1 or 2." Finally, Licensee committed to reallocate the priorities and assignments within the Office of the President of GPU Nuclear.

On October 7, 1983, the Commission took review of whether the hearing on the Hartman allegations should be stayed until the Commission's Office of Investigations (OI) had completed an investigation it had recently started on the Hartman allegations. To preserve the status quo, the Commission stayed the Appeal Board decision pending receipt and consideration of the parties' comments. (Unpublished Order of October 7, 1983.) At the time it issued the order the Commission was concerned that concurrent efforts by OI and the Licensing Board on the Hartman allegations could involve a duplication of effort and constitute a possible source of complaint of harassment of witnesses.

After the Commission stayed the hearing, DOJ asked the Commission to stay further agency activity related to the Hartman allegations until

¹² Among the matters the Commission directed the Licensing Board to examine was "whether the actions of Metropolitan Edison's corporate or plant management (or any part or individual member thereof) in connection with the accident at Unit 2 reveal deficiencies in the corporate or plant management that must be corrected before Unit 1 can be operated safely." CLI-80-5, 11 NRC 408, 409 (1980).

the then-pending criminal trial, *United States v. Metropolitan Edison Co.*, Crim. No. 83-00188 (M.D. Pa.), which involved the leak rate practices at TMI-2, had been completed. The Commission agreed to cooperate with the Department of Justice and suspended the OI investigation.

The Commission held an open meeting on November 28, 1983, to hear from GPU on its June 10, 1983 management organization proposal and any subsequent changes.¹³ GPU in its presentation stated that its June 10, 1983 plan had been implemented, and also committed to the following further steps. First, GPU would elect three outside directors "with meaningful credentials and demonstrated independence" to the GPU Nuclear Board of Directors. Second, these new directors would comprise a Nuclear Safety and Compliance Committee of the GPU Nuclear Board, which would employ a staff to monitor the operation and maintenance of the GPU system nuclear units.¹⁴ Third, the Nuclear Safety and Compliance Committee would periodically issue reports regarding the operation and maintenance of the GPU system nuclear units, and those reports would promptly be provided to the NRC and the public. Fourth, Robert Arnold, who had been President of GPU Nuclear, was reassigned to nonnuclear work within the GPU system. Philip Clark, formerly Executive Vice President, replaced Arnold as President of GPU Nuclear, while E.E. Kintner, formerly Vice President, became Executive Vice President. Both Clark and Kintner were elected members of the Board of GPU Nuclear.¹⁵

Subsequently, on February 6, 1984, GPU Nuclear announced further changes to its organization. John F. O'Leary, former Deputy Secretary of the Energy Department and GPU Board member since October 1979, was elected Chairman of GPU Nuclear. Clark, President and Chief Operating Officer of GPU Nuclear, was also appointed Chief Executive Officer. Herman Dieckamp, former Chairman and Chief Executive Officer of GPU Nuclear since its inception, remained only as a Director of GPU Nuclear, although he continued to hold the position of President, Chief Operating Officer, and a Director of GPU.

Metropolitan Edison Company ("Met. Ed.") entered into a plea agreement on February 29, 1984, with the United States which ended the

¹³ This meeting was held as part of the Commission's review of whether to lift the immediate effectiveness of the 1979 Orders which require that TMI-1 remain in a shutdown condition.

¹⁴ Licensee notified the Commission on March 15, 1984, that Messrs. Lawrence L. Humphreys (Chief Executive Officer of UNC Nuclear Industries), Warren F. Witzig (Chairman, Nuclear Engineering Department, Pennsylvania State University), and Robert V. Laney (consultant in nuclear and energy project management) had been elected to the GPU Nuclear Board of Directors, and that they would make up the Nuclear Safety and Compliance Committee.

¹⁵ The Commission heard oral presentations by the other parties on December 5, 1983, on GPU's proposal.

criminal prosecution. Met. Ed. pleaded guilty to one count of the indictment charging it with failure to establish, implement, and maintain an accurate and meaningful reactor coolant system water inventory balance procedure to demonstrate that unidentified leakage was within the allowable limits. It also pleaded no contest to six other counts of the indictment, including those which charged the company with improper manipulation of TMI-2 leak rate tests to generate results that would fulfill the company's license requirements.

After the settlement, the Commission asked the federal district court to provide the Commission with the record of the Grand Jury proceeding which led to the indictment of Metropolitan Edison. The court denied the request. *United States v. Metropolitan Edison Co.*, Crim. No. 83-00188 (M.D. Pa., June 25, 1984).

On September 11, 1984, the Commission issued an order lifting the stay of the hearing. CLI-84-17, 20 NRC 801. Simultaneously, the Commission sought the views of the parties on whether in light of changed circumstances the record still needed to be reopened on the Hartman allegations and, if so, what the scope of the hearing should be. CLI-84-18, *supra*.

B. Parties' Comments

The Commonwealth, TMIA, and UCS urged the Commission to allow the hearings on TMI-2 leak rate practices to be held, while the NRC Staff and the Licensee opposed those hearings.

The Commonwealth argued that even though the Hartman allegations resulted in the criminal conviction of the Licensee, further hearings are warranted because information on past TMI-2 leak rate practices has not been fully disclosed to the public. The Commonwealth asserted that without further inquiry it is unable to conclude that no one currently within TMI-1 management had knowledge of the leak rate falsifications, and that the question of who within the GPU organization had knowledge of or participated in the falsification of TMI-2 leak rate tests should be resolved prior to TMI-1 restart.

TMIA agreed with the reasons for hearings provided by the Appeal Board in ALAB-738. TMIA also relied extensively on statements made by the U.S. Attorney for the Middle District of Pennsylvania in recommending that the court accept the plea bargaining arrangement reached between the United States and Metropolitan Edison. For example, the U.S. Attorney told the court that he was prepared to introduce evidence that Metropolitan Edison had engaged in the practice of falsifying data

and discarding records in order to stay within the leak rate specifications required under its NRC license.

TMIA argued that, ever since the Hartman allegations surfaced, GPU has provided dishonest responses regarding the matter and that high-level officials such as William Kuhns, Chairman of the Board of GPU, Herman Dieckamp, President of General Public Utilities (GPU), Philip Clark, President of GPU Nuclear (GPUN), and E.E. Kintner, Executive Vice-President of GPU Nuclear, and the Board of Directors are directly responsible for providing less than candid responses. TMIA claimed that Licensee continues to deny and cover up the facts associated with the falsification scheme, noting that Licensee, even though it pled guilty, told the court that it did not admit any facts which would support a finding of guilt. Accordingly, TMIA believed that the record should be reopened so that management responsibility for the data falsification and the alleged continuing coverup can be examined.

UCS argued that the systematic, widespread and long-standing falsification of leak rate tests at Unit 2, undertaken to allow the plant to operate when it should have been shut down for safety reasons, is a grave indictment of the integrity and competence of the Licensee and constitutes sufficient reason for precluding restart. UCS maintained that GPUN bears continuing responsibility for these acts.

Like TMIA, UCS believed that GPUN is engaged in a continuing coverup regarding the matter. UCS stated that GPUN's effort both before and since the guilty plea has been to disassociate itself from the TMI-2 leak rate falsification by reassigning potentially involved individuals, and that this reshuffling is a sham. UCS stated that Unit 2 operators with clear potential direct involvement in leak rate falsification have been placed in responsible positions important to safety at TMI-1.

UCS stated that GPUN continues to deny that leak rate falsification took place, and to date has taken no disciplinary action against any person involved in or responsible for leak rate falsification. UCS asserted that GPUN is now just beginning a thorough investigation into the Hartman allegations, and that GPUN will seek to use every possible avenue to minimize the problems and to deny rather than correct them.

The Aamodts stated that the Commission cannot rely on OI's investigations and Staff's findings. The Aamodts claimed that the NRC Staff's judgment cannot be relied on because Staff kept the Hartman allegations out of the restart proceeding. The Aamodts expressed concern about a conclusion in OI's report on TMI-1 leak rate practices that Michael Ross, Manager of Plant Operations at TMI-1, did not have any knowledge of leak rate falsification at Unit 2 because he was only on duty a few hours each month. They believed that the OI conclusion on Ross

was unreasonable. They stated that Ross testified in the restart proceeding that he had frequent interchanges with TMI-2 operators and that he was in daily contact with the manager of TMI-2. Therefore, the Aamodts concluded, he must have had knowledge of leak rate practices at TMI-2.

Licensee, on the other hand, saw no need for hearings. Licensee stated there needs to be resolution of the Hartman allegations because the lack of such resolution prevents it from making full use of individuals associated with leak rate testing at TMI-2. It argued, however, that any further investigations and public proceedings which may grow out of the need to develop the facts should not be done in the context of the TMI-1 restart proceeding.

Licensee noted that it and the NRC were investigating leak rate testing practices at TMI-2, and that the investigations will provide an adequate basis for resolving the status of the separated individuals. Licensee also argued that any hearings should be separate from the restart proceeding because, pending the outcome of these investigations, Licensee has agreed that, except for Ross, who has been cleared of involvement in the leak rate falsifications by the NRC investigators and the NRC Staff, no individual licensed to operate TMI-2 prior to the accident would operate TMI-1.

Licensee quoted the U.S. Attorney's statement in support of the plea bargaining agreement in the criminal proceeding that its senior management had not been found by the U.S. Attorney to have participated in, directed, condoned or been aware of the facts or omissions that were the subject of the indictment. Licensee argued that in the absence of any involvement with the Hartman allegations by current TMI-1 management, there is no need to reopen the restart hearings on the Hartman allegations.

With respect to the arguments made by TMIA and UCS that Licensee has not admitted that TMI-2 leak rate tests were falsified, Licensee stated that it has not had the basis to admit or deny the allegations of leak rate falsification because investigation of these allegations has not been completed. Licensee asserted that during the pendency of the criminal case it was unable to interview those individuals involved in leak rate testing at TMI-2. Licensee stressed that as soon as the criminal case was completed it engaged Edwin Stier to conduct an independent investigation of leak rate practices. Licensee asserted that once the facts have been gathered, Licensee and others will be in a position to conclude whether leak rate falsification occurred at TMI-2.

With respect to UCS' allegations that no disciplinary action has been taken against persons involved in or responsible for leak rate falsification, Licensee argued that it is unreasonable to expect Licensee to take

any action before the full facts have been developed and before the affected individuals have been given the right to respond and confront individuals speaking against them.

The NRC Staff in concluding that hearings are not warranted relied heavily on the statements by the U.S. Attorney at the sentencing hearing. Staff believed, based on the statements by the U.S. Attorney, that first-line supervision and possibly middle management were directly involved in leak rate falsification at TMI-2, but that there is no indication that any of the directors or officers of GPUN from the time of its organization in 1982 to the date of the indictment, or any of the directors of Met. Ed. during the period covered by the indictment, participated in, directed, condoned, or were aware of the facts that led to the indictment.

In addition, Staff asserted that individual operators licensed at TMI-2 prior to the accident who might have been involved in or implicated in leak rate falsification at TMI-2 are not currently involved in TMI-1 operations. Staff excepted Michael Ross from this category. Staff, based on the available evidence, concluded that Ross had not engaged in any wrongdoing.

Staff concluded that although the Hartman allegations raised significant safety issues and, if considered, might well have led the Licensing Board to reach a different result with regard to the adequacy of previous TMI-1 staffing, "the individuals possibly involved in culpable activities are no longer associated with TMI-1 operations." Staff Comments at 18. Therefore, in the Staff's view there is no remaining significant safety issue regarding TMI-1 which would warrant a hearing on TMI-2 leak rate practices as part of the TMI-1 restart proceeding.

C. Analysis

The leak rate falsifications at TMI-2 clearly have a significant bearing on any evaluation of Met. Ed.'s pre-accident performance. However, the issue before the Commission today is whether, in view of the changes in Licensee's personnel, organizational structure, and procedures, the TMI-2 leak rate falsifications still meet the standards for reopening the restart proceeding, i.e., whether they currently raise a significant safety issue which might have affected the Licensing Board's decision. This determination cannot be based solely on an examination of the extent of pre-accident wrongdoing and the fact that the Licensing Board made its original management decision subject to the Hartman allegations (the factors addressed by the Appeal Board), but must also consider undisputed events in the past 5 years which bear on whether the prior significance

of the falsifications has now been eliminated, and whether any significant safety issues still remain.¹⁶

To determine whether the Hartman allegations still raise a significant safety issue, the Commission must first consider whether the personnel likely responsible for the falsifications under Met. Ed. are now in responsible management positions at GPU Nuclear or directly associated with the operation of TMI-1.¹⁷ If the personnel are still the same, then there is merit to the argument that there has been a change only in name, not in substance, and the integrity concerns raised by the Hartman allegations remain significant. However, if the persons likely responsible for or involved in the TMI-2 leak rate falsifications are not assigned to responsible management or operational positions at TMI-1, then the Hartman allegations no longer raise concerns about the integrity of those who will operate TMI-1. In that event, however, the Commission further should consider whether the new personnel, organizational structure, and procedures provide reasonable assurance that similar procedural violations will not recur.

1. Whether the Personnel Likely Responsible for the Falsifications Under Met. Ed. Are Also in Responsible Management Positions at GPU Nuclear or Directly Associated with the Operation of TMI-1

There have been significant changes in Licensee's personnel since 1979, including many since the record originally closed in 1981. Metropolitan Edison Co. has been replaced by GPU Nuclear as the licensee at TMI-1, and GPU Nuclear has a new chairman and revised Board of Directors, a new Nuclear Safety and Compliance Committee, a new President, Executive Vice President, Vice President of TMI-1, Chairman of the General Operations Review Board, and numerous other lower-level managers.¹⁸ In addition, until the Hartman matter is resolved Licensee

¹⁶ TMIA appears to argue that some of Hartman's other allegations warrant reopening. See note 9, *supra*. Those issues, which were fully explored in NUREG-0680, Supp. No. 5, even if true do not raise current significant safety concerns because they primarily relate to pre-accident procedures and individuals no longer employed in operational positions at TMI-1.

¹⁷ The Commission does not believe that individuals in other positions, even if implicated in the Hartman allegations, pose a risk to the safe operation of the plant. The present system of checks and balances and procedural safeguards ensures that no individual in other positions can adversely affect the plant's operation. See discussion, *infra*.

¹⁸ Philip Clark, GPU Nuclear President, informed the Commission during oral presentations on August 15, 1984, that of the twelve senior GPU Nuclear employees, eight had joined the GPU system after the TMI-2 accident, and three of the remaining four had no involvement with Met. Ed. Of 435 key personnel (including managers, technical/professional and licensed operators), 235 joined GPU after the accident and another 100 had been employed within the GPU system prior to the accident, but not with Met. Ed.

has committed not to return any individuals (except Michael Ross) licensed to operate TMI-2 prior to the accident to operational positions at TMI-1.¹⁹

With these changes in mind, the Commission has reviewed all operators and supervisors licensed at TMI-2 prior to the accident, and those managers in the line of command over operations up to the level of Vice-President of Generation,²⁰ to identify those likely to have had knowledge of or involvement in the leak rate practices prior to the accident, and hence who may have condoned or participated in the falsifications. Of these individuals, only two are currently employed in responsible management positions at TMI-1, and only one, Michael Ross, remains in an operational position. The other is Brian Mehler, manager of the Radwaste Department. In addition, the Commission has considered the impact of the continued presence of William Kuhns, Chairman of GPU, and Herman Dieckamp, formerly Chairman and Chief Executive Officer of GPU Nuclear and still President, Chief Operating Officer and a Director of GPU, and a member of the Board of GPU Nuclear.

Michael Ross, the Manager of Operations at TMI-1, is clearly in a significant safety position. Indeed, the Licensing Board observed that it was "pleased to have the opportunity to observe Mr. Ross so thoroughly, because he may be the most important person on the TMI-1 operating team as far as the public health and safety is concerned." LBP-81-32, *supra*, 14 NRC at 439.²¹ Recognizing Ross' significance, the Commission directed OI to examine his involvement at TMI-2 when it investigated pre-accident leak rate practices at TMI-1.

OI in its investigation interviewed Ross and many others under oath regarding his involvement at Unit 2, and reviewed records of his activities at TMI-2. Those interviewed by OI included shift supervisors who were licensed on both TMI-1 and -2 prior to the accident, the pre-accident TMI-2 Supervisor of Operations, previous TMI-1 Plant Superintendents, a former TMI-1 and TMI-2 Shift Foreman, and engineering personnel. The evidence developed by OI showed that Ross' role at TMI-2 was minimal, that during the period falsifications took place he

¹⁹ The Commission does not rely on two other commitments by Licensee — to reassign exempt employees and provide round-the-clock quality assurance coverage by degreed engineers — in its analysis of the Hartman allegations. With regard to Licensee's fourth commitment — to expand its Board of Directors and create a Nuclear Safety and Compliance Committee — the Commission *infra* makes the commitment a condition.

²⁰ The Vice-President of Generation is the highest position possibly implicated by the U.S. Attorney's statement at the sentencing hearing. See NUREG-0680, Supp. No. 5, at 5-6.

²¹ The Licensing Board went on to note its belief that Licensee's reliance on Ross was justified, and that the Board "was very favorably impressed by his appearances." 14 NRC at 440. Later allegations that Ross was involved in the cheating incidents were determined to be unfounded. LBP-82-56, 16 NRC 281, 333, *aff'd*, ALAB-772, 19 NRC 1193 (1984).

was present at TMI-2 only the minimum time necessary to maintain his Unit 2 license,²² and that he was not involved in the falsifications:

During these interviews, particular emphasis was placed on determining if the current TMI-1 Operations Supervisor (Michael Ross) was either aware of or involved in the falsification of leak rate surveillance tests at TMI-2. None of these interviewees, though, either alleged or implicated Ross in any improprieties at TMI-2 or TMI-1. Additionally, they supported earlier testimony given by Ross to the NRC that he had only minimal involvement in TMI-2 operations.

OI Supplemental Report 1-83-028 at 2.

Hence the only evidence even possibly linking Ross with TMI-2 leak rate falsifications is that he was cross-licensed on TMI-2, and therefore he could be presumed to have had some knowledge of TMI-2 activities. In view of OI's conclusions, the Commission finds that the mere fact that Ross was cross-licensed does not indicate that he was aware of the falsifications. The Commission concludes that it is highly unlikely that Ross knew of or was involved in leak rate falsifications at TMI-2, and that his continued presence at TMI-1 does not raise a safety concern.

There is a greater likelihood that Mehler, who was a shift supervisor at TMI-2 prior to the accident, had knowledge of or was involved in the falsifications. However, the relevant evidence is circumstantial rather than direct,²³ and, in any event, Mehler is now employed in the radwaste department, and therefore has no direct involvement in operating the reactor. The Commission has decided based on available information that, given the lesser safety significance of his present position, no further action regarding Mehler is necessary for TMI-1 to be operated safely, because retaining him in his present position does not pose a significant risk to public health and safety, at least for the time before the separate hearings on this issue can be completed.

Even though these are the only two individuals of concern currently in management or operational positions at TMI-1, the Commission must also address the possible return of other pre-accident TMI-2 operators and their supervisors. Licensee has committed not to return individuals licensed at TMI-2 prior to the accident to operational positions at TMI-1.

²² See, e.g., OI Supplemental Report 1-83-028, Exh. 1 at 25; Exh. 2 at 23-24; Exh. 7 at 6-7, 17; Exh. 8 at 45; Exh. 9 at 21; Exh. 12 at 26.

²³ The Commission agrees with Staff's statement in NUREG-0680, Supp. No. 5, that there is no direct evidence of improper acts by Mehler. However, the evidence indicates that falsifications were so widespread that, for purposes of this decision, the Commission will presume that all regular TMI-2 operators and shift supervisors might have known of the falsifications. (Ross was not a regular TMI-2 shift supervisor.)

The Commission has decided to modify Licensee's commitment somewhat to provide added assurance that none of those likely involved in the TMI-2 falsifications, or who had direct management supervision over operations, occupy responsible management or operational positions at TMI-1 without specific Commission approval. To accomplish this, the Commission will require that no pre-accident TMI-2 operator, shift supervisor, shift foreman, or any other individual both in the operating crew and on shift for training as a licensed operator at TMI-2 prior to the accident be employed at TMI-1 in a responsible management or operational position without specific Commission approval. "Operational position" as used in this condition includes any position involving actual operation of the plant, the direction or supervision of operations, or independent oversight of operations. This condition shall also apply to the pre-accident Vice President, Generation, TMI-2 Station Manager, TMI-2 Supervisor of Technical Support (from January 1977 to November 1978), TMI-2 Superintendent of Technical Support (from December 1978 to the accident), and TMI-2 Supervisor of Operations, all of whom were implicated by the United States Attorney in his Statement of Facts at the sentencing hearing. See NUREG-0680, Supp. No. 5, at 5-4.²⁴ However, as explained *supra*, this condition shall not apply to Ross, and the Commission has determined consistent with this condition that Mehler may continue in his present position. However, Mehler may not be transferred to another position covered by this condition without prior Commission approval. As explained *infra*, the Commission will institute a separate proceeding which will address the status of any individual currently employed at or wishing to return to a licensed nuclear power facility in an operational or responsible management position. The condition imposed above will remain in effect until that hearing has been completed.

The Commission has also considered GPU Nuclear's upper management, of which only William Kuhns and Herman Dieckamp possibly could be held accountable for the criminal acts at TMI-2. There is currently no direct evidence that either Kuhns or Dieckamp knew of, condoned, or was involved in leak rate falsifications at TMI-2. In the Change of Plea and Sentencing of Metropolitan Edison on February 28, 1984, United States Attorney David Queen stated that the evidence developed in the Grand Jury inquiry does not indicate that any of the

²⁴ The Commission notes that the NRC Staff in NUREG-0680, Supp. No. 5, stated that certain specified individuals (Zewe and Seelinger) could not be returned to responsible management positions without Staff approval solely because of their possible involvement in TMI-2 leak rate falsifications. The Commission finds that these individuals should be treated the same as others who were in equivalent positions. Accordingly, their employ is limited only by the above-imposed condition.

Directors and Officers of GPU Nuclear from its inception in 1982 to the date of the indictment, or any of the Directors of Met. Ed., "participated in, directed, condoned or was aware of the acts or omissions that are the subject of the indictment." Queen specifically included Kuhns and Dieckamp in this category. The Commission recognizes that neither it nor the public has access to the information before the Grand Jury which led to this statement. However, the Commission believes it is justified in relying on a good-faith statement by the U.S. Attorney to the court.

Moreover, the Commission does not believe that executive managers at their level ordinarily are involved in daily plant operations to the extent that they would be familiar with the details of how normal surveillance procedures are carried out, nor does the Commission believe they should be. *Cf.* Dieckamp testimony in mailgram hearing at 28,615 ("I was not knowledgeable about specific plant systems and their detailed purpose or the procedures for operating"). We believe the positions of Messrs. Kuhns and Dieckamp are so far removed from actual operations that it would be highly unlikely that either knew of the leak rate practices.²⁵

The Commission has nonetheless given considerable thought to the arguments that (1) Kuhns and Dieckamp should be held responsible for the acts of those under them, whether or not they knew what was occurring, and (2) if they did not know what was occurring, they should be faulted for not knowing because of the apparent widespread nature of the falsifications. If the Commission subscribed to either theory, it could find that there should be a hearing on the Hartman allegations in the re-start proceeding.

The Commission cannot find from the available evidence that Kuhns and Dieckamp were responsible for the attitude that allowed the falsifications to occur. The Commission is concerned with the apparent extent of falsification and the attitude that allowed such acts to occur. However, the Commission places primary responsibility for that attitude on those managers in charge of day-to-day plant operation, not on Kuhns and Dieckamp.

Nor does the Commission subscribe to the view that individual executive managers and Board members such as Kuhns and Dieckamp should be held personally responsible for all acts of subordinate employees. The Commission believes that only a few high-level employees are in such

²⁵ The Commission notes in this regard that none of those interviewed by OI suggested that executives such as Kuhns or Dieckamp had any actual knowledge of leak rate practices.

positions of responsibility that their acts may be considered synonymous with those of the company, and therefore that the executive managers as part of the corporate entity should be held responsible for their acts. However, even in those cases the company or executive managers should not necessarily be censured for the improper acts, if adequate corrective actions, such as discipline or removal, are implemented. As for other employees, the Commission expects executive managers and Board members to encourage a policy of discovering any problems or improper acts and of taking appropriate corrective action. However, the Commission will not hold, purely as an abstract matter, that executives such as Kuhns and Dieckamp are completely responsible for the acts of individual employees. For such responsibility to attach, there must be some knowledge of or involvement in those acts at the executive level. The Commission has found none in the present case.

Given the apparent extent of the leak rate problems, however, the Commission does fault Kuhns and Dieckamp for not having procedures in place to bring the leak rate problems to higher management's attention. Again, there is no reason to expect or require senior executives to be involved in or directly supervise day-to-day plant operations, but they should have procedures in place so that significant problems come to their attention. The Commission finds that, if falsifications were as widespread as it appears, plant management should have been aware of it and stopped it, and senior management should have been aware of plant management's failure. However, this failure must be viewed in context with remedial steps subsequently taken. The Commission is convinced that with the current organizational structure and procedures any future such failures will be identified to senior management. See discussion, *infra*. Since there was no apparent personal involvement by Kuhns or Dieckamp in the wrongdoing, and given the remedial procedures now in place, the Commission has concluded that the continued presence of Kuhns or Dieckamp does not result in the Hartman allegations raising a current significant safety concern.²⁶

²⁶ The Commission has also considered the arguments that Licensee is engaged in a continuing coverup of the TMI-2 leak rate falsifications. Licensee states it has been unable to pursue the matter because of the Grand Jury investigation, and accordingly took no action until the criminal trial was completed. Licensee is now investigating the matter. These actions do not indicate a coverup.

2. *Whether GPU Nuclear Has Appropriate Personnel, Operational Structure, and Procedures to Assure That Such Procedural Violations Will Not Again Occur*

Clearly the leak rate falsifications demonstrate significant past procedural deficiencies. However, they are but one more example of Met. Ed.'s pre-accident failings in this area. The restart proceeding was not intended to litigate all Licensee's past failings, but rather to determine whether TMI-1 can be safely operated now. *See* discussion, *infra*, on TMI-1 leak rate practices. The Commission is satisfied that the extensive examination of GPU Nuclear in this proceeding is sufficient to ensure that the personnel, procedures, and organization currently in place provide reasonable assurance that similar procedural deficiencies will not recur.

With regard to the specific issue of leak rate tests, there are numerous daily or weekly tests, in addition to leak rate tests, which, pursuant to NRC requirements, must be run at a nuclear plant. A practical method to assure that all these tests are run correctly and honestly is through general oversight of operations by independent organizations reporting to senior management. The Commission in this connection directed the Licensing Board to examine "whether Metropolitan Edison has made adequate provision for groups of qualified individuals to provide safety review of and operational advice regarding Unit 1." CLI-80-5, *supra*, 11 NRC at 409. The Licensing Board noted that "GPU Nuclear Corporation has instituted major organizational and staffing changes in order to provide additional safety review and operational advice regarding TMI-1," and that:

GPU Nuclear Corporation's safety review and operational advice programs are designed to assure that activities are performed in accordance with company policies and applicable laws, standards, policies, rules, regulations, licenses, and technical requirements; that proposed plant, test and procedural modifications received independent review; that events, including those that require prompt reporting to the NRC, are investigated and corrected in a manner which reduces the probability of recurrence of such events; and that trends which may not be apparent on a day-to-day basis or by consideration of individual items are detected and appropriate action taken.

LBP-81-32, *supra*, 14 NRC at 519-20. The Licensing Board after examining these programs concluded that "Licensee has made adequate provisions for groups of qualified individuals to provide safety review of and operational advice regarding TMI-1." *Id.* at 528. The Commission will not repeat the details of Licensee's safety review process here, but notes its general agreement with the Licensing Board's comments.

In addition, as indicated *supra*, Licensee has expanded its Board of Directors, and created a Nuclear Safety and Compliance Committee of that Board. The Committee, which will have an independent staff of its own, is designed to monitor the operation and maintenance of the GPU System's nuclear units, with specific attention to adherence to procedures and license requirements. This will provide even further assurance that operational tests will be overseen thoroughly. To ensure that these commitments remain in place, the Commission has decided to adopt them as conditions.

GPUN's quality assurance (QA) program also acts to ensure that surveillance procedures such as leak rate tests are properly done. The Licensing Board, noting that Licensee's overall QA organization and staffing for TMI-1 "has been restructured and improved since the TMI-2 accident" (*id.* at 425) stated that the major areas of improvement were "greater involvement of the QA organization in the review and approval of quality-related aspects of procedures for operations, maintenance, inservice inspection, modifications and procurement; in the performance of inservice inspections, nondestructive examinations, routine inspections, verification, surveillance and audit activities . . ." (*id.* at 427). The Licensing Board was "satisfied that Licensee's QA organization and program will be in a position to reasonably assure, or bring to the attention of top management in those cases where it cannot assure that the organizations which make up the plant and corporate structure are performing properly the functions for which they were intended." *Id.* at 428.

Further, Licensee's basic organizational structure has been substantially improved with the creation of GPU Nuclear. The Licensing Board examined, among other things, Licensee's management structure, corporate organization, onsite organization, and technical resources, and found all to be adequate. The Commission finds that the Licensing Board's examination of Licensee in all these respects ensures that these pre-accident procedural deficiencies no longer raise a significant safety concern.

3. Summary of Current Significance of Hartman Allegations

The Commission therefore finds that the pre-accident TMI-2 leak rate falsifications do not raise a currently significant safety issue. Those likely involved in the improper acts are not employed in responsible management or operational positions at TMI-1, and as a result of the in-depth examination of Licensee in the management proceeding, the Commission has confidence that GPU Nuclear has the necessary integrity and

competence to comply with procedures. The Commission concludes that the Hartman allegations no longer raise a significant safety issue which might have affected the Licensing Board's decision, and therefore reverses the Appeal Board's decision to reopen the record on this matter.

4. Institution of a Separate Proceeding

The Commission in the order taking review of this issue also asked whether, if a hearing on the Hartman allegations were not legally required, there should be a hearing separate from the restart proceeding to allow the matter to be fully aired. The Commission has decided that some hearing is warranted in order to determine the ultimate status of those likely involved in the TMI-2 leak rate falsifications, which includes those Licensee has segregated from operational duties at TMI-1 and those now working at other nuclear facilities.

The Commission has decided that a separate proceeding would be appropriate for several reasons. As explained *supra*, the Hartman allegations do not raise a significant issue for current operation of TMI-1. Hence there remains little reason to litigate that issue within the restart proceeding. Further, the individuals likely involved are now dispersed throughout the country. The Commission believes those individuals should receive notice of this hearing and be allowed to participate. A hearing into the involvement of those who are or may be employed by other licensees clearly has no bearing on the restart of TMI-1.

Accordingly, the Commission in the near future will issue a notice of hearing instituting a separate hearing on the TMI-2 leak rate falsifications. While that notice will specify the scope of the hearing and the procedures to be followed more precisely, the Commission intends the hearing to develop the facts surrounding the falsifications in sufficient detail to determine the involvement of any individual who may now work, or in the future desire to work, at a nuclear facility; specifically, whether any such individual participated in, or knew of and condoned, or by their dereliction or culpable neglect allowed the leak rate falsifications at TMI-2, and, if so, what action is appropriate. The hearing will not address those specifically cleared by the U.S. Attorney in his statement at the sentencing hearing, which includes Kuhns and Dieckamp.²⁷

²⁷ The U.S. Attorney stated that "the evidence presented to the Grand Jury and developed by the United States Attorney does not indicate that any of the following persons participated in, directed, condoned or was aware of the acts or omissions that are the subject of the indictment. And they are William G. Kuhns, Herman M. Dieckamp, Robert C. Arnold, James S. Bartman, Shepard Bartnoff, Frederick D. Hafer, Richard Heward, Henry D. Hukill, Edwin E. Kintner, James R. Leva, Bernard H. Cherry, Phillip R. Clark, Verner H. Condon, Walter M. Creitz, Robert Fasulo, Ivan R. Finfrock, William L.

(Continued)

As explained *supra*, the Commission feels it is entitled to rely on that statement, and it does not believe that agency resources should be used to duplicate the work of the Grand Jury where the result of that inquiry is known. Finally, the hearing will not address Michael Ross because, as explained *supra*, the Commission finds, based on OI's investigation into TMI-1 leak rate practices, that the possibility of his involvement is so remote that it does not warrant further consideration.

III. TMI-1 LEAK RATE TESTING PRACTICES

In September and October of 1983 the NRC Staff through a series of Board Notifications notified the Appeal Board that, contrary to its earlier assertions in NUREG-0680, Supp. No. 2, there were indications that leak rate falsification may have occurred at TMI-1. This conclusion was based on a review of 645 test records over the period from April 1, 1978, to March 31, 1979. That review identified thirteen instances of water additions, eleven instances of hydrogen additions, thirteen instances of feed-and-bleed operations, and one of all three kinds of instances, that were not properly accounted for in the leak rate test calculations. This matter accordingly was referred to OI for investigation.

Subsequently, the Aamodts filed a motion with the Appeal Board requesting that the record be reopened on this matter. UCS and the NRC Staff supported the Aamodts' motion. OI completed its investigation report into this matter while the Aamodts' motion was pending before the Board. OI Investigative Report No. 1-83-028.

The Appeal Board in ALAB-772, *supra*, granted the motion to reopen the record on this issue. The Appeal Board stated that it necessarily followed that this matter might have made a difference to the Licensing Board's decision because the Licensing Board had made its decision "subject to" the Hartman allegations. The Appeal Board found the new "allegations" potentially more significant than the Hartman allegations because they related to TMI-1.

The Appeal Board also found that its conclusion was reinforced by OI's investigative report on TMI-1 leak rate practices. The Appeal Board noted that the overall conclusions of the report were favorable to Licensee in that OI found neither a systematic pattern of falsification nor a

Gifford, Robert L. Long, Frank Manganaro, Ernest M. Schleicher, Floyd J. Smith, William A. Verrochi, Raymond Werts and Richard F. Wilson.

The list of individuals I just read includes all of the Directors and Officers of GPU Nuclear Corporation from its organization in 1982 to the date of the indictment and all the Directors of the Defendant Company during the period covered by the indictment."

motive to falsify the leak rate data. The Appeal Board noted, though, that the OI report disclosed (1) a lack of understanding regarding record-keeping requirements; (2) ignorance by both operating staff and management of the existence and significance for leak rate calculations of a "loop seal" in the instrumentation system;²⁸ and (3) inattention during the pre-accident period to work requests that would have highlighted the loop seal problem.

The Appeal Board stated that the OI reports had not been introduced into evidence in the proceeding and had not been subject to cross-examination. It held that the type of material presented by OI is best scrutinized by the Licensing Board as part of its review of all of the circumstances surrounding the leak rate testing practices at Unit 1. The Appeal Board directed the Licensing Board to consider TMI-1 leak rate practice in conjunction with the hearing it had previously ordered in ALAB-738 on TMI-2 leak rate practices.

D. Parties' Comments

The Commonwealth, the Aamodts, TMIA, and UCS advocated that hearings are warranted on TMI-1 leak rate practices. The NRC Staff and the Licensee disagreed.

The Commonwealth argued that while OI did not find systematic falsification of leak rate testing at TMI-1, it found some irregularities in testing practices and management procedures. The Commonwealth believed that whether these problems have been properly resolved by current management is significant to TMI-1 restart, and that the Commission cannot safely conclude that the leak rate testing problem is history until an evidentiary hearing has been held.

The Aamodts noted that while the conclusions in the OI report are favorable to GPUN, the OI investigations have not been entered into the record of the proceeding and therefore cannot form a legal basis for a Commission decision.

TMIA argued that while leak rate falsification was not as pervasive at Unit 1 as at Unit 2, manipulations and widespread disregard of license requirements occurred at Unit 1. TMIA asserted that the OI report on Unit 1 indicated that "bad" leak rates at Unit 1 were routinely discarded in violation of NRC and license requirements and tests showing negative leak rates within 1 gpm were accepted as valid, even though the operators were well aware that such tests were not legitimate and could not re-

²⁸ The "loop seal" provided a mechanism by which additions of hydrogen would affect the leak rate tests results.

flect actual plant conditions.²⁹ TMIA noted that these are the precise violations to which Met. Ed. pled guilty regarding Unit 2. TMIA claimed, for example, the procedures were routinely violated, with the blessing of Ross. TMIA asserted that even if the violations were not for the purpose of concealing actual leakage in excess of technical specification requirements, manipulations were done to mislead the NRC as to the adequacy of Licensee's procedures.³⁰ In TMIA's view, at the point at which management recognized that the system for identifying leakage was not working, there could no longer be assurance that the plant was safe, and management should have immediately responded to the problem. TMIA concluded that Unit 1 management in condoning such activities evidenced no greater respect for NRC requirements and obligations than those responsible for Unit 2 violations. TMIA accordingly concluded that the Staff conclusion that "none of the operational or management personnel at TMI-1 were involved in culpable activities" is clearly wrong.³¹

TMIA also made an argument apparently related to the truthfulness of current TMI-1 employees. TMIA noted that a Region I inspector, Dr. Jin Wook Chung, discovered in a Unit 1 inspection in 1983 the existence of a "loop seal" through which hydrogen could be added for the purpose of affecting leak rate tests, and that Chung stated in an OI interview that it was inconceivable that Michael Ross or other GPUN representatives were not aware of the loop seal prior to this inspection. TMIA, noting that Chung also indicated that one would presume based on publication of the Hartman allegations that Ross and other personnel in GPUN would have looked at Unit 1 leak rate mechanisms in light of those allegations to determine if there was a loop seal at Unit 1, concluded that it is not credible to believe that the existence of the loop seal in the makeup tank was not discovered until the 1983 Region I inspection, as GPUN claims.

UCS is also of the view that the pattern of similarities between the practices at Unit 1 and Unit 2 are strongly suggestive that the leak rate

²⁹ TMIA asserted that the Commission should not rely on the OI investigation. It stated that the Department of Justice decision to indict Met. Ed. made the criminal nature of leak rate falsification painfully clear to TMI-1 operators interviewed by OI, and accordingly it is not surprising that the operators denied actual knowledge of falsification.

³⁰ TMIA argued that neither OI nor the Staff have yet explained why "spurts" of hydrogen would have been added in the particularly small quantity evident from OI's technical review, other than for the purpose of affecting leak rate test results.

³¹ TMIA referenced the interview of former operator John Banks, the only operator interviewed who identified a possible motive for falsification at TMI-1. TMIA stated that Banks asserted that Michael Ross frequently passed remarks to the operators to "get a good leak rate," and that some of the operators might have interpreted Ross' statements as encouraging record falsification, if necessary. See note 38, *infra*.

falsification at Unit 2 extended to Unit 1, albeit on a smaller scale, and that denials of the operators had been given undue weight. UCS' comments to a large degree repeat those stated by TMIA. In addition, UCS calculated that about 6% of the Unit 1 leak rate tests reviewed by OI involved the addition of hydrogen or water or feed-and-bleed operations, all of which affect leak rate calculations. UCS noted that the practice of discarding bad leak rate tests violated at least four different technical specifications and administrative procedures.

UCS stressed that Staff's conclusion that leak rates were not falsified at TMI-1 is based not on facts but on unproven assumptions. Specifically, UCS attacked the Staff conclusion that the relatively low percentage of tests showing possible manipulation, as compared with TMI-2, demonstrated a lack of a systematic pattern of falsification. UCS argued that although it was not often necessary to cheat to get a good leak rate at TMI-1, manipulations were made when necessary to get an acceptable leak rate. UCS also attacked the Staff conclusion that there was a lack of motive to falsify because it was not hard to get a good leak rate test at TMI-1. UCS disputed this conclusion, stating that leak rate falsification is not inherently more excusable for being less frequent, if the need to falsify is also infrequent.

UCS maintained that Ross must have known about the discarding of bad tests and the acceptance of negative tests. UCS stated that Ross is universally regarded by the operators at TMI as eminently knowledgeable of all aspects of the operation of TMI-1, and that he has a reputation of being a stickler for detail. UCS argued that Ross' denial of knowledge of the loop seal lacks credibility and undermines the believability of his other testimony.

With respect to whether the standards for reopening the record have been satisfied, UCS maintained there was no real dispute. UCS noted that, since no party argued to the Appeal Board that the evidence of leak rate falsification could not change the result of the Licensing Board decision endorsing management integrity, they cannot do so now.

Licensee argued that the standards for reopening the record had not been satisfied. Licensee maintained that the OI report dispelled any notion that leak rate practices at TMI-1 could be equated with those at TMI-2. While Licensee recognized that the OI report did disclose some deficiencies in Licensee's leak rate testing practices at Unit 1, Licensee stated that those deficiencies had nothing to do with leak rate falsification or manipulation, and that the Appeal Board did not suggest that the information in the OI reports in itself met the standards for reopening.

Licensee also disagreed with the UCS and TMIA suggestion that adding hydrogen to the makeup tank during a leak rate test was

necessarily improper. Licensee claimed that intervenors failed to recognize that there were legitimate operational reasons why hydrogen periodically was added to the makeup tank. Licensee further asserted that none of the hydrogen additions would have affected leak rate tests in such a way that, if the additions had not been made, the limits for leakage would have been exceeded.

Licensee also disagreed with TMIA and UCS assertions that the practice of discarding leak rate tests was intended to cover up excessive leakage. Licensee argued that only those tests deemed "invalid" were not kept. Licensee claimed that far from attempting to conceal derogatory information about plant conditions, invalid tests were discarded because they were not indicative of true plant conditions.

Licensee also attacked UCS' suggestion that leak rate falsification can be inferred from the acceptance of negative leak rates within 1 gpm as valid. Licensee stated that at times during the operation of TMI-1, the standard deviation associated with a leak rate test ranged approximately from 0.2 to 0.7 gpm. As a result, assuming no unidentified leakage or a very low unidentified leakage, one would expect close to half of all leak rate tests to be negative. In other words, Licensee stated that due to the inherent variability of the test, negative leak rates were simply indicative of low levels of unidentified leakage and their retention does not suggest the falsification or manipulation of leak rate tests.

The NRC Staff agreed with Licensee that the standards for reopening the record are not satisfied on TMI-1 leak rate practices. Relying heavily on the OI report, it concluded that no allegations have been made that leak rate tests at TMI-1 were intentionally falsified or manipulated, and that the OI report had concluded that only a small percentage of leak rate surveillance tests conducted at TMI-1 during the period examined were accomplished during the periods where operator-induced evolutions occurred that would call into question the validity of these tests. Staff noted that of the questionable tests, technical analysis showed that, except in three instances, the technical specification acceptance criteria for unidentified leakage would have been satisfied had the operator-induced evolution not occurred. It also asserted that there is no conclusive evidence that any TMI-1 licensed or unlicensed operator intentionally performed plant evolutions during leak rate testing with the intended purpose of manipulating or falsifying leak rate test results. Staff stated that there was no apparent motive or need to manipulate leak rate tests at TMI-1, and that the OI investigation did not identify evidence that would indicate supervisory or management personnel placed pressure on the operators at TMI-1 to manipulate or falsify leak rate test results. Accordingly, Staff did not believe the Licensing Board would have

reached a different result on any issue in the proceeding had the OI investigation been conducted earlier and the results been considered by the Licensing Board.

C. Analysis

The standards for reopening require a consideration of three factors: (1) whether the motion to reopen is timely; (2) whether the information raises a significant safety concern; and (3) whether the information might have led the Licensing Board to reach a different result. No one disputes the timeliness of the present motion, and the Commission accordingly will limit its discussion to the latter two factors.

The OI investigation into TMI-1 leak rate practices included sworn interviews of all pre-accident and current TMI-1 control room operators, shift foremen, and shift supervisors, who actually conducted leak rate tests during the period under investigation. A large number of pre-accident and current staff personnel and site and corporate management officials were also interviewed under oath. The Commission finds that this investigation was thorough, and that there is no reason to believe that further hearings would produce significant new information on the possible irregularities in leak rate test practices. The Commission finds that there are no significant factual disputes concerning leak rate practices at TMI-1,³² and that the facts as currently known do not raise a significant safety issue which might have led the Licensing Board to reach a different result.

The information developed by OI establishes that, unlike at TMI-2, there was no reason to falsify leak rate tests at TMI-1. There was no excessive leakage. Moreover, as indicated in Supp. No. 5, out of the 645 leak rate tests examined, in only three cases would the leak rate have been excessive if the additions had not occurred.³³ This is far different from the practice at TMI-2 where it appears that deliberate falsifications occurred on a regular basis.

³² Although TMIA, UCS, the Commonwealth and the Aamodts all argue that hearings are necessary, their basic dispute appears to be with the conclusions reached by OI, rather than with the underlying facts. None of these parties have produced evidence to show that there were more numerous acts of possible falsification than OI found. What is at dispute is really how the material should be interpreted and what inferences should be drawn from the facts.

³³ The UCS argument that a few falsifications are as culpable as many where the need to falsify is less frequent has no applicability here because there was no need to falsify at all to obtain a satisfactory leak rate test.

The OI investigation revealed that leak rate testing was considered a ministerial monitoring duty at TMI-1 prior to the accident.³⁴ It was not difficult to obtain an acceptable leak rate test, and most operators relied on other plant parameters to determine actual leakage. Hence little significance was given to leak rate testing practices. Under these circumstances, it is not surprising that some irregularities in the data may appear. There is no evidence of falsification beyond speculative inferences that could be drawn solely from the circumstance of a few irregularities in the data and some superficial similarity between leak rate practices at TMI-2 and TMI-1.³⁵ The Commission finds the circumstantial evidence indicating there might have been a few improper leak rate tests conducted in 1978-1979 does not raise a significant safety concern that might have changed the Licensing Board's decision.

With regard to discarding invalid tests, this practice did violate NRC requirements. However, there is no evidence of a deliberate attempt to discard tests at TMI-1 to hide excessive leakage or to mislead the NRC. Rather, as noted by the Appeal Board, the evidence indicates a lack of understanding regarding record-keeping requirements.³⁶ As stated by the Appeal Board in denying a motion to reopen based on "new" information of pre-accident deficiencies in the training program:

The OI report and supporting documents show what, by this time, should not be news to anyone — that there were significant shortcomings, to say the least, in Licensee's training program before the 1979 TMI-2 accident. . . . This proceeding was not instituted to provide a forum in which to litigate directly all possible errors of the past. . . .

³⁴ The Commission also notes that there was a margin of error in the leak rate tests. Thus negative leak rates could be expected where there was low leakage, and acceptance of negative leak rate tests does not show any improper motivation.

³⁵ There is even some question about the interpretation of the data as demonstrating improper additions. The NRC Staff agreed with Licensee's own investigative report that "the method of identifying water additions and hydrogen additions to the makeup tank is necessarily subjective . . . and, therefore, disagreement in interpretation can be expected." Supp. No. 5 at 4-19. The Commission need not address this conflict because of its finding that the few possibly improper tests, even if improper, do not meet the standards for reopening.

The Commission also notes, however, that it is not expressing approval for the way leak rate tests were conducted prior to the accident. It appears clear there were problems with the testing procedures, and those problems should have been corrected at that time. However, that issue is no longer material to the current safe operation of TMI-1. See discussion in text, *infra*.

³⁶ With regard to the other two negative findings by the Appeal Board — the failure to discover the "loop seal" and inattention to work requests regarding the loop seal — the Commission finds these failings to be of minimal significance to the restart proceeding. The loop seal in itself was not important; what mattered was whether hydrogen was being improperly added. So long as falsifications were not occurring, it did not matter whether there was a mechanism by which they could occur. In addition, the issue of handling work requests was fully litigated in the proceeding regarding Licensee's maintenance program. That program has been substantially revised, and any additional pre-accident problems are not significant to the current program.

The "new" information . . . simply provides support for one of the underlying assumptions of this proceeding. It is redundant and, as such, its significance is questionable. It follows that it would not have likely affected the Licensing Board's decision on training . . . in any significant respect.

ALAB-774, 19 NRC 1350, 1356 (1984) (footnote omitted). The logic of that decision applies equally well here.³⁷

The Commission has examined the additional issues regarding TMI-1 leak rate practices raised by the intervenors as arguably requiring a hearing and finds that they do not support the need for additional hearings. The questions about Ross are based on little more than speculation. The major argument to support the conclusion that Ross is lying is that he knows so much about plant operations that he must have known what was going on. The Commission has carefully reviewed Ross' explanation and finds it to be credible. We do not agree that Ross must have known of the irregularities at TMI-1, given their infrequency and the mundane nature of the leak rate testing process. Nor do we find his denial of knowledge of the loop seal particularly significant. While it does appear that Licensee could have discovered the loop seal problem at TMI-1 at an earlier date, that a construction anomaly provided a method for manipulation of leak rate test results is not important; what is important is whether hydrogen was intentionally being added to falsify the leak rate test results. So long as no improper additions were being made, it matters little whether there is a technical means whereby such additions could be made.

Nor do the similarities of the TMI-1 irregularities to those at TMI-2 necessarily mean there was deliberative falsifications at TMI-1.³⁸ The leak rate tests at TMI-1 in most cases would have been acceptable even without the additions; hence even in those cases there was no need to falsify. At TMI-2 there apparently was a motive to falsify, and the available evidence indicates that there was widespread falsification with the intent to deceive the NRC. There has been no similar showing at TMI-1.

³⁷ The Commission thus disagrees with the Appeal Board's conclusion that the OI investigation supports its conclusion to reopen. Indeed, that decision appears directly contrary to the above-quoted statement in ALAB-774. The Commission also disagrees with the Appeal Board's finding that it necessarily follows that the TMI-1 questions might have affected the Licensing Board's decision because the Hartman allegations might have. Circumstantial evidence indicating there may have been a few instances of possible improprieties do not raise concerns similar to those raised by the TMI-2 allegations, where it appears from the available evidence that deliberate falsification occurred on a regular basis. No one at TMI-1, unlike at TMI-2, has alleged that leak rates were falsified, and at most there is only some limited circumstantial evidence of falsifications.

³⁸ The statement by Banks that test results could have been falsified in response to statements by Ross "to get a good leak rate test" was, at most, equivocal. Banks first stated there was no motive to falsify, and later, after followup questioning, stated that maybe someone else might have been intimidated into falsifying leak rate tests to obtain acceptable results.

Hence the Commission concludes that hearings on TMI-1 leak rate practices are not warranted.

IV. THE APPEAL BOARD'S CONDITION CONCERNING MR. HUSTED

A. Background

Charles Husted was a licensed operator training instructor. The Special Master, Licensing Board and Appeal Board all expressed concern with Husted's attitude because he failed to cooperate with NRC investigators and testified in a less-than-serious, flippant manner. Neither the Special Master nor the Licensing Board recommended sanctions, although the Licensing Board, partly in response to Husted's attitude, required Licensee to develop criteria for training instructors and to have the training program audited. The Licensing Board also recommended that Husted's performance receive particular attention in the audit.

Subsequent to the Licensing Board's decision, Licensee promoted Husted to Supervisor of Nonlicensed Operator Training. The Appeal Board, noting its view of the importance of attitude in an instructor, seriously questioned Licensee's judgment "in *promoting* Husted to an important position with management responsibilities." ALAB-772, *supra*, 19 NRC at 1224. The Appeal Board also noted in this regard that as a manager "Husted will presumably also have a role in establishing the criteria for training instructors and developing the audit program imposed by the Licensing Board, at least in part, as a remedy for his own failure to cooperate with the NRC." *Ibid.* Based on the above, the Appeal Board imposed as a condition of restart that Husted "have no supervisory responsibilities insofar as the training of non-licensed personnel is concerned." *Ibid.*

The Commission took review of

whether an adjudicatory board in an ongoing hearing has the legal authority to impose a condition on a licensee which in effect operates as a sanction against an individual, where that individual is not a party to the proceeding and has had no notice of a possible sanction or opportunity to request a hearing.

CLI-84-18, *supra*, 20 NRC at 811. The Commission further stated that, if it determined the Appeal Board erred, it would then decide whether to take separate enforcement action against Husted.

B. Parties' Comments

The Commonwealth stated the Commission can impose conditions on management conduct related to TMI-1 operation, and that any other view would make Commission inquiry into management integrity meaningless.

UCS generally supported the Commonwealth's views. UCS added that if a hearing is required, it should be held before restart because the Appeal Board's order implied the plant could not be safely operated with Husted in the questioned position.

TMIA, without addressing the issue presented, maintained that the issue the Commission should be concerned with is Licensee's employment practices, as demonstrated by Husted's promotion.

Licensee acknowledged that the Commission can require separation of individuals from safety-related work on a finding that separation is necessary to protect the public health and safety. Licensee stated this is not such a case, and NRC boards in an ongoing hearing do not have the legal authority to impose a condition which would in effect operate as a sanction against an individual, when that individual is not a party to the proceeding and has no notice of a possible sanction or opportunity to request a hearing. Licensee claimed that due process required notice and an opportunity for hearing where administrative action threatens an individual's livelihood.

Staff read relevant Supreme Court cases as suggesting

that when the government acts against an entity for the purpose of affecting a specific individual who is singled out and directly affected in some adverse way by the governmental action, then, unless the public health, safety and interest requires otherwise, that individual has a due process right to prior notice and an opportunity for a hearing before his interests are affected.

Staff Comments at 43. Based on this reading, Staff concluded that the Appeal Board erred.

C. Analysis

There are two separate bases which arguably may provide Husted a right to a hearing — § 189a of the Atomic Energy Act and the Due Process Clause of the Fifth Amendment of the Constitution. We will treat each in turn.

1. Section 189

Any interested person with the requisite standing may seek to intervene in a § 189a licensing proceeding. To establish standing, an individual must at a minimum show (1) the action being challenged could cause injury in fact to that individual, and (2) such injury is within the zone of interests protected by the Atomic Energy Act. *See, e.g., Portland General Electric Co.* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610 (1976). While an individual who suffers economic injury as a result of a Board's decision to bar him from working in a certain job would meet the first standard, it is unresolved in the courts whether economic injury in such a case would be within the zone of interests protected by the Atomic Energy Act. *See, e.g., Consumers Power Co.* (Palisades Nuclear Power Facility), ALAB-670, 15 NRC 493, 506 (1982) (concurring opinion of Mr. Rosenthal), *vacated as moot*, CLI-82-18, 16 NRC 50 (1982).

2. Due Process

The Due Process Clause of the Fifth Amendment prohibits a federal agency from depriving an individual of "liberty" or "property" interests without providing that individual an opportunity for a hearing.³⁹ A person's liberty interest is implicated "[w]here a person's good name, reputation, honor or integrity is at stake because of what the government is doing to him," or where the government's action "imposed . . . a stigma or other disability that foreclose[s] his freedom to take advantage of other employment opportunities." *Board of Regents v. Roth*, 408 U.S. 564, 573 (1972). Merely making a discharged employee less attractive for employment is not a deprivation of liberty. *See, e.g., Johnson v. University of Pittsburgh*, 435 F. Supp. 1328 (W.D. Pa. 1977). Thus, for example, no hearing is required where the discharge is for insubordination and failure to perform certain duties. *Capers v. Long Island R.R.*, 429 F. Supp. 1359 (S.D.N.Y.), *aff'd sub nom. Harris v. Long Island R.R.*, 573 F.2d 1291 (1977).

"To have a property interest in a benefit, a person clearly must have more than an abstract need or desire for it. He must have more than a unilateral expectation of it. He must, instead, have a legitimate claim of

³⁹ Individuals indirectly affected by government action may not have any hearing rights. *See O'Bannon v. Town Court Nursing Center*, 447 U.S. 773 (1980). In *O'Bannon* the Supreme Court held that the patients in a nursing home were only indirectly affected when the government acted against the nursing home, and therefore the patients did not have any hearing rights. The action here is not so indirect that the holding in *O'Bannon* would clearly apply.

entitlement to it." *Roth, supra*, 408 U.S. at 577. Thus, for instance, the government may not prevent an individual from working in his chosen profession without providing him notice and an opportunity to request a hearing, *see, e.g., Orr v. Trinter*, 444 F.2d 128 (6th Cir.), *cert. denied*, 408 U.S. 943 (1971), although there is no hearing requirement where the only thing at stake is a specific job with no claim of entitlement. *See Cafeteria and Restaurant Workers Union v. McElroy*, 367 U.S. 886 (1961).

3. *Holding*

The Commission has decided, in view of the way this issue has been presented, not to resolve the difficult questions presented. No Board has addressed the specific questions before the Commission, the real party in interest (Husted), who is not a party to this proceeding, has not been asked for his views, and the parties have not devoted considerable attention to this issue. The Commission therefore finds that definitive resolution of these issues should wait for a case where they can more appropriately be decided.

In fairness to Husted, however, the Commission has decided to provide him an opportunity to request a hearing on whether the Appeal Board's condition barring him from supervisory responsibilities insofar as the training of nonlicensed personnel is concerned should be vacated. Husted has 20 days after the service of this Order to request such a hearing. If he does request such a hearing, the Commission will assign the matter to an Administrative Law Judge for hearing separate from this proceeding.

Finally, the Commission must address Husted's status, should he request a hearing. The Appeal Board noted that the Supervisor of Nonlicensed Operator Training instructs those on the career path to becoming licensed operators and has management responsibilities. The Commission finds that there are sufficient safeguards in place to assure that allowing Husted to serve in this position during the pendency of any hearing would not pose any risk to the public health and safety. Husted would have no involvement in the direct operation of TMI-1, and would be only one of a number of persons involved in the training of nonlicensed individuals. Accordingly, should Husted request a hearing, the Commission has decided that the Appeal Board's condition should not remain in effect during the pendency of that hearing.

V. STAFF'S CHANGE OF POSITION

A. Background

Staff in Supp. No. 5 to NUREG-0680 found that new facts from OI investigations and from other relevant material concerning four matters — (1) TMI-2 leak rate falsifications, (2) false certification and management involvement in the coverup of cheating (the certification of Floyd), (3) pre-accident training irregularities and post-accident cheating, and (4) adequacy of responses to an October 1979 Notice of Violation — revealed a pattern of activity that,

had it been known at the time, would likely have resulted in a conclusion by the staff that the Licensee had not met the standard of reasonable assurance of no undue risk to public health and safety. However, these matters, or the significant facts concerning these matters, were not known to the NRC staff during the [Licensing Board's] proceeding on TMI-1 restart.

Supp. No. 5 at 13-5.

The Commission, in the order taking review of whether further hearings are required in the restart proceeding, directed Staff, if it believed the record did not need to be reopened on Supp. No. 5 issues, to explain how it reached this conclusion in view of the above statement. The Commission also directed Staff to "specify what testimony it gave before the Licensing Board that it would now change, and why that change in testimony does not require reopening." CLI-84-18, *supra*, 20 NRC at 814.

B. Parties' Comments

Staff stated that the concerns in Supp. No. 5 are with Licensee's *prior* management and operating personnel, and that it finds no undue risk to public health and safety with the *current* management and personnel. Staff concluded "there is no significant safety issue which would now cause the Licensing Board to reach a different decision on any restart issue because individuals whose management integrity was called into question by the new information are no longer involved in TMI-1 operations." Staff Comments at 33. Staff noted that integrity per se was not an issue in the restart proceeding, and hence was not the subject of testimony. Contrary to Commission instruction, Staff did not state what testimony in the restart proceeding, if any, it would change.

TMIA maintained that Staff's distinction between pre- and post-1982 Licensee is unfounded. TMIA stated that the resignation of Arnold by itself, the only significant change in Licensee's management, is insufficient to support Staff's conclusion. TMIA argued that the Licensing

Board found in Licensee's favor in 1981 because of Licensee's reorganization in 1980, and that Staff erred in stating that the reorganization occurred in 1982 and hence that management subsequent to 1982 is acceptable.

Finally, TMIA challenged Staff's assertion that it now has new information on the false certification of Floyd and the Hartman allegations. TMIA claimed there is no new information on the Floyd matter, and that the Staff knew of the significance of the Hartman allegations during the hearing.

UCS noted that Staff's statement in Supp. No. 5 is in effect an "admission that the decisional record in this case excludes information on integrity which the staff concedes would have dictated a different result." UCS Reply Comments at 10. UCS claimed that Staff's position that the decisional record developed by the Licensing Board is irrelevant in view of the new management is "absurd," stating that such a conclusion would make the whole adjudicatory process irrelevant. UCS also challenged Staff's statement that it was not aware of this information at the time it testified in the original management hearing. UCS pointed out that Staff sat through the hearings on the cheating incidents while well aware of the TMI-2 leak rate falsifications,⁴⁰ the training problems, and the false certification of Floyd, but nonetheless endorsed restart. UCS finds Staff's position "disingenuous," stating that Staff's actions indicate a willingness to disregard substantial evidence of a lack of integrity in order to support restart.

C. Analysis

The potential impact of Staff's "likely" change of position can be assessed by considering the relationship of each of the four items cited by Staff to the Licensing Board's decisions, followed by an assessment of its significance to the Licensing Board's overall finding that the management issues had been resolved for the purpose of restart. We will therefore address each of the four matters cited by Staff in turn.⁴¹

⁴⁰ Staff in its comments indicated that only those members of Staff who had worked on the NRC investigation had information regarding the truthfulness of Hartman's allegations, and they had been asked by the Justice Department not to discuss the information with others.

⁴¹ This matter deals with the adequacy of the evidentiary record, and hence the traditional standards for reopening based on new information are inapplicable.

1. The Hartman Allegations

Clearly the Licensing Board found the Hartman allegations relevant to its decision, but, in the absence of further information, concluded that they should not be a bar to restart. The Licensing Board in making this determination relied on Staff's description of the matter. LBP-81-32, *supra*, 14 NRC at 557. See discussion, *supra*.

Staff asserted that the following is the information which it did not know in the original restart proceeding:

- (1) Some operators willfully violated procedures and attempted to manipulate leak rate test results by the addition of hydrogen and/or water to the makeup tank. These operators were motivated to do so as a result of indirect pressure from management and/or a desire by individual operators to obtain satisfactory leak rate test results.
- (2) The staff was unaware until March 21, 1983 of the existence of the Faegre & Benson Report and its findings [Licensee's report into the technical basis for the Hartman allegations].
- (3) First-line supervision (i.e., shift foremen and shift supervisors) and possibly middle management were directly involved in leak rate falsification at TMI-2, and Met-Ed management was responsible for improper leak rate testing as well as for the poor attitude of the operators and first-line supervisors toward this test.
- (4) Falsification of TMI-2 leak rate test results did occur, and negligence on the part of management created, in part, the circumstances that resulted in leak rate falsification.

Staff Comments, Appendix at 4. These four pieces of information amount to a recognition that falsifications did occur, and that management was at least in part responsible. As explained *supra*, however, those responsible are not currently in responsible management or operational positions at TMI-1. The Hartman allegations therefore no longer raise a significant safety issue for operation of TMI-1, and Staff's likely change of position to the extent it was based on this issue is not now significant.

2. Certification of Floyd

Staff stated that "while the false certification of Floyd was addressed in the restart proceeding, it was not until after the close of the hearing that the Staff determined that Licensee management knew of, and subsequently covered up, Floyd's cheating, and that the licensee made a false certification to the NRC." Staff Comments, Appendix at 10.

The false certification of Floyd was litigated before the Licensing Board. The Board concluded that Gary Miller (former Station Manager),

with John Herbein's (former Vice President, Met. Ed.) knowledge and assent, made a false certification to the NRC. The Board also found that the evidence raised questions about Miller's competence, and directed that until the matter was further resolved any involvement of Miller in TMI-1 operations must be under the direct supervision of an appropriately qualified Licensee official. The Board further noted there was no evidence of improper conduct at any level higher than Herbein's, and that Herbein was no longer employed by GPU Nuclear.⁴² LBP-82-56, *supra*, 16 NRC at 354-55.

Thus, the Licensing Board clearly recognized the significance of this matter, and, in fact, expressed concern regarding Staff's position on this matter. *Id.* at 353.⁴³ Floyd, Herbein and Miller are no longer employed by GPUN, and, as a result of the OI investigation, the Commission has issued a Proposed Notice of Civil Penalty of \$100,000 against GPUN (held in abeyance at DOJ's request).⁴⁴ Since there is no new evidence implicating other individuals at TMI-1 in this incident and the Board did not rely on Staff's judgment here in the first place, we do not believe Staff's likely change of position might have changed the Licensing Board's decision. Under these circumstances, Staff's likely change of position because of this issue has minimal or no significance.

3. *Pre-accident Training Irregularities and Post-accident Cheating*

Staff's position on new information concerning pre-accident training irregularities and post-accident cheating is as follows. "Staff was aware during the TMI-1 restart proceeding that the Licensee had problems with its pre-accident training and requalification programs. The proceed-

⁴² If Staff is implying there is now evidence of involvement of others in management, e.g., Arnold, our review has disclosed no evidence beyond that available to the Licensing Board, and Staff has cited none. The Licensing Board knew of Arnold's involvement in Licensee's personnel action regarding Floyd. In addition, Arnold was the individual who brought this matter to the NRC's attention, and, regardless, he is no longer associated with TMI-1 operations.

⁴³ The Licensing Board found that

[t]he NRC Staff takes a surprisingly mild position on the August 1979 certification issue. . . .

. . . [A]t no place in the Staff's testimony or in the proposed findings and comments before us does the Staff discuss the untrue representation in the [certification] letter We do not understand this silence.

. . . .

. . . We recommend that the Commission direct the Staff to conduct an investigation We are somewhat disconcerted, however, because no component of the NRC Staff protested in this proceeding the false information in the certification to the NRC Perhaps [the Commission's Office of Inspector and Auditor] should be enlisted to participate in any such investigation.

16 NRC at 353.

⁴⁴ The Commission notes in this regard that Floyd on November 16, 1984 was convicted in the District Court for the Middle District of Pennsylvania because of this incident.

ing before the Licensing Board concentrated on the Licensee's post-accident training program." Staff did not become aware until after the Board's decisions "that certain preaccident Met-Ed management personnel demonstrated a poor attitude and disregard for Met-Ed Operator Requalification Program requirements and held responsible post-accident management positions associated with TMI-1 operations." Staff Comments, Appendix at 7. In general this attitude was shown in nonattendance and condoning nonattendance at training and a general management inattention to the requirements of the training program then in place.

This issue was addressed by the Appeal Board in ALAB-774. T̄M̄ĪĀ had moved to reopen the record based on the same pre-accident training irregularities now cited by Staff. The Appeal Board held as follows:

The OI report and supporting documents show what, by this time, should not be news to anyone — that there were significant shortcomings, to say the least, in licensee's training program before the 1979 TMI-2 accident. . . .

The "new" information . . . simply provides additional support for one of the underlying assumptions of this proceeding. It is redundant and, as such, its significance is questionable.

19 NRC at 1356. The Appeal Board went on to note that any information bearing on Licensee's existing training program could be pursued in the reopened hearing on training.

The issue then is whether Staff's likely change of position because of this issue has any significance in view of ALAB-774. There might have been some significance if Staff during the hearing had changed some of its favorable testimony on the training program. However, at this point in time pre-accident training irregularities have little or no significance regarding the adequacy of the current training program, *see* ALAB-774, 19 NRC 1350 (1984), and the post-accident cheating discussed by Staff has been fully litigated. Moreover, additional hearings on the effect of the cheating on the adequacy of Licensee's current training program were held subsequent to Staff's likely change of position, and Staff had the opportunity to present any revised views it had in those hearings. Staff chose not to present any changed testimony explaining its "likely" change of position, and completion of those proceedings should eliminate any significance in Staff's likely change of position because of this item.

4. Licensee's Response to the NOV

The fourth issue cited by Staff concerns the accuracy and completeness of Licensee's response to the October 25, 1979 Notice of Violation (NOV) imposing a civil penalty on Licensee for actions leading to the TMI-2 accident. Staff stated that it was not until after the close of the evidentiary record that it uncovered evidence indicating that the Licensee may have knowingly provided false information to the NRC in its response to the NOV.⁴⁵ This matter was not specifically litigated, although Licensee's response to the accident was litigated.

This issue raises a significant safety concern regarding whether individuals in Licensee's management made material false statements to the NRC in that, if true, it reflects some lack of integrity in Licensee's management. However, the two individuals primarily responsible for this response — Robert Arnold and Edward Wallace — are no longer associated with TMI-1 activities. Accordingly, the Commission finds that Staff's likely change of position regarding this issue is not currently significant enough to warrant further hearings.⁴⁶ Since the Commission has decided that this issue is no longer significant because of the removal of Arnold and Wallace, Licensee is to notify the Commission before returning either of these individuals to responsible positions at TMI-1.

5. Overall Impact of Staff's Likely Change of Position

Even though, as indicated above, none of the items cited by Staff for its likely change of position taken individually are significant enough to require hearings beyond those now under way, we must still consider the impact that a possible change of position by Staff might have had on the Licensing Board's overall finding on Licensee's management.

Staff in Supp. No. 5 stated that the four cited matters collectively indicated "a pattern of poor attitude toward training responsibilities and leak rate testing requirements, a failure to provide accurate and complete statements to the NRC, an unwillingness to admit violations of NRC requirements and a failure to promptly report cheating and its subsequent coverup." Based on this, Staff "would likely [have concluded] that the

⁴⁵ There is a related issue here. The Keaten Report was changed to conform to the false information in the response to the NOV when the Task Force apparently accepted those changes without independent assessment. Staff in Supp. No. 5 discounts this matter by stating "[t]he evidence does not support a conclusion . . . that such changes were the result of any influence on the task force by management." Supp. No. 5 at 8-14. See discussion, *infra*.

⁴⁶ As discussed *infra*, the Commission finds that there is no factual dispute regarding Dieckamp's decision not to become involved in this matter, and that his decision not to involve himself is not culpable.

Licensee had not met the standard of reasonable assurance of no undue risk to public health and safety.” Supp. No. 5 at 13-5.

Those statements in Supp. No. 5 directly conflict with Staff’s testimony in the restart proceeding. For instance, one issue specified for the restart proceeding was “[w]hat are the views of the NRC inspectors regarding the quality of the management of TMI Unit 1 and the corporate management, staffing, organization and resources of Metropolitan Edison.” CLI-80-5, *supra*, 11 NRC at 409. The Board, at Staff’s urging, found that “the NRC inspectors believe the Licensee to be capable of properly managing and safely operating TMI Unit 1.” LBP-81-32, *supra*, 14 NRC at 504. The Board noted in this regard that it had “relied very heavily upon the Staff’s proposed findings on this issue . . .” *Id.* at 502.

Similarly, the Licensing Board noted that,

[b]ased upon intangible subjective observations, the NRC staff witnesses believe that the senior management for TMI and GPU Nuclear are probably above the norm for other utilities the Staff has looked at in reviewing six plants in the last year for near-term operating licenses. . . . The Staff witnesses had nothing unfavorable to report and had no recommendation for further inquiry.

Id. at 430.⁴⁷

The question then concerns what impact there would have been on the Licensing Board’s decision had Staff testified that Licensee “had not met the standard of reasonable assurance of no undue risk to public health and safety,” and, correspondingly, whether Staff’s statement that it would “likely” have so testified invalidates the Licensing Board’s overall favorable finding on Licensee. The Commission finds that Staff’s “likely” change of position does not invalidate the Licensing Board’s decision. First, there was substantial other testimony on Licensee’s acceptability. Second, and more important, the Licensing Board examined individual issues bearing on Licensee’s acceptability. The Board, which was charged with fully inquiring into Licensee’s acceptability, could not have accepted Staff’s assertions without inquiry into the underlying events. Hence, while this testimony could have had a significant impact on the Licensing Board’s deliberations and the course and timing of the hearing, the issue before the Board would have involved the seriousness of these events, and whether adequate corrective action had been taken. Therefore it likely would at most have led to further consideration of the specific issues cited by Staff, in light of Staff’s altered

⁴⁷ Numerous other witnesses also testified on this issue, and many individuals in Licensee’s management structure testified before the Board. The Board discussed each individual in Licensee’s management structure in finding that structure acceptable.

views, rather than to further hearings on some abstract notion of corporate adequacy. The need for hearings on those issues has been discussed *supra*.

D. Summary

Of the four issues cited by Staff for its likely change of position, one is currently pending before the Licensing Board (training), one was already fully litigated (Floyd certification), and two are no longer significant to the operation of TMI-1 (Hartman allegations and response to NOV). Thus, we do not find Staff's new position to be of such significance as to warrant any further hearings beyond those now ongoing.

VI. ALLEGED DISCRIMINATION AGAINST PARKS, KING AND GISCHEL

A. Background

Messrs. Park, King and Gischel raised health and safety concerns regarding the way the cleanup of TMI-2 was being conducted. They first raised these concerns to the Licensee, and then to the NRC and the public. Each eventually left TMI-2, either by transfer (Parks and Gischel) or dismissal (King). OI issued an investigative report on these matters in two parts. The first part covered the alleged safety concerns, while the second concerned the alleged discrimination. OI Investigative Report No. H-83-002. The factual circumstances surrounding each case is discussed in detail in Supp. No. 5. We provide a brief summary below.

Gischel, who was the GPUN Plant Engineering Director at TMI-2, suffered a stroke in June 1982. He subsequently consulted Corporate Stress Control Services, Inc., about some physical impairments resulting from the stroke. He was advised that he should take a neuropsychological examination, and one was scheduled for him. He did not take the exam, and subsequently Stress Control advised the Licensee of its view that he should take the exam. Licensee and Gischel had a running disagreement about whether he had to take the exam as a condition of continued employment. The disagreement was ended by agreeing that Gischel would accept a transfer to a nonnuclear job.

King, who was the Plant Operations Director at TMI-2, was also at the same time the President of Quiltec, which provided engineering services to nuclear power plants. Several GPUN employees had gone to work for Quiltec after resigning from employment with GPUN. Upon learning of King's involvement with Quiltec, Arnold had him suspended without

pay. This was revised to suspension with pay until, after a further investigation, King was fired. King maintained there was no conflict of interest because Quiltec did not solicit GPUN employees.

Parks, a Bechtel⁴⁸ employee, worked as an Operations Engineer in the Site Operations Department. Parks had four specific complaints of harassment: (1) he was relieved of his duties as Alternate Startup and Test Supervisor; (2) he was interrogated as part of a Bechtel investigation into alleged violations of conflict-of-interest standards; (3) he was replaced as the primary Site Operations (SO) Department representative on the Test Working Group (TWG) for the Reactor Building Polar Crane Project; and (4) he was placed on leave of absence with pay and prohibited entry to the jobsite.

The Department of Labor (DOL) investigated the Parks matter and concluded that Parks had been discriminated against for raising health and safety concerns. The NRC Staff in Supp. No. 5, consistent with DOL's findings, found that the above four actions were improper. Staff also found three additional improper acts bearing on the integrity of GPUN management.⁴⁹

Bechtel's position is that Parks by making grave accusations concerning the professional competence and integrity of several of his co-workers lost his ability to function as a member of the professional organization at TMI-2. The DOL complaint was settled when Bechtel transferred Parks to a job in California.

B. Parties' Comments

TMIA asserted that the

"whistle blowers" had struggled for months to bring their concerns [of substantial safety significance] to the attention of GPU management, in hopes they would be resolved. Not only were their concerns ignored by management, the "whistle blowers" were subjected to harassment which intensified when they persisted in voicing their legitimate concerns.

TMIA Motion to Reopen at 5. TMIA maintained the OI investigation confirmed that the safety violations occurred, and that GPU harassed those trying to voice their concerns. This, TMIA asserted, "has created an atmosphere of fear and intimidation making individual disclosures of

⁴⁸ Bechtel is a prime GPU contractor on the cleanup of TMI-2.

⁴⁹ These acts were: (1) Comments by Barton (GPUN) threatening to fire or suspend Parks for publicly airing his allegations; (2) statements by B. Kanga (Bechtel) to Parks advising him not to publicly state his concerns, as another employee who had gone public had been humiliated; and (3) Kanga's statement to Parks that he had put Bechtel in a bad light with a client and stood a good chance of being fired.

safety violations impossible.” *Id.* at 13. In TMIA’s view, these actions are the clearest demonstration “of the nexus between GPU’s lack of competence and their lack of integrity.” *Ibid.*⁵⁰

Staff concluded that only Parks was harassed, and that this harassment was an isolated occurrence and not programmatic in nature. Staff, noting that GPUN has now promulgated policies designed to protect employees who raise safety concerns, found that this issue does not meet the standards for reopening.

Licensee stated that it commissioned Edwin Stier to investigate this matter, and Stier concluded that there had been no harassment. Regarding OI’s conclusions, Licensee stated they raise questions only about Robert Arnold, who is no longer associated with TMI-1.

C. Analysis

There do not appear to be any material issues of disputed fact here regarding the basic actions taken. It is unquestioned that (1) these individuals raised safety concerns, and (2) they thereafter lost their jobs at TMI, either by firing or transfer.⁵¹ However, in each case there does appear to be a dispute regarding whether the evidence indicates a connection between those two events.

The Energy Reorganization Act of 1974 (42 U.S.C. § 5851) and the Commission’s regulations (10 C.F.R. § 50.7) protect employees from discrimination for raising health and safety issues. Hence, if it were to be established that Licensee’s upper management (which oversees both TMI-1 and TMI-2) engaged in a pattern of discrimination against or condoned discrimination against individuals because they raised safety concerns, this might raise a significant safety/integrity issue which could have changed the Licensing Board’s decision. *See* ALAB-738, *supra*, 18 NRC at 198 (“reprisals against whistleblower-employees — if they are proven and if a nexus to TMI-1 management is suggested — certainly reflect negatively on management integrity and would provide a basis for further exploration”).

We will first discuss the case of King. King, while a GPUN employee, was also President of a company hiring GPUN employees (Quiltec). In addition, King had sent current GPUN employees to act as Quiltec representatives. GPUN, although it did not have a clear conflict-of-interest

⁵⁰ TMIA also asserted that Joyce Weinger, King’s secretary, was discriminated against because she supported King. We do not address Weinger’s case because it does not appear the action taken against her was related to raising safety concerns, and therefore that matter does not fall within the NRC’s jurisdiction.

⁵¹ We note that no party has moved to reopen because of the procedural violations themselves.

policy, did have a policy of strictly limiting recruiting of employees from other companies with which they did business and, equally as strenuously, protecting their own employees from outside recruitment. The Commission has concluded from the facts developed by OI that Licensee's actions concerning King were not improper, and that there is insufficient evidence to warrant a hearing on the inference that Licensee's actions were motivated by the fact that King had raised safety concerns.

The Commission notes in this regard that the only reasonable criticisms of Licensee here are that a Bechtel employee had a private procurement investigation of King conducted, that Licensee acted peremptorily in suspending King without pay based on the limited information it then possessed, and that the timing of King's suspension and ultimate removal was unfortunate.⁵² None of these criticisms raise a significant safety issue. The investigation by the Bechtel employee appears to have been at least partly based on a personality conflict, and GPUN did not approve of that investigation. Regarding the second criticism, Licensee had sufficient information to act against King when it did, and that action was substantiated by a later inquiry. Moreover, Licensee revised the suspension to one with pay to obtain further information from King regarding his safety concerns. Finally, while the timing of the suspension may have given the appearance that it was retaliatory, the evidence does not support such a conclusion. Appearances alone do not raise significant safety issues warranting a hearing. Hence the Commission finds that this issue does not raise a significant safety concern which might have altered the Licensing Board's decision.

We next turn to Gischel. The issue here concerns Licensee's motivation in requiring Gischel to take a neuropsychological examination.⁵³ In essence, Licensee was faced with contradictory medical advice. On the one hand, Stress Control advised Licensee that Gischel needed to take the neuropsychological examination for a full evaluation of his condition, and that in the absence of an exam Gischel posed a risk to himself and others in unescorted areas of the plant.⁵⁴ On the other hand, Gischel's physician stated that there was no need for him to take the examination.

⁵² With regard to TMIA's speculation that management knew of King's involvement with Quiltec at an earlier date, but did not become concerned until King began raising safety concerns, the Commission finds that such speculation would be based on no more than rumor and, accordingly, does not raise a significant safety concern.

⁵³ Gischel made numerous other complaints of harassment. The Commission agrees with the Staff's analysis that these other complaints were without merit. See Supp. No. 5 at 10-21, 10-22.

⁵⁴ TMIA criticizes the actions of Stress Control in this case. The motivations and acts of Stress Control are not at issue here. To the extent TMIA is arguing that GPUN and Stress Control together acted improperly, any such inference is based on pure speculation.

The Commission concludes GPUN did not act improperly under these circumstances. The evidence developed by OI indicates that Licensee was motivated by concern for Gischel's physical problems, and, indeed, if Licensee had not acted as it did it could have been criticized for failing to act regarding a potential safety concern. The Commission further notes in this regard that it was Gischel, not Licensee, who continued to change the ground rules and the format for taking the examination.

As in the case of King, this controversy happened to occur at the same time that Gischel was raising safety concerns. While this may have given the appearance of retaliation, the evidence does not support such an inference. Hence, the Commission concludes that this issue does not raise a significant safety concern which might change the Licensing Board's decision.

Finally, we turn to Parks. The actions taken against Parks present a more difficult question than those taken against King and Gischel. If the NRC Staff's findings of harassment are accepted, then Licensee is responsible for discrimination against Parks. While the Commission does not necessarily agree with all Staff's conclusions, the Commission has decided to accept those conclusions for the purposes of this analysis because, even if accepted, those conclusions do not warrant further hearings.

The issue then is whether the harassment found by Staff meets the standards for reopening, i.e., whether it raises a significant safety issue which might have affected the Licensing Board's decision. The Commission finds that it does not for the following reasons. First, Parks was a Bechtel employee, and Bechtel must bear primary responsibility for his harassment, although GPUN bears responsibility for acts of its contractor.⁵⁵ Second, there has been no showing of a widespread pattern of discrimination against more than one individual. Third, Robert Arnold, the major GPUN official involved, is no longer associated with TMI-1 activities. Fourth, these acts occurred at TMI-2, not TMI-1, and hence they relate to the safe operation of TMI-1 only insofar as there is an overlap of individuals or policies. The Commission finds that the removal of Arnold eliminates any such overlap. Fifth, Licensee has now adopted clear policies to prevent any future harassment or intimidation. For these reasons the Commission concludes that this issue does not require hearings.

⁵⁵ The cleanup at TMI-2 is being conducted as a joint effort by GPU Nuclear and its contractor Bechtel. The limited direct involvement of GPUN employees in any acts of harassment do not raise a significant safety issue because of the remedial acts taken by GPU Nuclear management, see Supp. No. 5 at 13-9, and because of the limited nature of that involvement.

VII. THE KEATEN REPORT

A. Background

Licensee shortly after the accident established an internal task force to investigate certain aspects of the accident. That task force, headed by R.W. Keaten, produced several drafts before the final report — the Keaten Report — was issued. Several questions were raised regarding some of the changes made by management to the report from draft to draft.

In addition, the review of the Keaten Report raised a question concerning the accuracy of information contained in Licensee's response to the NRC's October 25, 1979 Notice of Violation (NOV). In particular, Licensee in response to the NOV stated "there is no indication that this procedure [concerning closure of the power-operated relief valve (PORV) block valve] or the history of PORV discharge line temperatures delayed recognition that the PORV had stuck open during the course of the accident," and that elevated relief valve discharge line temperatures "do not appear to have been the result of a leaking PORV," but rather were related to a leaking code safety relief valve. The Keaten task force draft reports being circulated internally to upper management at the time of Licensee's response to the NOV contained information in conflict with the above two statements.

Staff after reviewing OI's investigative report concluded that "licensee did willfully violate the emergency procedure and that statements were made by the licensee in its response to the NOV that were neither accurate nor complete and that were contrary to other information in the possession of the licensee." Supp. 5 at 8-19. Regarding the individuals involved, Staff concluded that while E. Wallace (now at Oyster Creek) "was most closely involved . . . the responsibility for the licensee's inaccurate and incomplete statements must be shouldered by R.C. Arnold, who reviewed and signed the submission to the NRC, and by H.M. Dieckamp, who reviewed the response before it was submitted and chose 'not to intervene.'" *Id.* at 8-21.

B. Parties' Comments

TMIA argued that the Task Force "improperly modif[ie]d findings and conclusions on its own initiative." TMIA 2.206 Petition at A-173. TMIA alleged the changes were made to improve GPU's litigative posture in *GPU v. B&W*, to conform the Keaten Report to the false response to the NOV, and to present GPU to the NRC in a better light. TMIA maintained this is significant because Keaten and Long, the central task

force members, were and continue to be part of GPUN's management structure.⁵⁶

With regard to the false response to the NOV and the corresponding incorrect changes to the Keaten Report, TMIA stated "what is perhaps most disturbing is the company's continued support for the false premise upon which Licensee's dishonest response to the Notice of Violation was based. . . . Clearly, Licensee is either suffering from serious perceptual problems, or feels obligated to persist in maintaining self-serving, noncredible positions." *Id.* at A-180 to A-181.

TMIA next argued that Licensee has misrepresented to the Commission the purpose of the Keaten Report. TMIA compared statements by Kuhns and Dieckamp to the Commission that the report was only for internal purposes with statements by Keaten and Arnold that they recognized the report would be made public. TMIA also argued that the nature of the changes made to the report, and the various rationales for those changes, belie the view that the report was only for internal use.

Finally, TMIA maintained that Licensee improperly withheld the Keaten Report from the restart proceeding. TMIA argued the report was directly relevant to issues in the proceeding, and Licensee's "various excuses [for why it did not provide the report] not only contradict themselves, but, when viewed together, appear implausible." *Id.* at A-200.

UCS argued that further hearings are required on Licensee's response to the NOV and the revisions to the Keaten Report. UCS asserted the false response to the NOV "is a direct and damning indictment of licensee's management integrity." UCS maintained the revisions to the Keaten Report were made to conform it to the false NOV response, "to shift blame away from GPU in preparation for the company's litigation against B&W and generally to minimize or remove concessions of regulatory violations or even misjudgment on the part of licensee's management." UCS Comments at 49. UCS claimed that this shows that Licensee is not interested in learning the lessons from TMI-2 when to do so might imply fault or responsibility, and demonstrates a lack of integrity. UCS argued there must be a limit to the NRC's tolerance of Licensee removing implicated individuals without disavowing their acts, and that the denials by Keaten, Long and Arnold of any attempt to dictate the contents of the Keaten Report because of positions taken in the NOV response are incredible. Rather, UCS claimed, the evidence shows

⁵⁶ Long is currently the GPUN Vice President for Nuclear Assurance, while Keaten is the Director of Engineering Projects, GPUN.

that Keaten allowed the task force to be used as a tool in management's efforts to deceive the NRC.

UCS argued that material false statements were made to the NRC "and that current GPU management has neither disavowed them nor held anyone accountable." UCS maintained that these facts, if proven, establish "that GPU lacks the integrity to be entrusted with a license to operate a nuclear plant," and therefore the standards for reopening are met. UCS Comments at 52.

The Commonwealth maintained that changes to the Keaten Report were made to avoid liability in *GPU v. B&W*, and to conform to the misleading response to the NOV. The Commonwealth argued that although the sequence of events is clear, two questions remain to be resolved through hearings. Those questions are whether all those who may have influenced the report have been identified, and "[w]ould current management of GPU and do current management practices at TMI-1 preclude a repetition of a similar episode, and how?" Commonwealth Comments at 5.

Staff found no improper influence in the revisions to the Keaten Report, and that Licensee was under no obligation to provide that report to the NRC earlier than it did. Regarding the Licensee's inaccurate response to the NOV, Staff concluded that reopening is not warranted because the individuals responsible (Arnold and Wallace) are no longer associated with TMI-1, and because Mr. Dieckamp's involvement was not improper.

Licensee stated that the only issue raised here concerns the response to the NOV, and no hearings are warranted because neither of the individuals implicated is involved with TMI-1 restart.

C. Analysis

There are four separate matters which must be considered — the changes to the Keaten Report, Licensee's response to the NOV, Licensee's obligation to provide the Keaten Report to the NRC, and Licensee's recent statements and actions regarding that report. We will discuss each in turn.

1. Changes to the Keaten Report

Some of the changes discussed by TMIA do appear clearly to be designed to improve Licensee's image in the report. For instance, the conclusion that "the general operational condition appears to indicate a lack

of management awareness of problems, an insufficiently stringent standard by which to evaluate operations, and/or a management philosophy which accepted this situation, at least in the short run” was changed to “the task force did not perform a thorough review of the role played by TMI management relative to the identified problems. . . .” Similarly, the thought that if certain specific actions had been taken by the Licensee “the operators might have had sufficient information to recognize the stuck valve” was changed to “the need for improved means for identifying a stuck open PORV might have been recognized.”

While there are no factual controversies regarding what changes were made, there is some controversy regarding the reason for those changes. It can be argued from the existing information that the changes were made to make Licensee look better, both from a litigative posture and otherwise. The question we see is whether that issue warrants hearings. In our view, revisions to an internal report, even if designed for some external use, do not raise serious integrity concerns unless there is a showing that false information was used negligently or intentionally. The changes here for the most part reflected differences in judgment regarding managerial matters rather than technical matters of fact or expert judgment. The only apparent false information we are aware of in the Keaten Report is the same information as in Licensee’s response to the NOV. That information was inserted in the Keaten Report based on reliance on Wallace. We see no integrity concern in the mere fact that a task force in preparing a report relied on representations made to it. While in hindsight it appears reliance should not have been placed on Wallace, in the absence of any other evidence indicating an improper motive, we believe the act at the time was reasonable.

In addition, the Licensing Board in addressing Licensee’s response to the accident did not rely on Licensee’s testimony. The Licensing Board found the testimony of Keaten and Long “more positive than appears warranted.” LBP-81-32, *supra*, 14 NRC at 539. The Appeal Board, in addressing a challenge to Licensee’s witnesses on this issue, found

that the direct testimony of Licensee’s witnesses was not particularly probative or responsive to the issue at hand. But we also find that the Licensing Board appears to share that view, inasmuch as it did not rely on their testimony to any significant extent in reaching its conclusions on [this issue].

Thus, although the testimony of licensee’s witnesses . . . was not especially useful, it also did not provide the evidentiary basis for any critical finding by the Board.

ALAB-772, *supra*, 19 NRC at 1258-59. Thus further information on Licensee's view of the accident would not have had any impact on the Licensing Board's decision.

In sum, then, the Commission finds that the changes to the Keaten Report, even if designed to improve GPU's position, do not raise a significant safety issue which might have changed the Licensing Board's decision.

2. Licensee's Response to the NOV

There are no factual controversies regarding Licensee's response to the NOV. It appears that Licensee made material false statements in its response, but the two individuals primarily responsible (Arnold and Wallace) are no longer associated with TMI-1. The only individual left who was involved in any way is Dieckamp, and we see no significant factual disputes regarding his involvement. He reviewed the matter, found the argument "kind of thin," and chose not to intervene. While in hindsight this may have been unwise, it does not raise a significant safety concern.

With regard to the UCS challenge to Licensee's practice of shifting employees in question away from TMI-1, the Appeal Board in ALAB-772 discussed this issue in connection with whether further hearings were warranted on the "information flow" issue:

We would agree that, if further hearing established significant improper action by . . . any employee — the corporate entity itself must bear some of the responsibility. The degree would depend on the circumstances and conduct involved. In that sense, then, the corporate entity can never be held blameless for past acts. But the question here is whether the corporate entity can reasonably assure more responsible conduct by its managers in the future. A corporate entity is a "person" in the legal sense that it can sue and be sued and incur responsibilities, but in a real sense it can "act" solely at the direction of individuals. Replacing high level *managers* can therefore effect a corresponding substantive change in the philosophy and overall behavior of *management*. . . . [I]t cannot be gainsaid that [the absence of the implicated individuals] from the ranks of licensee's managers removes a large hurdle in licensee's path to proving it is competent to manage TMI-1 in a safe manner.⁹⁸

⁹⁸ We also note that the "corporate entity" to which TMIA refers has been denied permission to operate TMI-1 for more than five years. Virtually every aspect of its plant management and operation has undergone, and will continue to be subject to, scrutiny by the NRC and myriad external organizations (including intervenors) greater than that to which most other plants are subjected. Thus, it cannot be fairly said that the corporate entity has escaped sanction for its action in connection with the TMI-2 accident.

19 NRC at 1264-65 & n.98. With the removal of Arnold and Wallace, further hearings on this issue are not warranted.

3. Licensee's Obligation to Provide the Keaten Report to the NRC

There is no factual dispute regarding the circumstances under which Licensee provided the Keaten Report to the NRC, although contrary inferences can be drawn regarding why the Licensee did not provide it earlier. Any failure here would not be a material false statement, as the NRC Staff has concluded that it was already aware of the technical information in the report, but rather a violation of the Board Notification procedures, which require that all new information which is relevant and material be provided to the Boards in a timely fashion. Regardless, although Licensee perhaps should out of discretion have provided it to the Board, the Commission finds no serious concern here warranting a hearing.

4. Licensee's Recent Statements and Actions Regarding the Report

Intervenors argued that Licensee is now misrepresenting the purpose of the report, and that Licensee has failed to take appropriate action against those implicated in wrongdoing by OI. The Commission finds nothing warranting a hearing in Licensee's contradictory statements regarding the purpose of the report. Those statements indicate that the purpose of the report was an internal study, but it was recognized that the study might well be made public and hence have a public impact.

Nor do we believe a hearing is warranted on Licensee's disciplinary actions (or lack thereof). There is no controversy regarding what acts were taken, but rather with regard to the propriety of those acts. We do not find Licensee's practice of defending its employees prior to a formal determination of wrongdoing unreasonable. While Wallace and Arnold have been implicated in wrongdoing, they have not been found guilty, and we do not believe Licensee's actions toward these individuals raise any significant integrity concerns which might have affected the Licensing Board's decision, and accordingly they do not meet the standards for reopening.

VIII. CHANGES TO LUCIEN REPORT

A. Background

Shortly after the accident K.P. Lucien, an employee of Energy Incorporated (EI), under contract with GPU, investigated the factors that led up to the loss of feedwater during the accident. Lucien issued a report on September 1, 1979, which was critical of the startup and test program

at TMI-2. Members of the startup and test program disagreed with Lucien's report and set up a meeting with Lucien to discuss their disagreement. As a result of that conversation Lucien made several changes to his report. The issue is whether anyone acted improperly in connection with those changes.

B. Parties' Comments

TMIA, citing its 2.206 petition, stated that further hearings are required on this issue. TMIA made no argument regarding why the record should be reopened, instead merely stating its view of the facts of this issue and their significance.

The NRC Staff concluded that this matter does not meet the standards for reopening. Staff maintained that the changes to the Lucien Report do not raise questions about the integrity of the individuals involved, and there is no evidence that anyone in Licensee's management was involved in the changes.

Licensee maintained that this issue raises no integrity concern, and hence does not provide a basis for reopening.

C. Analysis

TMIA has presented no factual disputes which would warrant further hearing. Rather, the questions TMIA raises involve the inferences to be drawn from the facts presented by OI in its investigative report. We have examined the facts involved and do not believe that they warrant further hearings, or that the inferences which can reasonably be drawn from those facts warrant further hearings.

We will address two illustrative examples. TMIA maintained that Lucien's original finding that certain startup and test records may have been falsified was improperly changed. Lucien's original conclusion had been based on his review of records showing tests had been completed in 1 day when those tests could not physically have been done in 1 day. Lucien changed his conclusion when it was explained to him that only the date the overall testing process was finished was placed on the records. Lucien, based on this understanding, found that the discrepancy in the records "was the result of 'poor' administrative practices and record-keeping."

The second example concerns the handwritten memo accompanying Lucien's report when it was delivered to the Keaten Task Force. That memo stated, "[p]ler our understanding with R. Keaten, please launder this to bring it into line with your presentation of the forthcoming

master task force report.” Both Lucien and Long, to whom the memo was addressed, stated that the term “launder” meant only make the report conform with the written structure of the Keaten Report. TMIA concluded that “launder” was intended to mean conceal. TMIA supported this conclusion by arguing that the final Keaten Report was in fact substantially less critical than the Lucien Report.

We do not agree with TMIA’s inference that Lucien and Long are lying. The explanation given by Lucien and Long is reasonable, and the fact that the Keaten Report differed from the Lucien Report does not show an intent to conceal. We are aware of no direct evidence of wrongdoing in this matter, and hence conclude that hearings are not warranted.

IX. CHANGE IN OPERATOR TESTIMONY AT *GPU v. B&W* TRIAL

A. Background

During the review of the *GPU v. B&W* lawsuit record, it was determined that the trial testimony of W.H. Zewe (former TMI-2 Shift Supervisor) and E.R. Frederick (former TMI-2 operator) concerning whether high pressure injection (HPI) had been manually initiated on the morning of the accident differed significantly from previous statements made under oath by Zewe, Frederick, and C.C. Faust (former TMI-2 operator). These three individuals had previously stated that HPI had been manually initiated when the last two reactor coolant pumps were secured. At the *GPU v. B&W* trial, however, Zewe did not remember whether HPI had been initiated at that time, while Frederick testified that HPI could not have been initiated.

OI’s investigation indicated that the changes in testimony were brought about by GPU’s trial attorneys and were based on technical analyses that had been prepared subsequent to their prior statements. It also appears, however, that there is some question about the truthfulness of Frederick’s statement at trial and to OI that he had never previously taken a position on whether HPI had been initiated. Staff in NUREG-0680, Supp. No. 5, indicated that because of this concern, and his possible involvement in TMI-2 leak rate falsification, it would withhold Frederick’s TMI-1 Instructor Certification until these issues are resolved.

B. Parties’ Comments

TMIA, without addressing whether there are factual disputes and whether the standards for reopening are met, argued that further hear-

ings are required on this issue. TMIA's position is apparently based on its conclusion that the change in testimony "was the result of pressure exerted by GPU's attorneys and/or management, and likely untruthful." TMIA 2.206 Petition at A-238 to A-239. TMIA also appeared to imply that Licensee should have changed its official TMI-2 accident "sequence of events."

Staff concluded that the standards for reopening are not met because there is no "conclusive evidence of intentional misrepresentation," nor any evidence indicating improper activity or coercion by GPUN management. Staff Comments at 30.

Licensee stated this issue does not warrant reopening because there is no evidence "that licensee management influenced or made any attempt to influence the testimony of the operators in the *B&W* litigation." Licensee Comments at 26.

C. Analysis

There are no factual disputes here except for the concern about Frederick's earlier position. We believe Staff's actions concerning Frederick are reasonable, and that hearings on this issue would serve no useful purpose. We note in this regard that TMIA's inference that the change in testimony must have been improperly motivated is unsupported by any factual evidence, and it appears the change in testimony resulted from new technical analyses which had not previously been available to Zewe and Frederick, and which were brought to their attention by GPUN counsel to refresh their memories. We also believe Licensee was under no obligation to modify its official sequence of events because it is no longer material to any regulatory action, and, accordingly, Licensee is under no obligation to revise that document when new information becomes available. Hence, this issue does not meet the standards for reopening the record.

X. FINANCIAL/TECHNICAL INTERFACE

A. Background

One issue the Commission directed the Licensing Board to examine was whether the relationship between Licensee's "corporate finance and technical departments is such as to prevent financial considerations from having an improper impact upon technical decisions." CLI-80-5, *supra*, 11 NRC at 409.

The only evidentiary presentation by the NRC Staff on this issue was in the SER Supplement on management issues, NUREG-0680, Supp. No. 1. Staff in Supp. No. 1 stated that there was no indication of undue influence of financial considerations on TMI operation before the accident. Licensee presented the testimony of H. Dieckamp.

Since no intervenor presented evidence or proposed findings on this issue, the Licensing Board found it to be an uncontested matter. LBP-81-32, *supra*, 14 NRC at 514. The Licensing Board concluded that "Licensee's organizational framework and its practice of committing substantial resources to its nuclear business provides reasonable assurance that the relationship between its corporate finance and technical departments is such as to prevent financial considerations from having an improper impact upon technical decisions." *Id.* at 518. The finding was affirmed by the Appeal Board. ALAB-772, *supra*, 19 NRC at 1272.

The Licensing Board also examined other issues involving Licensee's finances in response to TMIA Contention 5. See LBP-81-32, *supra*, 14 NRC at 479. These issues included whether Licensee (1) deferred safety-related maintenance and repairs beyond the point established by its own procedures, (2) failed to keep accurate and complete maintenance records related to safety items, and proposed an excessive cut in the maintenance budget.

Staff's review of the *GPU v. B&W* lawsuit documents and OI's Keaten investigative report suggested that insufficient resources had been made available at TMI-2 prior to the accident, particularly with regard to the secondary side of the plant. Staff in Supp. No. 5 thus stated that "[t]his conclusion is at variance with staff's testimony" in the restart proceeding. Supp. No. 5 at 8-33.

B. Parties' Comments

TMIA, which again presented its view of the facts with no explanation of whether those facts meet the standards for reopening, would relitigate the entire issue of financial considerations.

Staff stated reopening is not required because the Licensing Board relied on substantial evidence besides the now-questioned Staff statement, and because much of that evidence focused on the post-accident period.

C. Analysis

The Commission has determined that this new information does not meet the standards for reopening. With regard to the financial/technical

interface issue, the Commission finds that much of the evidence before the Licensing Board focused on the post-accident period, and that the new information — which is primarily concerned with pre-accident matters — does not raise questions regarding Licensee's present financial commitments.

To the extent that TMIA is arguing that the entire issue of maintenance and financial considerations should be relitigated, there was evidence in the restart proceeding indicating that prior to the accident Licensee had insufficient resources devoted to nuclear operations. Any new information does not significantly add to the record in that regard. The concern today is with Licensee's current program. That program has been fully evaluated, and the new information does not raise serious concerns about the adequacy of that system.

XI. TIMELY REPORTING OF THE BETA/RHR REPORTS

A. Background

The BETA and RHR consultant reports were prepared for Licensee in early 1983,⁵⁷ and were subsequently provided to the NRC. The NRC's Executive Legal Director in a June 14, 1983 memorandum concluded that "[t]he licensee can be considered to have failed to meet its duty to make a Board Notification and its obligations under Section 186 (of the Atomic Energy Act) by failing to provide the BETA and RHR reports in a more timely fashion."

TMIA moved to reopen the record on this issue, and the Appeal Board denied that motion in ALAB-774.

B. Parties' Comments

TMIA, again without addressing whether there are material facts in dispute or whether the standards for reopening are met, stated this issue requires reopening. TMIA argued that Licensee had improper motives for withholding the reports, i.e., the adverse publicity which would result and the Appeal Board's possible interpretation of the reports' findings, and that Licensee was willing to make a Board Notification only when threatened by the NRC Staff. TMIA maintained that this evidences "serious integrity problems," and sets "an extremely bad exam-

⁵⁷The BETA Report was an efficiency study of TMI and Oyster Creek prepared by Basic Energy Technology Associates, Inc.

The RHR Report, prepared by Rohrer, Hibler & Replogle, Inc., assessed operator attitudes at those facilities.

ple from top management to subordinates as to what Licensee's legal responsibilities are." TMIA 2.206 Petition at A-243.

Licensee stated the Appeal Board already addressed this issue in ALAB-774, and there is no new information on this issue.

The NRC Staff maintained that this issue does not warrant reopening because the OI investigation revealed no basis for questioning the managerial integrity of any of the individuals involved. Staff also found that adequate corrective action has been taken to remedy Licensee's failure to evaluate and provide the reports to the NRC in a more timely fashion. Finally, the Staff noted that its position is consistent with that taken by the Appeal Board.

C. Analysis

The Commission in its order taking review of whether further hearings are required stated "[t]he parties should not address matters where motions to reopen have already been granted or denied on the same information cited by Staff, but rather should specify what, if any, new information which has not yet been passed on by a Board warrants reopening of the record." CLI-84-18, *supra*, 20 NRC at 814.

This issue was fully explored by the Appeal Board in ALAB-774. The Commission decided not to take review of that decision. The parties have brought forward no new information, and, accordingly, no further analysis is needed. This issue does not warrant further hearings.

Summary

The Commission has decided to allow the Licensing Board to render a decision on the Dieckamp mailgram and training issues. The Commission has also decided to institute a separate proceeding on the Hartman allegations, and to offer Husted an opportunity to request a hearing on the Appeal Board's condition barring him from working as a supervisor in the training of nonlicensed personnel. The Commission has decided that hearings are not warranted on any other issue. Finally, the Commission has decided to impose the following conditions on Licensee:

- (1) No pre-accident TMI-2 operator, shift supervisor, shift foreman, or any other individual both in the operating crew and on shift for training as a licensed operator at TMI-2 prior to the accident shall be employed at TMI-1 in a responsible management or operational position without specific Commission approval.

“Operational position” as used here includes any position involving actual operation of the plant, the direction or supervision of operators, or independent oversight of operations.

This condition shall also apply to the pre-accident Vice President, Generation, TMI-2 Station Manager, TMI-2 Supervisor of Technical Support (from January 1977 to November 1978), TMI-2 Superintendent of Technical Support (from December 1978 to the accident), and TMI-2 Supervisor of Operations. This condition shall not apply to Michael Ross, and Brian Mehler may continue in his present position consistent with this condition.

- (2) Licensee, in the absence of Commission authorization to the contrary, is to retain its expanded Board of Directors and its Nuclear Safety and Compliance Committee.

Commissioners Asselstine and Bernthal disapproved this Order. Their separate views are attached. The additional views of Chairman Palladino and Commissioners Roberts and Zech are also attached.

It is so ORDERED.

For the Commission

SAMUEL J. CHILK
Secretary of the Commission

Dated at Washington, D.C.,
this 25th day of February 1985.

DISSENTING VIEWS OF COMMISSIONER ASSELSTINE

In its August 9, 1979 order establishing this proceeding, the Commission concluded that it lacked the requisite reasonable assurance that Three Mile Island Unit 1 can be operated without endangering the health and safety of the public. CLI-79-8, 10 NRC 141, 142 (1979). The Commission's order enumerated a series of specific concerns supporting that conclusion, including: the special safety vulnerabilities in the Babcock and Wilcox design and the consequent greater burden that these reactors impose on the plant operators; the potential interaction between Unit 1 and the damaged Unit 2; the potential effect of cleanup activities at Unit 2 on the safe operation of Unit 1; the deficiencies in emergency

planning and station operating procedures which were so apparent during the Three Mile Island accident; and last, but not least, the serious questions about the management capabilities and technical resources of the Licensee which came to light as a result of the accident. Although the NRC Staff had developed a detailed set of required corrective actions to address many of these concerns, which the Commission expressly endorsed, the Commission found that these actions alone were not enough to restore the Commission's confidence in the Licensee's ability to operate this plant in a safe manner. Therefore, the Commission determined that a hearing was required on the issues specified in its order. The Commission further determined that this hearing must be completed, and the resulting decision of the licensing board must be reviewed by the Commission, prior to restart of the facility. *Ibid.*

In the ensuing years, a number of hearings have been held on the issues identified in the Commission's August 9, 1979 order. In addition, subsequent events have broadened the scope of the issues which are relevant to a decision on whether the Licensee can operate TMI-1 without endangering the health and safety of the public. Perhaps more than anything else, these events have served to focus attention in this proceeding on whether the Licensee has demonstrated the requisite competence and integrity to operate the plant in a safe manner. These events, and the concerns they raise, are not insignificant. Indeed, several events were so significant that they caused the NRC Staff to conclude that it could not support its previous testimony in favor of the Licensee's competence and integrity. These events include among others: the deliberate falsification of leak rate tests at TMI Unit 2 prior to the accident and the resulting criminal conviction of the Licensee for failure to even have a valid leak rate test; the widespread cheating by TMI-1 operators on company-administered tests and NRC licensing examinations as part of the requalification process for licensed operators; the false certification and management involvement in the coverup of cheating by a licensed operator during the requalification process; failures in the Licensee's pre-accident and post-accident training programs; evidence of contractor discrimination against an employee for seeking to raise safety concerns; evidence of widespread failures to follow safety procedures in the TMI-2 cleanup, and inaccuracies in the Licensee's response to the October 25, 1979 Notice of Violation which resulted from the TMI accident. Some of these events — most notably, the training and cheating incidents — are or have been the subject of hearings, but most have not. Some have also been covered, in varying degrees, by investigations by our Office of Investigations.

The question now before the Commission is whether additional hearings are needed in order to fulfill the requirements in the Commission's 1979 order prior to deciding to allow the restart of TMI-1. I conclude that further hearings are required in four areas to fulfill the Commission's commitments in the 1979 order. These areas are: (1) the Parks allegations regarding discrimination and widespread violations of safety procedures in the TMI-2 cleanup; (2) the Staff's change in position on the question of the Licensee's managerial competence and integrity; and, (3) TMI-2 leak rate falsification and TMI-1 leak rate falsification.

Parks Allegations

As OI's May 18, 1984 report on the Parks allegations notes, the Department of Labor has substantiated Mr. Parks' allegation that he was discriminated against by the Licensee's contractor for raising safety concerns regarding the TMI-2 cleanup. In addition, OI's September 1, 1983 report on allegations regarding TMI-2 safety procedures found widespread violations by the Licensee's contractor. The report went on to identify the failure of senior Licensee management to monitor responsibly the contractor's work and to hold the contractor accountable as the underlying cause of the violations of TMI-2 safety procedures.

The Parks allegations, and the ensuing OI reports, raise several issues which may be relevant to the Licensee's managerial competence and integrity to operate TMI-1. These issues include: the extent of discrimination against employees for raising safety concerns; any involvement of Licensee personnel; the implications of the discriminatory actions for the competence and safety attitudes of the Licensee's management, and the significance of the procedural violations and their relationship to a determination on the competence and integrity of the Licensee's operation of TMI-1. An opportunity for a hearing should be afforded on these issues.

Staff's Change in Position

The Staff's change in position presents perhaps the most compelling case for further hearings to fulfill the Commission's commitments in the August 9, 1979 order. In its July 1984 reevaluation of the Licensee's management integrity, the Staff found a pattern of activity by the Licensee which, had it been known by the Staff at the time the Staff formulated its position on management in the restart proceeding, "would likely have resulted in a conclusion by the staff that [the Licensee] had not met the standard of reasonable assurance of no undue risk to the public

health and safety." NUREG-0680, Supp. No. 5, at 2-2. The Staff went on to conclude, however, that the Licensee's present organization was acceptable. *Ibid.* That judgment was based upon a variety of factors: the Staff's finding on the significance and extent of Licensee participation in the pattern of events which the Staff identified as the basis for its change in position; the Staff's finding that the pattern of events which it identified as significant was all-inclusive; the Staff's finding that the present Licensee organization was a new organization in all significant respects, and the Staff's findings regarding subsequent performance of the Licensee's new organization.

It is clear that the Staff's change in position would have substantially affected the Licensing Board's earlier positive conclusion on the Licensee's competence and integrity. I cannot believe that the Board or the Commission would have found acceptable a licensee organization which the NRC Staff found to lack the requisite competence and integrity. This fact, together with the Staff's refusal to identify the specific portions of its previous testimony which are no longer valid, provides a compelling reason for further hearings on the broad question of the Licensee's managerial competence and integrity. That reason is further bolstered by the fact that there has been no opportunity for hearing on the many judgments made by the Staff, and the extensive new information relied upon by the Staff, in support of its current conclusion that the *present* Licensee organization possesses the requisite managerial competence and integrity to operate the plant in a safe manner. Further, the Licensing Board has never been given an opportunity to address the issue of whether all necessary remedial actions have been taken in response to these problems. Given these factors, it is beyond question that the present hearing record on the Licensee's management competence and integrity is stale and hardly serves as an adequate record upon which to make a decision.

Under these circumstances, the need to provide an opportunity for further hearings on the competence and integrity of the Licensee's current organization is clear. Such hearings should include: a review of the present TMI-1 organization; consideration of the Staff's reasons for its change in position and other factors affecting the validity of the Licensing Board's previous conclusions on the question; the significance and implications of a pattern of misconduct by the Licensee; the information and analysis which the Staff points to in support of its new conclusion regarding the competence and integrity of the Licensee's current organization; and the need for additional corrective actions.

TMI-2 and TMI-1 Leak Rate Falsifications

I also disagree with the Commission's treatment of the TMI-1 and TMI-2 leak rate issues (Hartman allegations). I believe that hearings are required on these issues and that those hearings must be a part of the TMI-1 restart proceeding. The reasons given by the Commission order for not reopening the record on the TMI-2 leak rate issues are very interesting and may have some relevance to whether the Commission can allow restart while the hearings proceed; however, on the issue of whether the TMI-1 record should be reopened, they are largely irrelevant.

We need not make predictions as to whether our hearing boards would find these issues relevant to restart because the Appeal Board has already decided that the restart record should be reopened to hear these issues. ALAB-738, 18 NRC 177 (1983) and ALAB-772, 19 NRC 1193 (1984).

The Board found that the Hartman allegations raised significant safety issues, stating:

Whether the Hartman allegations raise significant safety issues need not detain us long. Alleged violation of technical specifications, noncompliance with proper operating procedures, and destruction and falsification of records at Unit 2 before the accident — all assertedly under the auspices of at least first level management — obviously have serious implications for the proposed restart of Unit 1. The facts that the NRC staff referred this matter to the Justice Department for criminal investigation and that the Department has presented it to two Grand Juries underscore its significance.

ALAB-738, *supra*, 18 NRC at 188. The Board said that this was clearly within an issue the Commission directed the Licensing Board to examine:

"whether the actions of Metropolitan Edison's corporate or plant management (or any part or individual member thereof) in connection with the accident at Unit 2 reveal deficiencies in the corporate or plant management that must be corrected before Unit 1 can be operated safely[.]" CLI-80-5, 11 NRC 408, 409 (1980).

ALAB-738, *supra*, 18 NRC at 189.

The Board also concluded that the Hartman allegations might have affected the outcome of the Licensing Board proceeding. In fact, the Licensing Board noted its lack of information about the Department of Justice matter and made its conclusion that there were no deficiencies in corporate or plant management subject to the Hartman matter. The Appeal Board said that, in effect, the record never closed on this matter. Without an on-the-record examination of the Hartman matter, the Appeal Board said that the record contained a material gap and that it

could not make a final judgment as to the Licensee's management competence and integrity without an adequate record. The Appeal Board concluded that: " 'The Commission's primary commitment . . . to a fair and thorough hearing and decision' in this case requires no less than an exploration of Hartman's charges at [a] hearing. CLI-79-8, 10 NRC 141, 147 (1979)." *Id.* at 190.

In choosing to take review of the Appeal Board's decision, the Commission did not apply its usual standards for review. Normally the Commission only reverses an Appeal Board decision for a clear abuse of discretion or a clearly erroneous application of the law. 10 C.F.R. § 2.786. The Commission has not applied that standard here. Instead the Commission chose to reconsider the issue virtually without reference to the fact that the Appeal Board had already decided the issue. *See* CLI-84-18, 20 NRC 808 (1984).

The Commission has decided that the Appeal Board was wrong and that it need not reopen the TMI-1 hearing to take evidence on the Hartman issues. The basis for the Commission's conclusion is the mass of information available to the Commission about changes to TMI management, personnel and organization which has never been made a part of the hearing record and which has never been tested in an adjudicatory setting. In 1979, the Commission said that its decision on the management competence and integrity issues was going to be made on the record developed at a hearing before a licensing board. CLI-79-8, *supra*. In its haste to restart TMI-1, the Commission has decided to ignore that fact.

The information upon which the Commission relies to conclude that the record need not be reopened has never been the subject of a hearing. The parties have never had an opportunity to subject this information to cross-examination. The opportunity to file written comments on written reports is hardly an adequate substitute. Further, the Licensing Board has never had an opportunity to consider that information. The Board could very well decide that further management, personnel or organizational changes are necessary after reviewing a complete hearing record on the Hartman issues. In fact, the Licensing Board made its conclusions subject to the Hartman issues, and in effect, left the record open on these issues.

The Commission concludes, however, that it knows enough about what happened to find that there is no longer any safety significance to this issue. This conclusion is based on the changes to Licensee's organization, quarantine of some personnel from operational positions, and the statement of the U.S. Attorney relating to the plea agreement between the government and Licensee on the criminal indictment. I

cannot agree that the record is sufficiently complete that I can conclude with certainty that there is no remaining safety significance to these issues.

There has never been a complete, public investigation of this matter. OI did not complete its investigation of this issue, and the Grand Jury information is not available to us for evaluation. We have some information which clearly indicates that at least at TMI-2 the leak rate falsification was widespread and condoned, if not encouraged by, first-level management. However, we do not know precisely who was involved. We also do not know whether anyone above the first-level management should be held responsible. Therefore, we do not know whether all necessary remedial actions have been taken.

The Commission relies on the statement of the U.S. Attorney for its conclusion that upper level management should not be held responsible, and that there is, therefore, no further remedial action which must be taken. Unfortunately, the U.S. Attorney's statement while helpful as a starting place to begin an investigation of the issue can hardly be termed dispositive. We have no idea upon what information the U.S. Attorney's statement was based because we do not have access to Grand Jury materials. Also, the interests of the U.S. Attorney's office are not coextensive with those of the NRC. The U.S. Attorney is interested only in prosecution for violations of criminal statutes. The standards for proving criminal violations are much higher than those we apply to determine violations of our regulations. Further, our interests go beyond mere personal involvement in a particular act. We must also determine whether corporate management should be held responsible for such actions, regardless of direct involvement, because they allowed an attitude to develop such that falsifications occurred and because they had not developed procedures to assure that upper management was aware that the facility was not operating in conformity with its technical specifications. The Licensing Board has never been given an opportunity to consider these issues, or whether sufficient remedial actions have been taken to prevent the recurrence of such episodes and to ensure that the plant will be operated safely.

In fact, the issue of corporate responsibility will never be the subject of a hearing. The Commission has decided to throw a bone to the intervenors in the TMI-1 restart case by offering a limited hearing, outside the TMI-1 proceeding, which the Commission calls a "full airing" of the issue. That "full airing" will not address the involvement of anyone named by the U.S. Attorney in his statement. Thus, most of the GPU Nuclear management, and specifically Messrs. Kuhns and Dieckamp, are to be outside the scope of the proceeding. It will not address the

issue of corporate responsibility. This hardly amounts to a "full airing" of the issue. Obviously, the U.S. Attorney was right when he said that the Commission does not really care to know the true extent of what occurred and who were responsible. All the Commission seems to care about is what control room operators were involved. Once again the Commission demonstrates its talent for going for the capillary in resolving an issue.

While our information on TMI-1 leak rates is substantially more complete than that of the TMI-2 leak rate issues, that information is not a part of the TMI-1 restart record and has never been tested in an adjudicatory proceeding. I would also reopen the record on this issue so that there can be a full airing of the issue and so that the Licensing Board has a complete record before it when making a final judgment on the management competence and integrity of the utility. This would ensure that all needed remedial measures are required to further ensure that TMI-1 will be operated safely.

Conclusion

For the foregoing reasons, I conclude that further hearings are required on the subjects of TMI-2 and TMI-1 leak rate falsifications, the Parks allegations, and the Staff's change in position on the question of the Licensee's management competence and integrity. Absent a commitment to hold such hearings, I cannot find a basis for concluding that this Licensee possesses the requisite competence and integrity to operate TMI-1 in a manner that will not endanger the health and safety of the public. In deciding to deny further hearings on all but the question of TMI-2 leak rate falsifications, and to narrow the scope of that issue to the point where the hearing will be little more than a sham, the Commission has both abandoned the requirements it set forth in its August 9, 1979 order and broken its commitments to the public regarding the acceptable basis for a decision to restart TMI Unit 1. By its decision today, the Commission has violated the trust of the people of central Pennsylvania.

DISSENTING VIEWS OF COMMISSIONER BERNTHAL

At the outset I feel compelled to say that I consider this unfortunate split decision by the Commission on a matter as important as the TMI proceeding to be only the latest and most outstanding public interest

casualty of the extraordinarily restrictive deliberative process under which the Commission labors. That process virtually eliminates collegial decisionmaking as a practical possibility. And thus is the public deprived of what it deserves in the case of TMI perhaps more than in any other case considered by the Commission to date: a truly collegial decision.

As for the order itself, I have disapproved it not because I believe that further hearings on certain matters are necessarily *legally* required. Indeed, the information available to the Commission indicates that there have been sufficient changes in personnel and attitude in the GPU organization so as to offer substantial assurance that the significant problems of the past will not recur. And in keeping with their legal right, the parties to this proceeding have had extensive opportunity to comment on the available information, both in writing and in oral presentations at past Commission meetings.

Thus, while I can appreciate and respect the position of my colleagues who believe that no further hearings in this matter are either required or appropriate, I believe that the path they have chosen is unwise and ill-advised.

All Commissioners agree that there would be little point to the Commission now interfering with the Licensing Board's final consideration of the Dieckamp mailgram and training issues. The Board is certainly aware of the need to expedite its decision on these matters, to the extent possible. I also agree that further hearings should be held in the Hartman matter, although I do not believe that any useful purpose was served by the Commission specifying that such hearings be held *outside* the scope of the restart proceeding. In addition, I agree with the majority that elementary concepts of fairness require that we issue a formal opportunity for hearing to Mr. Husted prior to removing him from his supervisory position.

As for the other matters at issue, I depart from the position taken by the majority. It is true that the Commission has broad authority to decide which of these issues must be resolved in an adjudicatory format. Shortly after the TMI accident, the Commission announced that adjudicatory hearings would be convened on the issues raised by the accident. In my view, that was a purely *discretionary* decision by the Commission.

Since that decision, the Commission has proceeded to conduct off-the-record informal reviews of a number of TMI-related matters. Such reviews arguably also fall within the broad discretionary privilege of the Commission on a matter which is, after all, an enforcement proceeding under standard Commission procedure.

Nevertheless, in this case I believe that the Commission must exercise extraordinary diligence and perseverance to see that, insofar as is possible and appropriate within its special purview, it has provided the public with a complete record of the facts and events associated with the TMI accident and its aftermath, so that all reasonable public concerns and questions with respect to the long and troubled history of the TMI facilities may finally be laid to rest. There is therefore a strong, and I believe decisive, public policy value in full public hearings on all significant issues related to TMI-1 restart.

While further hearings may not be required as a *legal* matter on any remaining issues, policy considerations thus lead me to conclude that three outstanding matters deserve special consideration by the Commission: (1) The Staff's likely change of position; (2) The Parks allegations; and (3) TMI-1 leak rates.

As to the Staff's likely change of position, I agree that a case can be made that the four instances which are cited by the Staff are or will be resolved by one or more of the following: (1) the now-completed training hearings; (2) a further hearing of appropriate scope on the Hartman matter; and (3) the fact that the individuals directly involved in false statements on the NOV are no longer associated with TMI-1. However, if the four instances discussed by the Staff are considered not in isolation, but as a pattern of activity which might have had a significant impact on the Licensing Board's decision, an integrated picture of all elements involved in this issue is of significant public policy importance. I therefore would support the holding of further hearings on the overall pattern of conduct cited in NUREG-0680, Supp. No. 5.

In the matter of the Parks allegations, as I understand it, Mr. Parks' assertions that he was harassed have been substantiated by the Department of Labor investigation. Although neither Mr. Arnold nor any of his in-line superiors at GPU who could have played a direct role in this incident are today associated with TMI-1,¹ sound public policy again suggests that the test of cross-examination in a hearing be applied to determine whether the DOL investigation is indeed dispositive of this matter.

Concerning TMI-1 leak rates, the Appeal Board thought this issue sufficiently important to remand the issue to the Licensing Board in ALAB-772. Extensive information available to the Commission (but not part of the now 3-year-old Licensing Board record) indicates no motive for or verifiable pattern of such falsification at TMI-1. Nevertheless, in this circumstance the Commission should seek to be responsive to the Appeal

¹ Although Mr. Dieckamp remains on the Board of Directors of GPU Nuclear, he is no longer involved with the day-to-day operations of TMI-1.

Board's remand. On balance therefore, I would support an adjudicatory test of the off-the-record information considered by the Commission concerning TMI-1 leak rates.

Finally, it is important to emphasize that I am under no illusion that the Commission might somehow, by convening further hearings on some or all of the issues which I have identified, satisfy all those who might oppose eventual operation of this facility. Rather, given the age of the record in this case and the significant off-the-record information on which the Commission would have to rely were restart to be authorized, I believe that the vast majority of the public will be far better able to understand and concur in whatever judgment the Commission finally makes in this matter if the Commission makes every reasonable effort to assure a thorough airing of all essential information considered by the Commission.

SEPARATE STATEMENT OF CHAIRMAN PALLADINO AND COMMISSIONERS ROBERTS AND ZECH

Our judgment on where the public interest lies regarding the necessity and value of additional formal adjudicatory hearings in this proceeding is just opposite that of our two dissenting colleagues. While we certainly respect their views, we believe it useful to summarize briefly the reasons for our position in that regard.

At this point in this prolonged proceeding, our task is to determine whether there are any remaining significant disputed issues of fact relevant to the resolution of the 1979 order which immediately suspended the license to operate TMI-1. As a matter of its discretion, the Commission in 1979 also decided to hold adjudicatory hearings, in which interested members of the public were allowed to participate, on the immediately effective suspension order. In the almost 6 years which have passed since the immediately effective suspension order, exhaustive adjudicatory proceedings have been conducted. We need not be apologetic to anyone on the efforts this agency has made over these 6 years to have identified and adjudicated all relevant significant disputed issues of fact in this proceeding. Last September, we gave all of the interested parties the opportunity to inform us of their views on any specific factual issues which remain in dispute. Those responses together with our own review of the issues in this proceeding are the basis for our conclusion that, except as noted in our memorandum and order, no further adjudicatory

hearings are warranted to resolve significant facts which remain in dispute in this proceeding and which are needed for a final decision on the suspension order. Without such factual issues to be resolved, further adjudicatory hearings would serve no proper and useful purpose. For whatever other reason they may be desirable, holding "trials" when none are required is not, in our judgment, a responsible regulatory action.

We are aware of the understandable and proper interest of the citizens of the Commonwealth in this matter. We support complete, candid, and open communications with them at all times regarding all matters relating to safety at the plant. We do not believe, however, that holding unwarranted formal adjudicatory hearings would best serve the legitimate purpose of having the public fully informed on such matters.

The fundamental issue before us is whether the record now available is adequate for us to reach a judgment on the competence and integrity of the present TMI-1 management and organization to operate the plant with reasonable assurance that the public health and safety is protected. In reviewing this matter, we have carefully considered whether, on the basis of our own evaluations, and on the basis of the parties' responses to our September 11, 1984 order, additional disputed factual matters need to be resolved in adjudicatory proceedings. We have concluded that there are none, other than as indicated in our memorandum and order. Under these circumstances, we simply cannot agree either that it would serve the public interest, or that it would otherwise be sound regulatory policy for us to perpetuate the formal adjudicatory process which the Commission initiated as a discretionary matter in 1979 to assist it in making a decision on the immediately effective suspension order. The formal decisions which have been rendered to resolve a variety of issues in this proceeding demonstrate that the objectives of developing a full record for the resolution of contested issues has been met. There is no further purpose to be served by still another round of adjudicatory hearings. We must move on to consider a decision, one way or the other, on the continuing justification for the immediately effective suspension order. Under these circumstances, at this stage of the proceeding, it is our judgment that neither our regulatory responsibilities nor the public interest justify our acting otherwise on the question of holding further adjudicatory hearings.

Although the foregoing gives the fundamental basis for the differences between the majority and the dissenting opinions on the need for further adjudicatory hearings, we wish to respond briefly to certain specific points raised by the dissenting opinions. Our detailed rationale on the issues raised by the dissenters is, of course, set forth in our memorandum and order.

The Staff's Change in Position

The Staff's assertion of its likely change of position rested on allegedly new information about four items. Our memorandum and order analyzes each item and concludes that none presents a significant safety issue for the operation of TMI-1. It also points out that two of the items have been or will be the subject of full board proceedings and that the remaining two items hold no continuing significance to TMI-1 operation.

Commissioner Asselstine's characterization of the Staff's change in position is fundamentally inaccurate in two important respects. First, the Staff did not change its position on the competence and integrity of the Licensee's current management. It stated that a pattern of activity which occurred prior to and shortly after the accident "would likely have resulted in a conclusion by the staff that the licensee had not met the standard of reasonable assurance . . ." This referred to Met-Ed's organization *prior* to and shortly after the accident. Second, the Staff took a position on the adequacy of the successor organization, GPU Nuclear, and evaluated and revalidated its acceptability. The adequacy of GPU Nuclear has been litigated.

The Allegation of Leak Rate Falsification at TMI-1 and TMI-2

With regard to the allegations of leak rate data falsification at TMI-1, the memorandum and order notes that a thorough investigation of the allegations concluded that there was no reason to falsify leak rate test results at TMI-1. The order also notes that a detailed NRC review of the test results themselves evidenced no pattern of deliberate falsification. The memorandum and order's analysis of the Hartman allegations of falsifications at TMI-2 points out the U.S. Attorney's statement, in the course of the proceedings on plea and sentencing, that

the evidence presented to the grand jury and developed by the United States Attorney does not indicate that any of the following persons participated in, directed, condoned or was aware of the acts or omissions that are the subject of the indictment. And they are William G. Kuhns, Herman M. Dieckamp . . .¹

The order concludes that Kuhns and Dieckamp should not be deemed responsible for leak rate falsification solely by virtue of their corporate position or their lack of awareness of falsification. We also found that, in view of our Office of Investigations' conclusions, it is highly unlikely

¹ Commissioner Asselstine is wrong to dismiss the U.S. Attorney's statement because of the different standards that apply to criminal violations. The quoted U.S. Attorney's statement is not couched in terms of the criminal standard.

that Michael Ross knew of or was involved in leak rate falsifications at TMI-2, and that his continued presence at TMI-1 does not raise a safety concern.

The order further notes that no other person involved in the TMI-2 operations during the period of leak rate falsification would be employed in a responsible management or operational position at TMI-1 without prior Commission approval.

Commissioner Asselstine's characterization of why the majority chose to approve a hearing on TMI-2 leak rate falsification outside the restart proceeding is inaccurate and misleading. He has inappropriately and incorrectly attributed motives to the majority which have no bearing on the real reasons for our decision. The majority was concerned that the TMI-2 leak rate issue would have inadequate public disclosure and that those individuals who are believed to have been involved would never be identified as culpable or exonerated, as appropriate. For the reasons stated in the memorandum and order, that purpose clearly has nothing to do with the TMI-1 restart proceeding.

The Parks Matter

The Commission memorandum and order notes that there has been no showing of a widespread pattern of discrimination, that the acts of harassment and intimidation involved TMI-2 activities (not TMI-1), that the major GPUN official involved is no longer associated either with GPUN or TMI-1 activities, and that GPUN has adopted clear policies to prevent future acts of harassment or intimidation.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Thomas S. Moore
Dr. Reginald L. Gotchy

In the Matter of

Docket No. 50-482-OL

**KANSAS GAS & ELECTRIC
COMPANY, et al.**
**(Wolf Creek Generating Station,
Unit 1)**

February 5, 1985

Finding no error requiring corrective action, the Appeal Board affirms on *sua sponte* review a Licensing Board initial decision (LBP-84-26, 20 NRC 53 (1984)) that authorized the issuance of an operating license for the Wolf Creek facility.

DECISION

On July 2, 1984, the Licensing Board rendered its initial decision in this operating license proceeding involving the Wolf Creek nuclear facility located in Coffey County, Kansas.¹ Essentially confined to emergency

¹ LBP-84-26, 20 NRC 53.

planning issues raised by certain intervenors in the proceeding,² the decision resolved those issues in the applicants' favor. Thus, subject to the prior fulfillment of two conditions imposed by the Board with respect to the Coffey County emergency plan, the Director of Nuclear Reactor Regulation was authorized to issue an operating license for the facility upon making the requisite findings on the matters not in adjudication.³

No appeals were taken from the initial decision. Consequently, in accordance with our customary practice, we undertook to review the decision *sua sponte*.

During the course of that review, we learned that the emergency exercise for the facility was scheduled for November 7, 1984. This fact prompted us (1) to direct the NRC staff to provide us with the results of that exercise as soon as the information became available; and (2) pending receipt of those results, to hold the completion of the *sua sponte* review in abeyance.⁴

Staff counsel has now supplied us with the Federal Emergency Management Agency's (FEMA's) evaluation of both the November 7 exercise involving the Wolf Creek radiological emergency response plans and the subsequent December 19 remedial exercise involving the alert and notification system of the State of Kansas and Coffey County.⁵ In addition, we have been given FEMA's revised interim findings on the state and local emergency preparedness plans and implementing procedures developed for a radiological emergency at Wolf Creek.⁶ Collectively, these materials led the FEMA Regional Director to conclude that

1) the State and local emergency plans are adequate and capable of being implemented, and 2) the exercises demonstrated that the off-site preparedness is adequate to provide reasonable assurance that appropriate measures can and will be taken to protect the health and safety of the public living in the vicinity of the site in the event of a radiological emergency.⁷

² Another intervenor had put forth a single contention pertaining to the financial qualifications of one of the applicants. That intervenor was subsequently dismissed as a party to the proceeding by reason of the Commission's removal of financial qualifications as a litigable issue in operating license proceedings. See ALAB-784, 20 NRC 845 (1984).

³ LBP-84-26, *supra*, 20 NRC at 122-23.

⁴ See October 23, 1984 order (unpublished).

⁵ Attachment to January 30, 1985 letter from Myron Karman to this Board.

⁶ *Ibid*.

⁷ January 14, 1985 memorandum from Patrick J. Breheny, Regional Director, FEMA-Region VII, to Samuel W. Speck, Associate FEMA Director for State and Local Programs and Support, attached to Karman letter, note 5, *supra*.

Our own scrutiny of the FEMA-supplied documents disclosed nothing that might cast doubt upon the validity of the Licensing Board's ultimate conclusion that the Wolf Creek emergency plans meet the regulatory requirements and provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.⁸ We therefore have gone forward with the *sua sponte* review of the content of the initial decision itself.⁹ Inasmuch as no error requiring corrective action has come to light, the decision is now *affirmed*.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

⁸ See LBP-84-26, *supra*, 20 NRC at 122. In the circumstances, there is no occasion to reopen the evidentiary record of this proceeding to receive the FEMA documents. Needless to say, had it brought the acceptability of the Wolf Creek emergency plans into question, we could not have given any effect to the new information without first including it in the record. And such a step would not have been taken without the prior solicitation of the views of the parties.

⁹ In an operating license proceeding, our *sua sponte* review generally is confined to the issues resolved in the Licensing Board's initial decision. Thus, should the staff's review of a license application reveal deficiencies in the facility that were not the subject of adjudication, such matters are left for staff resolution.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

**Gary J. Edles, Chairman
Dr. W. Reed Johnson
Thomas S. Moore**

In the Matter of

**Docket Nos. 50-498-OL
50-499-OL**

**HOUSTON LIGHTING & POWER
COMPANY, *et al.*
(South Texas Project, Units 1
and 2)**

February 6, 1985

Because the Licensing Board's substantive determination in a partial initial decision (LBP-84-13, 19 NRC 659) that the applicant is likely to be able to meet the character and competence requirements necessary to obtain an operating license for the South Texas plant is expressly subject to change in light of forthcoming hearings, the Appeal Board declines to review that determination. It affirms the Licensing Board's ruling on the standard to be applied in measuring character and competence and various other rulings.

RULES OF PRACTICE: APPELLATE REVIEW

Generally, appeal boards do not review licensing board determinations that do not constitute a final resolution on the merits. *See, e.g., Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-738, 18 NRC 177, 190 (1983).*

REGULATIONS: PLANT CONSTRUCTION STANDARDS

The Commission's regulatory scheme recognizes that an applicant is bound to make errors necessitating correction during the course of construction of a nuclear power plant. *See, e.g.,* 10 C.F.R. § 50.55(e); 10 C.F.R. Part 50, Appendix B, § XVI.

OPERATING LICENSE PROCEEDINGS: QUALITY ASSURANCE (CONSTRUCTION)

Plainly, whether a plant was properly built bears on whether it can be operated safely. Construction quality assurance issues are a frequent component of operating license proceedings. *See, e.g., Union Electric Co. (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 345 (1983).*

OPERATING LICENSE PROCEEDINGS: APPLICANT'S CHARACTER AND COMPETENCE

Neither the Atomic Energy Act nor the Commission's case law provide a complete definition of character or competence. Prior decisions simply identify the factors that are pertinent to an inquiry into those matters.

OPERATING LICENSE PROCEEDINGS: APPLICANT'S CHARACTER AND COMPETENCE (REMEDIAL EFFORTS)

Although no cases are precisely on point, the clear import of prior appeal board decisions is that remedial efforts are relevant to determining whether applicants should be permitted to obtain or retain licenses.

OPERATING LICENSE PROCEEDINGS: QUALITY ASSURANCE

Denial of a license requires a finding that it is not possible for the ascertained quality assurance failings either to be cured or to be overcome to the extent necessary to reach an informed judgment that the facility has been properly constructed. *Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2), ALAB-770, 19 NRC 1163, 1169 (1984).*

OPERATING LICENSE PROCEEDINGS: APPLICANT'S CHARACTER AND COMPETENCE

A review of the totality of circumstances is required to permit a reasonable prediction regarding whether an applicant for an operating license can and will comply with the safety and environmental standards imposed by statute and the Commission's regulations and procedures.

OPERATING LICENSE PROCEEDINGS: APPLICANT'S CHARACTER AND COMPETENCE

Even an applicant's poor past conduct need not automatically foreclose a finding that it now possesses the requisite high degree of character or competence to obtain an operating license.

ADJUDICATORY BOARDS: BIAS

That a board reaches conclusions and makes findings contrary to those urged by a party does not establish bias. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-644, 13 NRC 903, 923 (1981).

RULES OF PRACTICE: APPELLATE REVIEW (CROSS-EXAMINATION RULINGS)

A mere demonstration that a board erred by curtailing cross-examination is not sufficient to warrant appellate relief. The complaining party must demonstrate actual prejudice — i.e., that the ruling had a substantial effect on the outcome of the proceeding. *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), ALAB-788, 20 NRC 1102, 1151 (1984).

ADJUDICATORY BOARDS: AUTHORITY (CROSS-EXAMINATION PLANS)

The authority of a board to demand cross-examination plans is encompassed by the board's power to control the conduct of hearings and to take all necessary and proper measures to prevent argumentative, repetitious, or cumulative cross-examination. 10 C.F.R. §§ 2.718(e), 2.757(c). See also *Louisiana Power and Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1096 (1983). Indeed, such plans are encouraged by the Commission as a means of making a hearing

more efficient and expeditious. *Statement of Policy on Conduct of Licensing Proceedings*, CLI-81-8, 13 NRC 452, 457 (1981).

RULES OF PRACTICE: BRIEFS

Bald allegations made on appeal of supposedly erroneous Licensing Board evidentiary rulings may be properly dismissed for inadequate briefing. *See* 10 C.F.R. § 2.762(d).

RULES OF PRACTICE: CROSS-EXAMINATION (SCOPE)

It is firmly established that the scope of cross-examination is ordinarily limited to matters raised in direct testimony. *See Waterford, supra*, 17 NRC at 1096 and cases cited.

RULES OF PRACTICE: EVIDENCE (PREFILED WRITTEN TESTIMONY)

The use of prefiled, written testimony generally is permitted by the Administrative Procedure Act in licensing cases and authorized by the Commission's Rules of Practice. 5 U.S.C. § 556(d); 10 C.F.R. § 2.743(b).

RULES OF PRACTICE: EVIDENCE (WITNESS PANELS)

The use of witness panels is a long-standing practice in licensing hearings, consistent with Commission policy. *See* 10 C.F.R. Part 2, Appendix A, § V(d)(4).

RULES OF PRACTICE: APPELLATE REVIEW

A party may not raise on appellate review licensing board practices it did not object to at the hearing stage.

RULES OF PRACTICE: APPELLATE REVIEW (SCHEDULING DECISIONS)

To justify overturning a licensing board's scheduling decision, an appeal board must be satisfied that the licensing board set a schedule that deprives a party of its right to procedural due process. *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-459, 7 NRC 179, 188 (1978). *See also Wisconsin Electric Power*

Co. (Point Beach Nuclear Plant, Unit 1), ALAB-719, 17 NRC 387, 391 (1983).

RULES OF PRACTICE: BRIEFS

An appellant carries the burden of presenting an appeal board with an adequate brief in the first instance and bears the risk of any oversight by the board if it fails to do so. A failure to brief issues adequately deprives the appeal board precisely of that assistance which the Rules of Practice are designed to have an appellant provide, i.e., to flesh out the bare bones of claims on appeal and to present the board with sufficient information or argument to allow an intelligent disposition of the issues. *Commonwealth Edison Co.* (Byron Nuclear Power Station, Units 1 and 2), ALAB-793, 20 NRC 1591, 1619 n.133 (1984), quoting *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-270, 1 NRC 473, 475 (1975), and *United States v. White*, 454 F.2d 435, 439 (7th Cir. 1979). See also *Wisconsin Electric Power Co.* (Point Beach Nuclear Plant, Unit 1), ALAB-696, 16 NRC 1245, 1255 (1982); *Public Service Co. of Oklahoma* (Black Fox Station, Units 1 and 2), ALAB-573, 10 NRC 775, 786-87 (1979).

RULES OF PRACTICE: REOPENING OF PROCEEDINGS

The five-factor test normally used to determine whether to grant a nontimely request for intervention, or to permit the introduction of additional contentions by an existing intervenor after the filing date, should also be applied to determine whether one intervenor may be allowed to adopt contentions that no longer have a sponsor when the sponsoring intervenor withdraws from the proceeding. See 10 C.F.R. §§ 2.714(a)(1), (b).

OPERATING LICENSE PROCEEDINGS: ENVIRONMENTAL AND SAFETY ISSUES

There is no automatic right to adjudicatory resolution of environmental or safety questions associated with an operating license application. See *Cincinnati Gas and Electric Co.* (William H. Zimmer Nuclear Power Station), ALAB-305, 3 NRC 8, 9 (1976). The Commission's regulations limit operating license proceedings to "matters in controversy among the parties" or matters raised on a licensing board's own initiative *sua sponte*. 10 C.F.R. §§ 2.104(c), 2.760a.

RULES OF PRACTICE: WITHDRAWAL OF INTERVENOR

Where only a single intervenor is participating in an operating license proceeding, its withdrawal serves to bring the proceeding to an end. Where there is more than one intervenor in a case, the withdrawal of one does not terminate the proceeding. Under NRC procedure, however, it does serve to remove the withdrawing party's contentions from litigation. *Project Management Corp.* (Clinch River Breeder Reactor Plant), ALAB-354, 4 NRC 383, 391-92 (1976).

RULES OF PRACTICE: CONTENTIONS (ACCEPTANCE)

The mere acceptance of contentions at the threshold stage does not turn them into cognizable issues for litigation independent of their sponsoring intervenor. *Texas Utilities Generating Co.* (Comanche Peak Steam Electric Station, Units 1 and 2), CLI-81-36, 14 NRC 1111, 1113-14 (1981). Safety or environmental matters not the subject of contentions or raised by a board *sua sponte* are left for nonadjudicatory resolution by the NRC staff. *Consolidated Edison Co. of New York* (Indian Point, Units 1, 2 & 3), ALAB-319, 3 NRC 188, 189-90 (1976).

RULES OF PRACTICE: CROSS-EXAMINATION

Under principles announced in *Prairie Island*, an intervenor may ordinarily conduct additional cross-examination and submit proposed factual and legal findings on contentions sponsored by others. *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-244, 8 AEC 857, 863, 867-68 (1974), *aff'd in pertinent part*, CLI-75-1, 1 NRC 1 (1975).

RULES OF PRACTICE: CONTENTIONS (REQUIREMENTS FOR INTERVENTION)

The Commission's regulations require that, at the outset of a case, each intervenor submit a list of the contentions which it seeks to have litigated. 10 C.F.R. § 2.714(b). Moreover, one may not introduce affirmative evidence on issues raised by another intervenor's contentions. *Prairie Island, supra*, 8 AEC at 869 n.17.

RULES OF PRACTICE: CONTENTIONS

Because contentions can be withdrawn or settled through negotiation, a non-sponsoring party assumes at least some risk that the pursuit of its

interests may not be wholly within its control. *Clinch River, supra*, 4 NRC at 392. See *Duke Power Co.* (Cherokee Nuclear Station, Units 1, 2 and 3), ALAB-440, 6 NRC 642, 645 (1977).

RULES OF PRACTICE: REOPENING OF PROCEEDINGS (STAFF PARTICIPATION)

Participation of the NRC staff in a licensing proceeding is not tantamount to participation by a private intervenor. *Washington Public Power Supply System* (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167 (1983). By analogy, the availability of staff review outside the hearing process generally does not constitute adequate protection of a private party's rights when considering factor two under 10 C.F.R. § 2.714(a).

RULES OF PRACTICE: REOPENING OF PROCEEDINGS (GOOD CAUSE)

If, in the circumstances of a particular case, there is a sound foundation for allowing one entity to replace another, it can be taken into account in making the "good cause" determination under 10 C.F.R. § 2.714(a). *Gulf States Utilities Co.* (River Bend Station, Units 1 and 2, ALAB-444, 6 NRC 760, 796 (1977)).

APPEARANCES

Lanny Sinkin, Washington, D.C. (with whom **Craig Jordan**, **Michael Hall**, and **Margaret Burns**, Austin, Texas, and **Robert Hager**, Washington, D.C., were on the brief), for intervenor **Citizens Concerned About Nuclear Power, Inc.**

Maurice Axelrad, Washington, D.C. (with whom **Jack R. Newman**, **Alvin H. Gutterman** and **Donald J. Silverman**, Washington, D.C., and **Finis E. Cowan**, Houston, Texas, were on the brief), for applicants **Houston Lighting & Power Company, et al.**

Edwin J. Reis (with whom **Oreste Russ Pirfo** was on the brief) for the Nuclear Regulatory Commission staff.

DECISION

We have before us the appeal of the intervenor, Citizens Concerned About Nuclear Power, Inc. (CCANP), from a March 14, 1984 partial initial decision in this operating license proceeding involving the South Texas nuclear power project.¹ The facility consists of two pressurized water reactors, each with a rated electrical output of 1250 megawatts, located approximately fifteen miles southwest of Bay City, Texas.

The NRC issued construction permits for South Texas in 1975.² The operating license application was filed in 1978 by Houston Lighting and Power Company (HL&P), Central Power and Light Company, and the cities of Austin and San Antonio, Texas. HL&P, however, is the lead applicant with responsibility for construction and operation of the project. Brown and Root, Inc. (B&R) was chosen by HL&P as architect-engineer, constructor and project manager. Various problems attended the project from its inception. Over a period of about six years, beginning even before issuance of the construction permits, the NRC's Region IV staff performed more than seventy site and corporate inspections and investigations and issued more than forty notices of noncompliance or deviation.³

As a result of HL&P's seeming inability to correct previously identified problems, along with continuing allegations concerning intimidation and harassment of quality control inspectors and lack of quality control, the staff undertook a special investigation between November 1979 and February 1980. That investigation culminated in the issuance of Report 79-19 by the Commission's Office of Inspection and Enforcement.⁴ The report identified twenty-two noncompliances in construction activity, substantiated allegations of harassment and intimidation of quality assurance inspectors, noted substantial deficiencies in the construction of the project, and, in general, cast serious doubt on HL&P's ability to manage the construction of the project. The report was accompanied by a proposed civil penalty of \$100,000 and an order to show cause requiring HL&P to demonstrate why safety-related construction activities at South Texas should not be halted.⁵

¹ LBP-84-13, 19 NRC 659.

² LBP-75-71, 2 NRC 894 (1975), *aff'd*, ALAB-306, 3 NRC 14 (1976).

³ LBP-84-13, *supra*, 19 NRC at 738. A noncompliance is a failure to comply with a NRC regulatory requirement. 10 C.F.R. Part 2, Appendix C, §§ III and IV. A deviation is a failure to satisfy a voluntary commitment. *Id.* § IV(E)(3).

⁴ Staff Exhibit (Exh.) 46, Appendix D.

⁵ 45 Fed. Reg. 30,753 (1980).

The applicant responded to the order by acknowledging most of the staff's findings, paying the civil penalty, and undertaking remedial measures.⁶ In late 1981, HL&P replaced B&R as architect-engineer and project manager. Bechtel Power Corporation assumed those duties. Ebasco Services later replaced B&R as the constructor.⁷

Prior to issuance of the show cause order, the Licensing Board assigned to preside over the operating license proceeding had proposed to hear the intervenors' contentions relating to construction and quality assurance deficiencies before the other issues in the proceeding. It did this "so that, if corrective action is required, it may be undertaken as early as possible in the construction schedule."⁸ Thereafter, the intervenors also asked the Commission to direct a hearing on the staff's order to show cause. They contended that the violations found by the NRC investigation were part of an ongoing pattern of problems that called into question whether the safety of the plant could be assured. The Commission denied the intervenors' request for a hearing but endorsed the Licensing Board's proposal to hold expedited hearings as part of the ongoing operating license proceeding. The Board was instructed to issue "an early and separate decision" on whether the matters brought to light by the order to show cause — including, specifically, the broad issue of HL&P's character and competence to operate the plant — warranted denial of the operating license application.⁹

In response to the Commission's instructions, the Board proposed to divide the operating license proceeding into three phases. Phase I was designed to deal with the applicant's character and competence and various quality assurance/quality control (QA/QC) issues. These matters were derived primarily from the Commission's order. The Board's decision in Phase I is the subject of this appeal.

Based on its review of the evidence in Phase I, the Board found "no basis *at this time* for concluding (1) that the reasonable assurance findings contemplated by 10 C.F.R. § 50.57 cannot be made, or (2) that HL&P currently lacks managerial competence or character sufficient to preclude an eventual award of operating licenses for [the South Texas Project]."¹⁰ Hearings on some aspects of the competence and character issue, however, are not complete. First, the Board has yet to hear testimony on the so-called Quadrex Report. That study, prepared at the behest of HL&P by Quadrex Corporation, an independent consultant,

⁶ LBP-84-13, *supra*, 19 NRC at 667.

⁷ *Ibid.*

⁸ Licensing Board Memorandum (March 10, 1980) (unpublished) at 2.

⁹ CLI-80-32, 12 NRC 281, 290-92 (1980).

¹⁰ LBP-84-13, *supra*, 19 NRC at 668 (emphasis added).

“analyzes the engineering practices and capabilities of Brown and Root, Inc. . . .”¹¹ Furthermore, the Board must hear the parties’ evidence regarding the performance of HL&P and its new contractors since the close of the hearing.¹² These matters will be taken up in Phase II. As a consequence, the Board expressly left open the possibility of modifying its tentative findings and conclusions regarding character and competence.¹³

Before us CCANP challenges a number of the Board’s substantive determinations and also argues that certain procedural errors occurred that deprived it of a fair hearing.¹⁴ Because the record on the issues of character and competence remains open and the Board’s findings are expressly subject to change, we cannot reach any appellate determination on the merits of the ultimate issue of HL&P’s fitness to operate the plant. Generally, we do not review licensing board determinations that do not constitute a final resolution on the merits.¹⁵ Perforce, we do not examine the numerous factual findings or inferences that undergird a board’s conditional conclusions.

We nonetheless recognize that this is a unique proceeding in which the Commission has specifically directed the Licensing Board to issue an “early and separate” decision on the character and competence question. Thus, the Commission intended a determination of whether the application should be denied at the threshold. In such circumstances, we do not believe it is appropriate to defer all appellate consideration.

We also appreciate that much time and effort have already been expended in connection with the appeal and that some of the subsidiary questions, at least, are now amenable to resolution. Indeed, our early pronouncement on these questions — such as whether the Licensing

¹¹ Licensing Board Memorandum and Order (March 25, 1982) (unpublished) at 1-2.

¹² See LBP-84-13, *supra*, 19 NRC at 697, 698, 832.

¹³ *Id.* at 668, 691, 697-99. In Phase III, HL&P and the staff will update testimony regarding HL&P’s planned organization for operation. Because operation of the plant is several years away, and HL&P has been concentrating on construction, its operational plans are incomplete. See *id.* at 782-87.

¹⁴ On June 27, 1984 we rejected CCANP’s 118-page, late-filed brief because it greatly exceeded the 90-page limit we established in response to the intervenor’s motion for an enlargement of the page limit for briefs. Order of June 27, 1984 (unpublished). Again, CCANP has submitted a brief in excess of that limit. Although in this instance we accept the brief, it appears that CCANP easily could have presented its argument within the 90-page limit. (Indeed, it appears that the 70-page limitation contained in 10 C.F.R. § 2.762(e) should have been sufficient.) In the future, we expect strict adherence to the terms of our orders.

¹⁵ In the *Three Mile Island Restart* proceeding, for example, the Licensing Board issued conditional findings on the issue of management integrity and competence in view of the pendency of ongoing investigations by the Department of Justice. We declined to make any final judgment on appeal as to the licensee’s management competence and integrity in the face of what we there described as “[t]he absence of a materially complete record.” *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), ALAB-738, 18 NRC 177, 190 (1983).

Board applied the correct standard when measuring character and competence, or whether prejudicial procedural error was committed — may be helpful to the parties and the Licensing Board in litigating Phase II of the case. Accordingly, we take the somewhat unusual step of resolving certain issues at this time.¹⁶

We affirm the Licensing Board's ruling with respect to the standard to be applied when measuring character and competence. We find no bias or procedural error in the Board's conduct of the proceeding. As discussed in Part II(G), *infra*, however, we return one matter to the Board for its further consideration — whether certain issues originally raised by former intervenor Citizens for Equitable Utilities, Inc. (CEU) present serious safety or environmental questions that warrant Board examination pursuant to its *sua sponte* authority. We decline to review the Board's determination that HL&P is likely to be able to demonstrate that it possesses the requisite fitness to operate the South Texas plant safely.

I. THE CHARACTER AND COMPETENCE ISSUE

A central issue on appeal is what standard for character and competence should be used to measure HL&P's eligibility for an operating license. As a threshold matter, CCANP suggests that we have a "unique opportunity to address an issue that has never really been addressed by the . . . Commission . . . in the context of a nuclear licensing proceeding."¹⁷ We believe our mission is far more limited.

As we recognized in our decision last year in the *Three Mile Island (TMI) Restart* proceeding, despite the lack of definitive standards for measuring an applicant's character and competence the adjudicatory boards do not operate entirely within a regulatory vacuum.¹⁸ To be sure, neither the Atomic Energy Act nor the Commission's case law provide a complete definition of character or competence.¹⁹ Nevertheless, prior decisions identify the factors that are pertinent to an inquiry into those

¹⁶ Although the Commission did not specifically instruct the Licensing Board on how to manage the case, it did call for an "early and separate" decision to resolve the character and competence questions — presumably with appellate review to follow. See CLI-80-32, *supra*, 12 NRC at 292. Because the Licensing Board has yet to resolve these questions, no such decision has been issued. Nevertheless, in the circumstances it is consistent with the Commission's expectation of an "early and separate" decision for us to undertake a limited review of the Licensing Board's decision at this time.

¹⁷ App. Tr. 4.

¹⁸ *Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1)*, ALAB-772, 19 NRC 1193, 1206 (1984).

¹⁹ See *id.* at 1206-07.

matters. Consequently, neither we nor the Licensing Board is writing on a clean slate.

The Licensing Board used the Commission's decision denying the intervenors' request for a hearing on the staff's show cause order, CLI-80-32, as its starting point.²⁰ It concluded, first, that character and competence are separate elements of fitness to operate a nuclear plant.²¹ Second, by reference to CLI-80-32 and other Commission precedent, it determined what factors are pertinent to a character and competence inquiry.²² In particular, it pointed to the sufficiency of staffing and resources, the quality of management, and the adequacy of a utility's organization as bearing on the question of management competence. It recognized that an evaluation of character called for a "more subjective determination" but concluded that only those character traits relevant to the construction or operation of a nuclear power plant should be considered. In the Board's judgment, "[w]hat is necessary is a nexus of a particular trait to particular performance standards contemplated by the Atomic Energy Act or NEPA and NRC's implementing regulations and guides."²³ Specifically, the Board concluded that it was necessary to scrutinize HL&P's record of compliance with NRC regulations, its response to noncompliances, and its candor in dealing with the Commission, the Board, the staff and other parties.²⁴ We find no fault with the Board's approach.

The focus of the intervenor's appeal is its disagreement with the Board's view of reformation of character and improvement in competence as decisional factors. The Board concluded that the Commission's instituting order contemplated a determination of both (i) whether past acts, standing alone, warrant a denial of the license application, and (ii) whether the totality of HL&P's performance, including corrective action, is sufficient to justify a finding that there is reasonable assurance that HL&P can and will operate the plant safely.²⁵ The Board acknowledged that some character defects, such as an applicant's intentional lack of candor, might warrant denial of a license without any evaluation of an applicant's efforts at reformation.²⁶ Nonetheless, it concluded that evaluation of remedial measures was a proper part of an overall appraisal of character and competence. We agree.

²⁰ LBP-84-13, *supra*, 19 NRC at 670. The intervenor acknowledges that this approach is correct. See CCANP Brief at 1.

²¹ LBP-84-13, *supra*, 19 NRC at 671.

²² *Id.* at 672-76.

²³ *Id.* at 675-76.

²⁴ *Id.* at 676.

²⁵ *Id.* at 676-78.

²⁶ *Id.* at 677-78.

The Licensing Board's analysis is consistent with the language of CLI-80-32. The Commission said, in pertinent part:

The history of the South Texas Project . . . is relevant to the issue of the basic competence and character of [HL&P]. Central to that issue are two questions: whether the facts demonstrate that the licensee has abdicated too much responsibility for construction to its contractor . . . and whether the facts demonstrate an unacceptable failure on the part of [HL&P] to keep itself knowledgeable about necessary construction activities. Either abdication of responsibility or abdication of knowledge . . . could form an independent and sufficient basis for revoking a license or denying a license application on grounds of lack of competence (i.e., technical) or character qualification on the part of the licensee or license applicant. . . . In large part, decisions about licenses are predictive in nature, and the Commission cannot ignore abdication of responsibility or abdication of knowledge by a license applicant when it is called upon to decide if a license for a nuclear facility should be granted.

We believe that the . . . issues relating to technical competence and to character permeate the pleadings filed by Citizens. They do deserve a full adjudicatory hearing, as they will no doubt get in the operating license proceeding, and they do deserve expeditious treatment because they could prove disqualifying. Accordingly, we agree that the Licensing Board in the operating license proceeding should proceed with its expedited hearing on the quality control-related issues (including the allegations of false statements in the FSAR). As the Board has already determined to proceed in this manner, no formal order is necessary. However, we expect the Board to look at the broader ramifications of these charges in order to determine whether, if proved, they should result in denial of the operating license application.²⁷

CCANP argues that, by referring to an abdication of responsibility or an abdication of knowledge serving as "an independent and sufficient basis for . . . denying a license," the Commission intended to confine the Licensing Board's examination of HL&P's performance to the period preceding and covered by the order to show cause. CCANP asserts that, by looking at remedial measures, the Board essentially declined to follow the Commission's directions.²⁸ We perceive no such limitation in the Commission's order.

In the first place, the Commission stated only that abdication of responsibility or knowledge could prove disqualifying, not that such a result must or would follow. We believe that the Commission's language reflects an explicit judgment that the allegations, even if proven, need not automatically dictate denial of the license. Rather, the charges would bear on a predictive determination regarding the likelihood that the applicant could operate the plant safely and in conformity with Commission regulations. Such a determination would necessarily embrace an examination of remedial measures.

²⁷ CLI-80-32, *supra*, 12 NRC at 291-92 (footnotes omitted).

²⁸ CCANP Brief at 1-2.

The history of the introduction of character and competence questions into this operating license proceeding confirms the Licensing Board's reading of the Commission's order. When the staff issued its order to show cause, the Board had already proposed to hold early hearings in the operating license proceeding directed to similar issues in order to determine the need for, and efficacy of, corrective action. The Commission was well aware of this focus.²⁹ Indeed, it gave the Board the green light to "proceed with *its* expedited hearing on the quality control-related issues."³⁰

The Commission also wanted a more far-reaching investigation and thus instructed the Board "to look at the broader ramifications of these charges."³¹ It sought a thorough review of whether HL&P's conduct up to the time of the order to show cause was such that the Commission could ever be confident that the plant could be operated safely. At the time the Commission issued its order, there were pending allegations that false statements had deliberately been included in HL&P's final safety analysis report (FSAR). In this connection, the Commission noted that operating license determinations were essentially predictive, and that material false statements, if made intentionally or with disregard for the truth, may so erode Commission confidence in an applicant that it could, without more, prevent grant of a license.³² It was also aware of an admission by HL&P that quality assurance personnel had been harassed or intimidated.³³ Thus, there was a genuine question as to whether construction of the plant up to that time was adequate. In the circumstances, the Commission understandably expected the Board to review whether HL&P's application may already have been irremediably tainted. We see no intention on the Commission's part, however, to circumscribe the matters the Board proposed to examine to *exclude* the appraisal of the need for, and efficacy of, remedial measures.

Indeed, the very scheme of the Commission's regulations recognizes that an applicant is bound to make errors necessitating correction during the course of construction of a nuclear power plant. For example, 10 C.F.R. § 50.55(e) requires that applicant notify the Commission of "each deficiency found in design and construction, which, were it to have remained uncorrected, could have affected adversely the safety of operations," including any "significant breakdown in any portion of the

²⁹ See CLI-80-32, *supra*, 12 NRC at 290.

³⁰ *Id.* at 291 (emphasis added).

³¹ *Ibid.*

³² *Id.* at 291 & nn.4 & 5.

³³ *Id.* at 283-84.

quality assurance program.”³⁴ Such recognition that errors will be made and must be corrected buttresses the view that remedial measures are an essential component of any analysis of character and competence.³⁵

The Board’s construction of the Commission’s order is also consistent with the case law touching upon an applicant’s character and competence. Although no cases are precisely on point, the clear import of our decisions is that remedial efforts are relevant to determining whether applicants should be permitted to obtain or retain licenses. In the *Byron* case, for example, we concluded that denial of a license requires a finding that “it is not possible for the ascertained quality assurance failings either to be cured or to be overcome to the extent necessary to reach an informed judgment that the facility has been properly constructed.”³⁶ Similarly, in the *Midland* proceeding, we endorsed the licensing board’s exploration of both the quality assurance deficiencies that led to institution of the proceeding to suspend the licensee’s construction permit and subsequent corrective measures.³⁷ And, quite recently, in the *Three Mile Island Restart* case, we observed that evaluation of the efficacy of remedial action was a necessary element in determining whether the licensee had demonstrated its ability to operate in a safe and responsible manner in the future.³⁸ In sum, we have required a review of the totality of circumstances in order to permit a reasonable prediction regarding whether an applicant can and will comply with the safety and environmental standards imposed by statute and the Commission’s regulations and procedures.³⁹

³⁴ See also 10 C.F.R. Part 50, Appendix B, § XVI.

³⁵ CCANP argues that because the objective of the proceeding is to predict whether the plant can be operated safely and in conformity with Commission regulations, the Board improperly evaluated whether the plant had been built adequately. CCANP Brief at 4. We find no problem with the Board’s inquiry in this regard. Plainly, whether the plant was properly built bears on whether it can be operated safely. Construction quality assurance issues are a frequent component of operating license proceedings. See, e.g., *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 345 (1983) (“A recurring issue in reactor operating license proceedings is whether the facility has been properly constructed.”).

³⁶ *Commonwealth Edison Co.* (Byron Nuclear Power Station, Units 1 and 2), ALAB-770, 19 NRC 1163, 1169 (1984).

³⁷ *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-283, 2 NRC 11, 20 (1975).

³⁸ *Three Mile Island Restart*, ALAB-772, *supra*, 19 NRC at 1232.

³⁹ CCANP relies on *United Broadcasting Co. v. FCC*, 565 F.2d 699 (D.C. Cir. 1977), *cert. denied*, 434 U.S. 1046 (1978), *aff’g Applications of United Television Co.*, 55 F.C.C.2d 416 (1975), to support its view that the Commission intended the violation of its rules to be disqualifying even if the violations could be remedied. CCANP Brief at 2, 7-8. That reliance is misplaced. First, the *United Broadcasting* case was cited only by Commissioners Gilinsky and Bradford in their concurring statement in CLI-80-32. Contrary to CCANP’s assertion, it was not relied on by the majority of the Commission. More important, the case does not support CCANP’s position. To be sure, the court approved the FCC’s refusal to renew a radio license in view of the long history of persistent violations of the FCC’s rules. Important to that agency’s decision, however, was a finding that the applicant’s remedial measures were mere “window dressing” and that no reliance could be placed on its promise of future compliance. Thus, the court’s decision is fully consistent with an approach that includes examination of remedial measures.

CCANP also claims that the Board used the term "competence" too expansively to include managerial characteristics that better belong under the heading of "character." In CCANP's view, the Commission limited the term "competence" to technical rather than managerial characteristics.⁴⁰ The precise import of CCANP's argument is unclear. Presumably, it believes that the various indicia of alleged incompetence would be considered less amenable to remedial action if defined as character flaws. We believe the Board's distinction between character and competence is in line with CLI-80-32 and governing precedent. In any event, the Board considered all important evidence pertaining to both character and competence⁴¹ and we cannot conclude that the semantic distinctions CCANP asks us to make would alter the ultimate result.

CCANP further asserts that the Board should have assessed HL&P's character by reference to various general factors it considers pertinent: foresight, judgment, perception, resolve, integrity, and values.⁴² The Board concluded that use of the factors cited by CCANP "would serve only to replace one label, 'character,' with many" and that such factors were also too abstract to be useful in responding to the Commission's concerns outlined in CLI-80-32.⁴³ Our review of the Board's decision, however, satisfies us that the Board did take these factors into account insofar as they have some relationship to the Commission's health and safety standards.⁴⁴ CCANP's argument is therefore without merit.⁴⁵

⁴⁰ CCANP Brief at 12-13.

⁴¹ See *Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3)*, ALAB-732, 17 NRC 1076, 1109-10 (1983).

⁴² CCANP Brief at 37-40. See also *id.* at 23-26.

⁴³ LBP-84-13, *supra*, 19 NRC at 675.

⁴⁴ For example, the Licensing Board expressly evaluated CCANP's evidence on the applicants' "integrity" when reviewing the applicant's candor. *Id.* at 684. CCANP acknowledges that honesty and candor are important character traits in the licensing context but defines this element of character as "integrity." CCANP Brief at 27-28.

⁴⁵ Finally, CCANP argues that the Board's decision has the effect of establishing an inappropriately low standard for an applicant's character. CCANP Brief at 40, 81-82. We disagree. The thrust of CCANP's argument is that HL&P's poor performance prior to issuance of the notice of violation and order to show cause in 1980 is the best measure of how it is likely to perform under its operating license. Based on HL&P's indisputably poor past performance through 1980, CCANP argues that the Board should have found HL&P unqualified but, instead, has countenanced an impermissibly low standard for character. Such argument is simply a variant of CCANP's general claim that remedial measures must be ignored. To be sure, HL&P's performance before issuance of the order to show cause may be an indication of likely future performance. But even an applicant's poor past conduct need not automatically foreclose a finding that it now possesses the requisite high degree of character or competence. Thus, we do not agree that the Board's approach has resulted in the establishment of an inappropriately low standard for character evaluation. We emphasize, however, that we are not now deciding what conclusions should be drawn from HL&P's past performance. See p. 370, *supra*.

II. ALLEGED BIAS AND PROCEDURAL ERRORS

CCANP cites bias by the Board and various procedural errors as evidence that it was deprived of a fair hearing in violation of its due process rights and the Administrative Procedure Act.⁴⁶ We do not find any evidence of bias or any deprivation of constitutional or statutory rights as claimed by the intervenor. In any event, CCANP has not demonstrated that it was prejudiced by any of the Board's actions about which it complains.

A. CCANP contends that the Licensing Board was biased.⁴⁷ Assertedly, this bias manifested itself in the determinations contained in the Board's partial initial decision — for example, the Board's definition of character, which was not identical to the one suggested by CCANP, and its consideration, contrary to CCANP's desire, of HL&P's remedial actions.⁴⁸ CCANP also objects to the Board's characterization of some of its proposed findings as " 'broad, ill-defined,' and of 'little assistance.' "⁴⁹ It believes that the Board "demonstrated repeated hostility toward CCANP's efforts" by these and other substantive determinations in favor of HL&P.⁵⁰

CCANP's position is without foundation. That the Board reached conclusions and made findings contrary to those urged by a party does not establish bias.⁵¹ Moreover, as discussed in Section I, the standards adopted by the Board are proper.⁵²

B. CCANP claims that the Board arbitrarily interfered with its cross-examination by requiring it to submit cross-examination plans, threatening at several points to disallow further questions, and actually terminating its questioning of witnesses.⁵³ In reviewing these claims, we start from the proposition that a mere demonstration that the Board erred by curtailing cross-examination is not sufficient to warrant appellate relief.

⁴⁶ See 5 U.S.C. §§ 554-558.

⁴⁷ CCANP Brief at 57.

⁴⁸ *Ibid.*

⁴⁹ *Id.* at 59.

⁵⁰ *Ibid.* See also *id.* at 59-61.

⁵¹ *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-644, 13 NRC 903, 923 (1981).

⁵² The presence on the Board below of Judge Hill, a Licensing Board member whom CCANP unsuccessfully sought to disqualify at an earlier stage, does not advance CCANP's cause. The Commission previously determined that Judge Hill was not disqualified from serving on this Licensing Board. See CLI-82-9, 15 NRC 1363, *rev'g* ALAB-672, 15 NRC 677 (1982). We are bound by that decision. Further, CCANP has not directed us to any new evidence since the Commission's ruling (apart from the Board's rejection of its various arguments) that would demonstrate Judge Hill's alleged bias.

⁵³ CCANP Brief at 64-67.

“The complaining party must demonstrate actual prejudice — i.e., that the ruling had a substantial effect on the outcome of the proceeding.”⁵⁴

Certainly, the authority of the Board to demand cross-examination plans is encompassed by the Board’s power to control the conduct of hearings⁵⁵ and to take all “necessary and proper measures to prevent argumentative, repetitious, or cumulative cross-examination.”⁵⁶ Indeed, such plans are encouraged by the Commission as a means of making a hearing more efficient and expeditious.⁵⁷ In any event, CCANP points to no harm, and we see none, that resulted from the Board’s requirement in this case.

CCANP contends that the Board threatened to and did terminate its cross-examination for no reason other than the Board’s belief that a “reasonable time” for such examination had passed.⁵⁸ It appears that, in at least one instance, the Licensing Board actually did refuse to allow CCANP to continue with cross-examination because the agreed upon “time period . . . ha[d] run out,” even though counsel for intervenor had not finished his questioning.⁵⁹ CCANP, however, failed to make the required showing below of what further information it sought to elicit.⁶⁰ On appeal, CCANP does not even attempt to show how it was prejudiced by the Board’s ruling. Similarly, its general assertions that the Board’s threats to terminate cross-examination created an “oppressive atmosphere” that made effective questioning impossible are not enough to warrant reversal. Again, CCANP’s brief does not point to any questions that it would have pursued had it not felt oppressed. It has failed to demonstrate, therefore, that any harm befell it as a result of the Board’s actions.⁶¹

⁵⁴ *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), ALAB-788, 20 NRC 1102, 1151 (1984), quoting *Waterford, supra*, 17 NRC at 1096.

⁵⁵ 10 C.F.R. § 2.718(e).

⁵⁶ 10 C.F.R. § 2.757(c). See *Waterford, supra*, 17 NRC at 1096 (licensing board may insist on advance indication of what cross-examiner hopes to elicit).

⁵⁷ *Statement of Policy on Conduct of Licensing Proceedings*, CLI-81-8, 13 NRC 452, 457 (1981).

⁵⁸ CCANP Brief at 64.

⁵⁹ See Tr. 6818.

⁶⁰ See *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 697 & n.14, *aff’d*, CLI-82-11, 15 NRC 1383 (1982).

⁶¹ At oral argument, counsel for CCANP offered only one example of asserted prejudice involving an evidentiary ruling against it. See App. Tr. 33-37. At Tr. 9794-9824, counsel for CCANP attempted to cross-examine staff witnesses with respect to the “importance” of certain failures of the applicant. The Board sustained staff and HL&P objections on the ground that the term “importance” as it had been discussed was too vague but suggested that CCANP should frame its questions in terms of “gross negligence.” See Tr. 9814-15. CCANP refused to accept the Board’s suggestion. Instead, it was apparently content to take exception to the Board’s ruling and move on to a different line of questioning. See Tr. 9824-28. In these circumstances, where CCANP abandoned the attempt to pursue this area of inquiry in terms acceptable to the Licensing Board, we cannot conclude that it was prejudiced by the Board’s ruling.

On a related note, CCANP cites to a large number of transcript pages as containing “at least thirty-five . . . erroneous rulings concerning [its] cross-examination [of] [s]taff witnesses.”⁶² CCANP does not discuss why any of these rulings is incorrect or what effect they may have had on the outcome of the proceeding. Rather, it merely characterizes the objections of the other parties that prompted the rulings as “groundless and harassing.”⁶³

The staff is correct that such bald allegations may be properly dismissed for inadequate briefing.⁶⁴ Nonetheless, we have carefully reviewed the pages cited by CCANP to determine in fact whether any “harassment” occurred. We agree with the intervenor that numerous objections were made by counsel for both HL&P and the staff during CCANP’s cross-examination of staff witnesses. Such objections at a minimum can be described as persistent. It is also true that the Board sustained the vast majority of these objections. But because the questions posed by intervenor’s counsel were often broad, repetitious, or unclear, and CCANP has not demonstrated that it was prejudiced by any of the rulings, we cannot say that the Board committed reversible error. We are nevertheless constrained to add that the frustratingly slow pace of the challenged portion of the hearing was attributable, in part, not so much to the form of the questions asked but to the length of the objections⁶⁵ and the ensuing argument permitted by the Board.

Lastly, CCANP challenges the appropriateness of limiting the scope of cross-examination to matters raised in direct testimony. CCANP claims, without reference to any supporting citation, that such a restriction is “controversial [and] . . . criticized.”⁶⁶ To the contrary, it is firmly established that the scope of cross-examination is ordinarily so limited.⁶⁷

C. CCANP objects on appeal to the use of prefiled, written testimony and the presentation of evidence by, and cross-examination of, witnesses sitting in panels.⁶⁸ As CCANP conceded at oral argument, however, it did not object to these practices before the Licensing Board or ask the Board for any other arrangements.⁶⁹ Its objections thus come too late. Moreover, the use of prefiled, written testimony generally is permitted

⁶² CCANP Brief at 66. *See also* App. Tr. 33.

⁶³ *See* CCANP Brief at 66.

⁶⁴ *See* 10 C.F.R. § 2.762(d) and note 88, *infra*.

⁶⁵ *See* 10 C.F.R. § 2.743(d).

⁶⁶ CCANP Brief at 70.

⁶⁷ *See Waterford, supra*, 17 NRC at 1096 and cases cited.

⁶⁸ CCANP Brief at 71-74.

⁶⁹ App. Tr. 32. For example, in contrast to CCANP’s failure to object, intervenor CEU requested that panel members be sequestered. The Board granted two such requests. Tr. 6458, 8038.

by the Administrative Procedure Act in licensing cases⁷⁰ and authorized by the Commission's Rules of Practice.⁷¹ The use of witness panels is likewise a long-standing practice in licensing hearings, consistent with Commission policy.⁷² Further, CCANP has not demonstrated any prejudice to it from the use of these practices in this case.

D. CCANP argues that it was prejudiced by the Licensing Board's scheduling of hearings. CCANP asserts that it "was unable to have the individual most familiar with the details of this case" present during part of the hearing because he was busy taking law school examinations and the Licensing Board refused to delay the hearings for a week.⁷³ We considered a similar argument when it was earlier raised by CCANP in a request for directed certification.⁷⁴ To justify overturning a licensing board's scheduling decision, we must be satisfied that the board set a schedule that deprives a party of its right to procedural due process.⁷⁵ We find that no such prejudice or deprivation of due process resulted from the Board's schedule.

CCANP was represented by counsel at the hearing during the week in question and does not assert that this representation was less than adequate. The only harm claimed was that CCANP had to spend its limited resources to obtain outside counsel and that his knowledge of the case was not as great as it could have been.⁷⁶ CCANP obviously would have preferred that its *pro se* representative be present during that one-week period. In denying directed certification under 10 C.F.R. § 2.718(i), however, we observed that CCANP's scheduling request did not rise to the level of "a compelling demonstration of a denial of due process or the threat of immediate and serious irreparable harm" that would warrant our interlocutory intercession.⁷⁷ Against CCANP's need for a delay we balanced the following facts:

- (1) [CCANP knew] since November 19, 1980, that the hearing would commence in early May 1981 and that alterations to the schedule would be disfavored . . . ;
- (2) [CCANP had] not provided any specific explanation as to why no other members of their organization [were] available or able to participate in the . . . hearing;
- (3) the parties . . . had almost two full months between the Board's oral ruling . . . denying

⁷⁰ 5 U.S.C. § 556(d).

⁷¹ 10 C.F.R. § 2.743(b).

⁷² See 10 C.F.R. Part 2, Appendix A, § V(d)(4).

⁷³ CCANP Brief at 67.

⁷⁴ See ALAB-637, 13 NRC 367 (1981).

⁷⁵ *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-459, 7 NRC 179, 188 (1978). See also *Wisconsin Electric Power Co.* (Point Beach Nuclear Plant, Unit 1), ALAB-719, 17 NRC 387, 391 (1983).

⁷⁶ CCANP Brief at 67.

⁷⁷ ALAB-637, *supra*, 13 NRC at 371.

the postponement and the first day of the hearing; and (4) . . . the Commission ordered this hearing to be expedited⁷⁸

These facts remain true. CCANP's preference for a delay is not grounds for reversal where it has not demonstrated substantial harm because of the Licensing Board's scheduling order.

E. The Licensing Board allowed over eighteen months for discovery before the beginning of the Phase I hearing.⁷⁹ Included in this period was a three-month extension requested by CCANP.⁸⁰ CCANP nonetheless complains that it was not given "ample opportunity for discovery."⁸¹

CCANP assigns two reasons why the discovery period was inadequate. First, it claims (albeit without details) that it was unable to conduct discovery because of "illness of outside counsel retained for that purpose."⁸² Next, it states that the Board denied its motion for additional discovery concerning certain matters that apparently came to light during the discovery period. In this connection, according to CCANP, the Board then left unfulfilled its promise to allow extra cross-examination by CCANP on these unspecified matters.⁸³

CCANP's complaint must fail. Without knowing the length of CCANP's counsel's illness, or why CCANP was unable to obtain substitute counsel or conduct discovery itself, we are unable to conclude that the time allotted was inadequate. Further, CCANP does not cite to its request for extension that was denied by the Licensing Board. As mentioned, the Board granted CCANP's July 8, 1980 motion to extend discovery for the length of time requested. The only other similar motion that appears in the record was made by another intervenor, CEU, right before the beginning of the hearing.⁸⁴ Although that motion was denied,⁸⁵ CCANP was permitted sufficient cross-examination on the matters of concern to CEU.⁸⁶ Further, as HL&P notes, CCANP "was provided [with] a large number of documents in response to its informal discovery request at the hearing."⁸⁷ In the circumstances, CCANP has

⁷⁸ *Ibid.* (footnote omitted).

⁷⁹ Memorandum and Order (Aug. 3, 1979) (unpublished) at 10; Memorandum and Order (Aug. 1, 1980) (unpublished) at 2; Second Prehearing Conference Order (Dec. 2, 1980) (unpublished) at 5-7.

⁸⁰ Motion for Extension of Discovery Period (July 8, 1980); Memorandum and Order of Aug. 1, 1980 at 2.

⁸¹ CCANP Brief at 74.

⁸² *Ibid.*

⁸³ *Ibid.*

⁸⁴ Citizens for Equitable Utilities Motions (May 11, 1981) at 9.

⁸⁵ Tr. 1009.

⁸⁶ See Tr. 4589-4716.

⁸⁷ See Tr. 4876.

not established that the Licensing Board abused its discretion in setting the time limits for discovery.⁸⁸

F. The Licensing Board denied CCANP's motion to reopen the record to admit evidence relating to a report prepared by the Commission's Office of Inspector and Auditor.⁸⁹ CCANP challenges that denial.⁹⁰ Upon review of the pleadings and the relevant record, we find that virtually all of the factual information CCANP sought to introduce was already in the record. Thus, the Board did not err in denying the motion.

G. CEU was an active intervenor in Phase I and the sole sponsor of five contentions (numbers 4-8). CEU, however, withdrew from the case as part of a settlement agreement with HL&P. Under the agreement, a CEU representative was invited to participate in HL&P's annual independent audit of its construction quality assurance program.⁹¹ Subsequent to CEU's withdrawal, CCANP requested that it be allowed to adopt the five contentions that no longer had a sponsor. The Licensing Board granted its request only with respect to contention 4 (concerning the ability of the plant to withstand hurricanes).⁹² On appeal, CCANP asserts that it should have been able to take up contentions 5-8 as well.

In determining whether to allow CCANP to stand in the shoes of CEU, the Licensing Board applied the five-factor test normally used to determine whether to grant a nontimely request for intervention,⁹³ or to permit the introduction of additional contentions by an existing intervenor after the filing date.⁹⁴ The test requires a board to balance the following considerations:

⁸⁸ CCANP's brief on this issue lacks any citation to the record as well as specific facts concerning the incidents about which it complains. Although we have searched the record in order to find support for CCANP's assertion, we remind CCANP that it carries the burden of presenting us with an adequate brief in the first instance and bears the risk of any oversight by us if it fails to do so. As we recently reiterated in *Commonwealth Edison Co.* (Byron Nuclear Power Station, Units 1 and 2), ALAB-793, 20 NRC 1591, 1619 n.133 (1984), quoting *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-270, 1 NRC 473, 475 (1975), and *United States v. White*, 454 F.2d 435, 439 (7th Cir. 1979), "a failure to brief issues adequately 'deprives us precisely of that assistance which the Rules of Practice are designed to have an appellant provide, i.e., to flesh out the bare bones [of claims on appeal] . . . and to present us 'with sufficient information or argument to allow an intelligent disposition of [the] issue[s].'" " See also *Wisconsin Electric Power Co.* (Point Beach Nuclear Plant, Unit 1), ALAB-696, 16 NRC 1245, 1255 (1982) (treating inadequately briefed exceptions as waived); *Public Service Co. of Oklahoma* (Black Fox Station, Units 1 and 2), ALAB-573, 10 NRC 775, 786-87 (1979) (dismissing inadequately briefed exceptions).

⁸⁹ LBP-84-13, *supra*, 19 NRC at 715-21.

⁹⁰ CCANP Brief at 89.

⁹¹ See letter to Licensing Board from W.S. Jordan and J.R. Newman (June 14, 1982) and attachments.

⁹² See LBP-82-91, 16 NRC 1364 (1982).

⁹³ 10 C.F.R. § 2.714(a)(1).

⁹⁴ 10 C.F.R. § 2.714(b).

- (i) Good cause, if any, for failure to file on time.
- (ii) The availability of other means whereby the petitioner's interest will be protected.
- (iii) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.
- (iv) The extent to which the petitioner's interest will be represented by existing parties.
- (v) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

In reviewing the Licensing Board's determinations concerning contentions 5-8,⁹⁵ we must first consider the correctness of applying the five-factor test. CCANP, after all, is not a late intervenor to the proceeding. Nor are the contentions themselves newly advanced; they had already been accepted by the Board for litigation by CEU. Thus, CCANP is not proffering "new contentions" in the usual sense of 10 C.F.R. § 2.714 of the Commission's regulations. Nevertheless, as explained below, we believe that a balancing of the factors contained in 10 C.F.R. § 2.714 was correct in the circumstances.

CCANP's principal argument on appeal is that it should be permitted to adopt CEU's contentions in order to ensure litigation of important safety or environmental questions. It claims, in addition, that no prejudice to HL&P results from continuing an inquiry into issues it knew would be explored. CCANP observes that it saw no need to embrace CEU's contentions earlier because it had the right to cross-examine on them and "trusted CEU to vigorously pursue them."⁹⁶ We reject CCANP's arguments.

To begin with, there is no automatic right to adjudicatory resolution of environmental or safety questions associated with an operating license application.⁹⁷ The Commission's regulations limit operating license proceedings to "matters in controversy among the parties" or matters raised on a licensing board's own initiative *sua sponte*.⁹⁸ Where only a single intervenor is participating in an operating license proceeding, its withdrawal serves to bring the proceeding to an end. Where there is more than one intervenor in a case, the withdrawal of one does not terminate the proceeding. Under NRC procedure, however, it does serve to remove the withdrawing party's contentions from litigation.⁹⁹

⁹⁵ The admissibility of contention 4 is not before us on appeal.

⁹⁶ CCANP Brief at 76.

⁹⁷ See *Cincinnati Gas and Electric Co.* (William H. Zimmer Nuclear Power Station), ALAB-305, 3 NRC 8, 9 (1976).

⁹⁸ 10 C.F.R. §§ 2.104(c), 2.760a.

⁹⁹ *Project Management Corp.* (Clinch River Breeder Reactor Plant), ALAB-354, 4 NRC 383, 391-92 (1976).

The Commission has made it clear, in this regard, that the mere acceptance of contentions at the threshold stage does not turn them into cognizable issues for litigation independent of their sponsoring intervenor.¹⁰⁰

This approach is neither unfair to remaining intervenors nor inconsistent with the public interest. Intervenors, after all, choose the issues they wish to advance. To be sure, under principles announced in our *Prairie Island* opinion,¹⁰¹ an intervenor may ordinarily conduct additional cross-examination and submit proposed factual and legal findings on contentions sponsored by others. But that does not elevate the intervenor's status to that of a co-sponsor of the contentions.¹⁰² Because contentions can be withdrawn or (as in the instant case) settled through negotiation, a non-sponsoring party assumes at least some risk that the pursuit of its interests may not be wholly within its control.¹⁰³ Indeed, an approach that accorded a remaining intervenor more or less an equal right to pursue contentions earlier put forth by another party would frustrate the Commission's policy of encouraging legitimate efforts by applicants and intervenors to reach good faith, mutually satisfactory resolution of issues without the need for litigation.¹⁰⁴

We find that the facts support the Board's decision to deny CCANP's request. The original request proceeded from the basic assumption — now rejected — that CCANP was entitled to stand in CEU's litigation shoes without an attempt to satisfy any criteria for adopting the contentions late.¹⁰⁵ The Licensing Board's decision thoroughly appraised each of the five factors. It noted, among other things, that CCANP had never exhibited any particular independent concern about any of the conten-

¹⁰⁰ *Texas Utilities Generating Co.* (Comanche Peak Steam Electric Station, Units 1 and 2), CLI-81-36, 14 NRC 1111, 1113-14 (1981). Safety or environmental matters not the subject of contentions or raised by a board *sua sponte* are left for nonadjudicatory resolution by the NRC staff. *Consolidated Edison Co. of New York* (Indian Point, Units 1, 2 & 3), ALAB-319, 3 NRC 188, 189-90 (1976).

¹⁰¹ *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-244, 8 AEC 857, 863, 867-68 (1974), *aff'd in pertinent part*, CLI-75-1, 1 NRC 1 (1975).

¹⁰² The Commission's regulations require that, at the outset of a case, each intervenor submit "a list of the contentions which [it] seeks to have litigated." 10 C.F.R. § 2.714(b). Moreover, one may not introduce affirmative evidence on issues raised by another intervenor's contentions. *Prairie Island*, *supra*, 8 AEC at 869 n.17.

¹⁰³ *Clinch River*, *supra*, 4 NRC at 392. See *Duke Power Co.* (Cherokee Nuclear Station, Units 1, 2 and 3), ALAB-440, 6 NRC 642, 645 (1977).

¹⁰⁴ See 10 C.F.R. § 2.759. See also *Statement of Policy on Conduct of Licensing Proceedings*, *supra*, 13 NRC at 455 (parties should be encouraged to negotiate at all times prior to and during the hearing to resolve contentions).

¹⁰⁵ See *Citizens Concerned About Nuclear Power, Inc. (CCANP) Motion to Adopt Contentions of Intervenor Citizens for Equitable Utilities (CEU)* (July 29, 1982).

tions in question.¹⁰⁶ It also observed that CCANP had not attempted to demonstrate how it would assist in developing the record on any of CEU's contentions. On appeal, CCANP does not seriously challenge either the Board's resort to a five-factor balancing approach or its observations regarding the individual factors. Rather, it merely reiterates its view that the contentions raise serious issues that it should be allowed to pursue.¹⁰⁷ In the context of this proceeding at least, this is not enough to warrant CEU's replacement by CCANP.¹⁰⁸

In rejecting CCANP's argument, however, we do not endorse the Licensing Board's finding that, as a matter of law, the departure of one party from a proceeding may never be an element of good cause when deciding whether to permit a remaining intervenor to adopt contentions earlier submitted by another. An absolute rule that the withdrawal of one intervenor could not be taken into account when considering good cause would do little more than encourage all intervenors to become nominal co-sponsors of all contentions at the outset — and, thus, perhaps complicate litigation and settlement offers. As we said in *River Bend*, “[i]f, in the circumstances of the particular case, there is a sound foundation for allowing one entity to replace another, it can, of course, be taken into account in . . . making . . . the ‘good cause’ determination.”¹⁰⁹

There is an additional aspect of the Board's decision that gives us cause for concern, and requires us to return this matter to the Board for further consideration. When it originally admitted contentions 4-8 under the sponsorship of CEU, the Board did not simply find them acceptable for admission into the case. It affirmatively characterized all five contentions as raising “significant safety or environmental issues.”¹¹⁰ Indeed,

¹⁰⁶ As the Licensing Board pointed out, CEU and CCANP jointly sponsored Contentions 1 and 2, CCANP was the sole sponsor of Contention 3, and CEU was the sole sponsor of Contentions 4-8. LBP-84-13, *supra*, 19 NRC at 666. It thus appears that CCANP identified at the outset those particular issues about which it shared concern with CEU. The contentions now at issue were not among them.

¹⁰⁷ CCANP asserts: “Had CCANP known that CEU was going to leave the proceeding prior to litigation of the contentions, CCANP might well have asked to be joined on the contentions.” CCANP Brief at 76.

¹⁰⁸ In ruling on factor two in the five-factor analysis (i.e., the availability of other means by which the petitioner's interest will be protected), the Board concluded that CCANP's interest in contentions 5-8 would be adequately protected by the NRC staff through its normal, nonadjudicatory review of the license application. See LBP-82-91, *supra*, 16 NRC at 1369-70. In *Washington Public Power Supply System* (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167 (1983), decided after the Board's ruling here, we determined that the participation of the NRC staff in a licensing proceeding was not tantamount to participation by a private intervenor. By analogy, the availability of staff review outside the hearing process generally does not constitute adequate protection of a private party's rights when considering factor two. Nonetheless, on the facts of this case, even weighing factor two in CCANP's favor does not alter the ultimate balance of the factors.

¹⁰⁹ *Gulf States Utilities Co.* (River Bend Station, Units 1 and 2, ALAB-444, 6 NRC 760, 796 (1977)).

¹¹⁰ Memorandum and Order (Aug. 3, 1979) (unpublished) at 2.

the Board considered the issues sufficiently significant that it was willing to overlook whether there was good cause for CEU to file its contentions late. The Board did not address these concerns regarding contentions 5-8 when disposing of CCANP's motion. In our judgment, some further explanation is required. If the Board remains of the view that these contentions present serious safety or environmental issues it can invoke its *sua sponte* powers under 10 C.F.R. § 2.760a to review them even in the absence of contentions.¹¹¹

III. FURTHER PROCEEDINGS

Our decision to defer appellate review of the Licensing Board's findings regarding the applicant's character and competence does not signal an opportunity for *de novo* relitigation of matters disposed of by the Licensing Board. Our opinion today resolves several of the intervenor's most important arguments and that resolution becomes the law of the case for future litigation in the proceeding.

We *affirm* the Licensing Board's ruling with respect to the standard to be applied when measuring character and competence. We find no bias or prejudicial error manifested in the Board's conduct of the proceeding. We *remand* one matter to the Board for its further consideration, i.e., whether the issues originally raised by CEU present serious safety or environmental questions that warrant Board examination pursuant to its *sua sponte* authority.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

¹¹¹ See *Waterford, supra*, 17 NRC at 1110-12. Such powers can be invoked only after advising the Commission and observing special procedures. See *Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1)*, ALAB-685, 16 NRC 449, 452 n.5 (1982), citing *Houston Lighting and Power Co. (South Texas Project, Units 1 & 2)*, LBP-81-54, 14 NRC 918, 922-23 & n.4 (1981).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Gary J. Edles
Howard A. Wilber

In the Matter of

Docket No. 50-322-OL-4
(Low Power)

LONG ISLAND LIGHTING
COMPANY
(Shoreham Nuclear Power
Station, Unit 1)

February 21, 1985

The Appeal Board affirms with one exception the conclusions reached in the Licensing Board's October 29, 1984 initial decision that granted the applicant's request for an exemption from certain regulatory requirements and authorized low power testing of the Shoreham facility. *See* LBP-84-45, 20 NRC 1343. The Appeal Board reverses the Licensing Board's conclusion on one matter, remands it to the Board for further proceedings, and vacates the exemption as to certain phases of low power operation.

REGULATIONS: EXEMPTIONS

Under 10 C.F.R. § 50.12(a), the Commission may grant such exemptions from the requirements of its regulations as it determines are authorized by law; will not endanger life, property, or the common defense and security; and are otherwise in the public interest.

RULES OF PRACTICE: IMMEDIATE EFFECTIVENESS REVIEW

The Commission ordinarily does not undertake an immediate effectiveness review in an operating license proceeding unless the initial decision authorizes facility operation at greater than five percent of rated power. 10 C.F.R. § 2.764(f)(1).

RULES OF PRACTICE: IMMEDIATE EFFECTIVENESS REVIEW (EFFECT ON APPEAL BOARD)

Unless the Commission otherwise explicitly so directs in its immediate effectiveness determination, an appeal board is not to give any weight to any statement reflecting that determination. 10 C.F.R. § 2.764(g).

RULES OF PRACTICE: IMMEDIATE EFFECTIVENESS REVIEW (PARTIES' COMMENTS)

Section 2.764(f)(2)(ii) of 10 C.F.R. allows the parties to a proceeding to submit to the Commission within ten days of an initial decision brief comments pointing out matters which, in their view, pertain to the immediate effectiveness issues before the Commission.

REGULATIONS: INTERPRETATION

The Commission is the ultimate arbiter within this agency of what is meant by the provisions of its own regulations and the language contained in its own opinions. Nonetheless, absent the availability of a definitive Commission pronouncement, it often falls to the appeal board to undertake to resolve disputes between parties as to the proper interpretation and application of a particular Commission regulation or formal opinion.

OPERATING LICENSES: CRITERIA (PHYSICAL SECURITY PLAN)

Each application for a license to operate a nuclear power plant must include a physical security plan that addresses how the applicant intends to comply with Part 73 of the Commission's regulations pertaining to the protection of the plant. *See* 10 C.F.R. §§ 50.34(c), 73.1(b)(1)(i). Among other things, Part 73 prescribes various requirements for the protection of "vital equipment." *See* 10 C.F.R. §§ 73.55, 73.2(i).

OPERATING LICENSES: CRITERIA (PHYSICAL SECURITY PLAN)

Under the Commission's regulation, vital equipment includes any equipment or system, the failure or destruction of which could directly or indirectly endanger the public health and safety by exposure to radiation. 10 C.F.R. § 73.2(i).

APPEARANCES

Karla J. Letsche and Lawrence Coe Lanpher, Washington, D.C. (with whom **Herbert H. Brown**, Washington, D.C., was on the brief), for the intervenor Suffolk County.

Fabian G. Palomino, Albany, New York, for the intervenor State of New York.

Robert M. Rolfe and Anthony F. Earley, Jr., Richmond, Virginia (with whom **W. Taylor Reveley, III**, and **Donald P. Irwin**, Richmond, Virginia, were on the brief), for the applicant Long Island Lighting Company.

Robert G. Perlis for the Nuclear Regulatory Commission staff.

DECISION

Before us is the appeal of intervenors Suffolk County and the State of New York from the Licensing Board's October 29, 1984 initial decision in this operating license proceeding involving the Shoreham nuclear power facility.¹ In that decision, the Board granted the applicant's request for an exemption from the requirements of General Design Criterion (GDC) 17² to enable it to conduct low power testing of the facility up to five percent of rated power. Insofar as here relevant, GDC 17 requires

¹ LBP-84-45, 20 NRC 1343.

² 10 C.F.R. Part 50, Appendix A.

an onsite alternating current (AC) electric power system meeting certain standards concededly not met by the system now in place.³

The intervenors' attack upon the initial decision is broad-based and encompasses a large number of asserted errors on the part of the Licensing Board. On a close examination of the decision, the underlying record and the appellate positions of the parties as developed in their extensive briefs, we concluded that all of the substantial issues presented by the appeal fell into one of three areas:

- (1) the meaning and scope of both (a) the phrase "otherwise in the public interest" contained in 10 C.F.R. § 50.12(a)⁴ and (b) the standard for a grant of an exemption under section 50.12(a) set forth in CLI-84-8, an earlier Commission decision in this proceeding;⁵
- (2) the meaning and scope of the Commission's directive in CLI-84-8 that facility operation utilizing the substitute AC electric power system be "as safe as" that operation would have been with a "fully qualified" onsite AC power source; and
- (3) the applicability to the substitute AC electric power system of the physical security provisions of 10 C.F.R. Part 73.

Consequently, our focus at oral argument was upon those areas.⁶

We held oral argument in this case on February 11. The following day, the Commission issued a memorandum and order in which it announced that it was allowing the Licensing Board's initial decision to become immediately effective.⁷ In the course of its explanation of the

³ The applicant's original intention was to use Transamerica Delaval (TDI) diesel generators to comply with the onsite power requirements of GDC 17. As matters now stand, the suitability of those generators is in litigation before the Licensing Board. Further, diesel generators of a different manufacturer, which the applicant intends to utilize eventually in place of the TDIs, are in the process of installation and presumably will have to undergo staff review before being used in satisfaction of GDC 17 requirements.

The system that the applicant proposes to use during low power testing under the sought GDC 17 exemption (in lieu of a system meeting GDC 17 standards) consists of a 20-megawatt (MW) gas turbine, four temporary 2.5-MW diesel generators, and the commercial AC power grid.

⁴ The exemption here involved was sought under section 50.12(a), which provides in relevant part:

The Commission may, upon application by any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

⁵ 19 NRC 1154 (1984).

⁶ Insofar as concerns those appellate claims of the intervenors that do not come within one of the above identified areas, none appears to require specific treatment in this opinion. More particularly, each such claim is either manifestly without merit or grounded upon Licensing Board error not having a crucial bearing upon whether the grant of the section 50.12(a) exemption should be set aside. We thus eschew a commentary on those claims in the interest of expediting our disposition of the issues that bear much more heavily on the correctness of the result below.

⁷ CLI-85-1, 21 NRC 275 (1985). The Commission had previously noted that any Licensing Board decision granting an exemption from the requirements of GDC 17 would not become effective until the
(Continued)

basis for that determination, the Commission addressed and resolved in the applicant's favor the pivotal questions in the first two of the three areas that we had previously identified as likely determinative of the outcome of the intervenors' appeal. The order nonetheless ended with the statement that "[t]he foregoing is entirely without prejudice to pending appeals before the Atomic Safety and Licensing Appeal Board."⁸ Further, 10 C.F.R. § 2.764(g) states that, "[u]nless the Commission otherwise explicitly so directs in its immediate effectiveness determination," we are not to give "any weight" to any statement reflecting that determination.

I.

We fully recognize, of course, our obligation to respect and obey Commission directives. Nonetheless, in the highly unusual circumstances of this case, we find ourselves unable to comply fully with either the "without prejudice" notation in CLI-85-1 or the even stronger admonition in 10 C.F.R. § 2.764(g) to the same general effect.

On occasion, the Commission may reach and announce a conclusion on an essentially factual issue in the course of its immediate effectiveness review. When this occurs, and assuming no explicit Commission instruction to the contrary, we see no impediment to an appeal board passing independent judgment on the same factual issue and, possibly, reaching a different conclusion in its appellate decision. (Among other things, the rule detailing the procedure for the conduct of immediate effectiveness reviews does not appear to contemplate the same in-depth examination of the underlying evidentiary record as would customarily be undertaken by an appeal board in response to a formal appellate attack upon crucial findings of fact in the initial decision.⁹) Moreover, with regard to

Commission had conducted an immediate effectiveness review. CLI-84-8, *supra*, 19 NRC at 1156. An express announcement of that purpose was necessary because the Commission ordinarily does not undertake an immediate effectiveness review in an operating license proceeding unless the initial decision authorizes facility operation at greater than five percent of rated power. See 10 C.F.R. § 2.764(f)(1).

In actuality, the immediate effectiveness determination in CLI-85-1 applied only to Phases III and IV of the applicant's low power testing program, involving such testing at elevated temperature and pressure levels up to five percent of rated power. Last November, the Commission made immediately effective, subject to certain conditions, the Licensing Board's authorization of Phases I and II of the program (fuel loading, precriticality testing, and cold criticality testing). CLI-84-21, 20 NRC 1437. See also LBP-84-53, 20 NRC 1531, 1542 (1984).

⁸ CLI-85-1, *supra*, 21 NRC at 279.

⁹ 10 C.F.R. § 2.764. Additionally, in conducting an immediate effectiveness review, the Commission does not normally have the benefit of the same full briefing enjoyed by the appeal boards. See section 2.764(f)(2)(ii), allowing the parties to submit to the Commission within ten days of the initial decision "brief comments . . . pointing out matters which, in their view, pertain to the immediate effectiveness issue."

a legal issue turning upon the interpretation and application of Constitutional or statutory provisions, there might well be similar warrant for a fresh look by an appeal board even if the immediate effectiveness determination had addressed the issue.¹⁰ But what confronts us here is a quite different situation.

As previously noted, in large measure the substantial issues presented by the intervenors' appeal turn upon a determination as to the meaning and scope of the terms of either a *Commission* regulation (10 C.F.R. § 50.12(a)) or a *Commission* opinion in this very proceeding (CLI-84-8, *supra*) or both. Further, these same issues were not merely considered by the *Commission* in its immediate effectiveness review, but resolved.¹¹ The short of the matter is that, in CLI-85-1, the *Commission* interpreted one of its own regulations and one of its own opinions in a manner at odds with the interpretation that necessarily undergirds the intervenors' challenge before us to the Licensing Board's disposition of their public interest and "as safe as" claims.

In our view, it would defy all reason for us to do anything other than to accept and apply the *Commission's* determinations in this regard. Simply stated, the *Commission* must be deemed the ultimate arbiter of what was meant by the provisions of its own regulations and the language contained in its own opinions. To be sure, absent the availability of a definitive *Commission* pronouncement, it often falls to us to undertake to resolve disputes between parties as to the proper interpretation and application of a particular *Commission* regulation or formal opinion.¹² But, once the *Commission* has spoken on the subject itself, the pursuit of such an undertaking perforce is no longer either required or tenable. For it cannot seriously be suggested that it is open to us to con-

¹⁰ Once again, the *Commission* likely would not have the benefit of full briefing on the issue. Of course, were the appeal board to reach a different conclusion than that contained in the immediate effectiveness determination, the *Commission* would have a further opportunity to examine the matter on review of the appeal board's decision.

¹¹ In addition, CLI-85-1 discussed other *Commission* regulations and opinions at least on the periphery of the issues brought to us by the intervenors (e.g., 10 C.F.R. § 50.47(d); CLI-83-17, 17 NRC 1032 (1983); CLI-84-9, 19 NRC 1323 (1984)).

¹² As reflected by the transcript of the oral argument on the intervenors' appeal (which took place before the issuance of CLI-85-1), we were fully prepared to fulfill that responsibility here.

¹³ We recognize the possibility that an immediate effectiveness determination might contain a seemingly tentative (and therefore not necessarily definitive) interpretation of a regulation that the *Commission* had not previously fully considered in an adjudicatory framework. In such circumstances, an appeal board conceivably might be justified in offering its own contrary interpretation of the regulation (which, on review of the board's decision, the *Commission* could accept or reject). We need not pursue the point further here, however, because, in the context of this very exemption request, the import of section 50.12(a) received full consideration in CLI-84-8. Consequently, there is no reason to assume that what the *Commission* had to say about the section's meaning in CLI-85-1 represented anything less than a fully informed judgment on the *Commission's* part.

clude that the Commission has misinterpreted one of its own regulations, directives, or pronouncements.¹³

We accordingly affirm without further discussion the Licensing Board's ultimate resolution of the intervenors' public interest and "as safe as" claims. Although not necessarily in agreement with everything that the Board said or did in connection with the claims, we are persuaded that the Commission's treatment in CLI-85-1 of section 50.12(a) and CLI-84-8 has rendered harmless any Licensing Board error along that line. To repeat, on these two aspects of their appeal, the intervenors' success hinged entirely upon a determination — now totally foreclosed by CLI-85-1 — that the Licensing Board had crucially misapprehended the mandate imposed upon it by regulation and Commission order.

A like disposition, however, cannot be made of the issues in the third category of importance to the outcome of the appeal: those pertaining to the applicability to the substitute AC electric power system of the physical security provisions of 10 C.F.R. Part 73. In terms, CLI-85-1 left open the question whether the intervenors' contentions in that area were improperly disallowed.¹⁴ Accordingly, in Part II we turn to a consideration of the intervenors' insistence that this question requires an affirmative answer.

II.

Each application for a license to operate a nuclear power plant must include a physical security plan.¹⁵ That plan must address how the applicant intends to comply with Part 73 of the Commission's regulations pertaining to the physical protection of the plant.¹⁶ Among other things, Part 73 prescribes various requirements for the protection of "vital equipment."¹⁷ Vital equipment is defined as

any equipment, system, device, or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure, destruction, or release are also considered to be vital.¹⁸

¹⁴ 21 NRC at 279.

¹⁵ 10 C.F.R. § 50.34(c).

¹⁶ See 10 C.F.R. § 73.1(b)(1)(i).

¹⁷ See 10 C.F.R. § 73.55.

¹⁸ 10 C.F.R. § 73.2(i).

Suffolk County's original contentions relating to physical security issues were resolved in a Final Security Settlement Agreement that was approved by the Licensing Board in 1982.¹⁹ That was, of course, well before the applicant sought an exemption from GDC 17 in early 1984. Relying on that settlement agreement, the Licensing Board initially precluded the County and the State from raising any new physical security matters in connection with the exemption request.²⁰ In response to a request for directed certification filed by those intervenors, the Commission reversed the Board, however, and authorized the filing of new contentions "so long as they were responsive to new issues raised by LILCO's exemption request, relevant to the exemption application and decision criteria cited and explained in . . . [CLI-84-8], and reasonably specific and otherwise capable of on-the-record litigation."²¹ The Commission also indicated that "security issues, if any, may be litigated (1) to the extent that they arise from changes in configuration of the emergency electric power system and (2) to the extent they are applicable to low power operation."²²

The County and the State thereafter submitted seven contentions concerning security problems allegedly implicated by the exemption proposal. Those contentions raised two basic issues: whether the temporary diesel generators and the gas turbine²³ should be treated as "vital equipment" and whether the addition of the new equipment required changes in the existing physical security plan. The Licensing Board issued a restricted order on September 19, 1984, denying admission of the proposed security contentions, and later publicly summarized its reasons for denying admission.²⁴ At the heart of the Board's decision was its conclusion that

as a matter of law . . . under a request for *exemption* from certain regulations for the purpose of low-power testing, the power enhancements need not be treated as "vital." To require this equipment to be treated as vital would, in effect, negate the exemption provisions.²⁵

¹⁹ Licensing Board Memorandum and Order Canceling Hearing, Approving Final Security Settlement Agreement, and Terminating Proceeding (Dec. 3, 1982) (unpublished).

²⁰ Licensing Board Order Granting LILCO's Motion In Limine (June 20, 1984) (unpublished).

²¹ Commission Memorandum and Order (July 18, 1984) (slip opinion at 2-3) (unpublished).

²² *Id.* at 3.

²³ See note 3, *supra*.

²⁴ LBP-84-45, *supra*, 20 NRC at 1356-58.

²⁵ *Id.* at 1357 (emphasis in original).

The Board additionally concluded that the intervenors had failed to demonstrate with reasonable specificity that certain of the new contentions were not encompassed within the previously approved Security Plan, and observed that some of the new contentions also failed to meet the criteria described in the Commission's July 18, 1984 order. Finally, the Board noted that, in any event, pursuant to informal arrangements with the NRC staff, the applicant had voluntarily agreed to modify its physical security arrangements for the temporary diesel generators.²⁶

The intervenors assert that the Board's ruling was erroneous.²⁷ The applicant contends that the security issues were resolved correctly.²⁸ The NRC staff argues that the intervenors have failed on appeal to address sufficiently the reasoning advanced in the Board's restricted order of September 19 or to identify any error in the Board's ruling.²⁹ We find that the intervenors have adequately pointed to prejudicial error in the Board's ruling. Thus, we reverse the Board's decision and remand the security issues for further consideration in light of our determinations here.

As noted earlier, vital equipment is

any equipment [or] system . . . the failure [or] destruction . . . of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure [or] destruction . . . are also considered to be vital.³⁰

It is clear that this is a functional description and does not specifically address the type or location of the equipment required to fulfill the function. The gas turbine and the temporary diesels, therefore, are to be considered vital equipment if they are necessary to protect the public health and safety.

We believe they are. The Licensing Board found that if, under certain postulated accident conditions during five percent power operations, AC power was restored to the plant within fifty-five minutes, there would be no release of fission products and the low power testing would thus not endanger life or property.³¹ It further found that the necessary power

²⁶ *Id.* at 1358.

²⁷ Suffolk County and State of New York Brief in Support of Appeal of October 29, 1984 ASLB Decision on LILCO's Exemption Request (Dec. 11, 1984) (hereafter Intervenors' Brief) at 18-25.

²⁸ Long Island Lighting Company's Reply Brief (Jan. 14, 1985) (hereafter LILCO Brief) at 24-31.

²⁹ NRC Staff Response to Suffolk County and State of New York Brief in Support of Appeal of October 29, 1984 ASLB Decision on LILCO's Exemption Request (Jan. 22, 1985) (hereafter Staff Brief) at 36-39.

³⁰ 10 C.F.R. § 73.2(i).

³¹ LBP-84-45, *supra*, 20 NRC at 1400.

could be restored within fifty-five minutes from either the gas turbine or the temporary diesels located at the site.³² Because these findings establish that this equipment is essential to the protection of the public from exposure to radiation in the event of a loss-of-coolant accident (LOCA) together with a loss of offsite power, we conclude that it must be considered vital equipment as defined in 10 C.F.R. § 73.2(i).

The applicant contends that the substitute AC power equipment is not "vital" because the Commission's regulations do not currently require that onsite power be considered "vital equipment" even for full power operations. To support this argument, it points to a recent Commission notice of proposed rulemaking that it claims would, for the first time, treat back-up AC power sources as vital equipment.³³ That proposal simply does not support the applicant's argument.

At present, the regulations provide no express list of equipment that must be designated as vital. Rather, site-specific security plans set out what equipment the applicant intends to include as vital or what the NRC staff considers vital.³⁴ In the cited notice of proposed rulemaking, the Commission sets out "to clarify and refine" the requirements for the designation and protection of equipment in vital locations.³⁵ As we read the proposal, there is no intention to impose new or additional requirements with regard to the AC power supply. True enough, under the proposed regulation onsite AC power would for the first time be expressly labeled as "vital." But the same is true for such other items as the reactor containment and the reactor control room.³⁶ Surely, it cannot be seriously suggested that, until now, the Commission deemed the containment and the control room as other than vital equipment. Thus, the fact that the onsite power sources were likewise not previously explicitly listed as vital equipment is not dispositive.

We disagree with the Licensing Board's view that treating the substitute AC power equipment as vital would "negate the exemption provisions."³⁷ The exemption request filed by the applicant concerns the design criteria for emergency power supplies contained in 10 C.F.R. Part 50, not the security of those supplies as required by Part 73. The applicant is currently attempting to ensure adequate protection of the tempo-

³² *Ibid.*

³³ LILCO Brief at 25-26.

³⁴ Counsel for the staff indicated at oral argument that alternate power sources are now treated by the staff as vital equipment. App. Tr. 102. The staff's position on the need to treat the temporary diesel generators as vital equipment was revised during the proceeding. This action resulted in considerable confusion among the parties and the Licensing Board.

³⁵ 49 Fed. Reg. 30,735 (1984).

³⁶ *Id.* at 30,735, 30,737.

³⁷ LBP-84-45, *supra*, 20 NRC at 1357.

rary diesels. It seems clear that a requirement that it protect the substitute power supply would not vitiate the benefits it might obtain from the Part 50 exemption itself.

We likewise reject the applicant's suggestion that approval of the exemption request should implicitly include exemption from Part 73. Its application sought "an exemption under § 50.12(a) from that portion of General Design Criterion 17, and from any other applicable regulations, if any, requiring that the TDI diesel generators be fully adjudicated prior to conducting the low power testing . . ."³⁸ The Commission treated the request as submitted under 10 C.F.R. § 50.12 of its regulations.³⁹ An exemption from the requirements of Part 73 would have been submitted pursuant to 10 C.F.R. § 73.5, not section 50.12. Moreover, because a loss of all AC power during a LOCA could result in core damage and, thus, harm to the public if AC power is not restored within a certain time period, we do not believe that grant of an exemption from the Part 50 design requirements should automatically relieve the applicant of the security requirements contained in Part 73. Given the critical nature of the gas turbine and the temporary diesels to the safety of the public, security must be assured. We do not suggest that such assurance cannot be forthcoming consistent with the use of the exemption authority. But, even if we assume that an exemption from Part 73 should now be embraced in this application, the intervenors are entitled to litigate contentions directed toward Part 73 issues.

The Board's error in excluding certain contentions because the emergency power supplies were not deemed "vital equipment" requires a reexamination of these contentions. The Board also rejected certain of the contentions because they were insufficiently specific or not adequately tied to changes arising in the Security Plan as a result of the use of temporary power sources. Rejection of these latter contentions appears to have stemmed, at least in part, from the Board's determination that the substitute power supplies need not be considered as vital equipment. Its conclusions regarding the lack of adequate specificity and nexus to changes in the security plan flowing from the use of the substitute power sources should be reevaluated in light of our determination that such sources are vital equipment.

The staff's statement that the applicant has voluntarily agreed to provide protection to the temporary diesel generators so that any disagreement the staff had with the Licensing Board is now moot⁴⁰ does not

³⁸ Application for Exemption (May 22, 1984) at 4.

³⁹ See CLI-84-8, *supra*, 19 NRC at 1155-56.

⁴⁰ Staff Brief at 39 n.22.

affect our decision. The short answer is that the actions taken by the applicant have not been subjected to adversarial exploration; i.e., the intervenors have not been accorded an opportunity to address the applicant's recent changes.

One additional matter will need to be clarified by the Board on remand. In its initial decision the Board relied on both the gas turbine and the temporary diesels as the source of emergency power. It is not clear, however, whether, because of its location, the gas turbine can be protected to the level required for vital equipment. The Licensing Board nevertheless found that the historical reliability of the temporary diesels has been "excellent."⁴¹ It also noted that the ultimate mission of the temporary diesels is to act as a backup to the gas turbine.⁴² This being so, the Board might need to determine whether, when considering the limited operating conditions of the exemption request, the reliability of the temporary diesels is sufficient to provide adequate protection for the public. If found sufficiently reliable and adequately protected, the treatment of the temporary diesels as vital equipment without similar treatment of the gas turbine could satisfy the need for a secure source of AC power. As an alternative, the Board might need to consider whether a level of protection of the temporary diesels and the gas turbine is adequate to satisfy the concerns for physical security of this equipment for low power testing, even though that level may be somewhat less than normally provided to vital equipment.⁴³

We *affirm*, in substantial part, the conclusions reached in the Licensing Board's initial decision. The Board's disposition of the intervenors' security contentions is *reversed*, and the case is *remanded* to the Licensing Board for further proceedings consistent with this opinion. The au-

⁴¹ LBP-84-45, *supra*, 20 NRC at 1372.

⁴² *Ibid.*

⁴³ In its restricted decision, the Board also suggested that it placed some reliance as well on the availability of power from the Long Island power grid. Order Denying Revised Security Contentions (Sept. 19, 1984) at 9 (restricted). We do not read the Board's decision as holding that, in the event of a loss of off-site power, such power could always be restored within fifty-five minutes. We assume the Board placed ultimate reliance on emergency power supplied by the temporary diesels or the gas turbine. The Board may wish to clarify this matter on remand.

thorization of the exemption is *vacated* insofar as it permits Phases III and IV of low power operation.⁴⁴

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

⁴⁴ We terminate, because it is obviously no longer needed, the requirement imposed by our unpublished February 13, 1985 order that the applicant provide us with two business days notice of its intention to embark upon Phase III of its low power testing program. We decline to upset the Licensing Board's grant of an exemption for the conduct of Phase I and II activities. See note 7, *supra*. As found by the Board below, core cooling and, thus, AC power is not needed in the event of a loss-of-coolant accident during Phase I and only after at least a month if an accident were to occur during Phase II. LBP-84-45, *supra*, 20 NRC at 1362-63, 1384-85, 1393. As a result, there are no security concerns regarding the substitute AC power supply during Phases I and II.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**John H Frye, III, Chairman
Dr. Harry Foreman
Gustave A. Linsenberger**

In the Matter of

**Docket No. 50-70-OLR
(ASLBP No. 83-481-01-OLR)**

**GENERAL ELECTRIC COMPANY
(GETR Vallecitos)**

February 13, 1985

Having earlier concluded that petitioner has standing to participate in this proceeding, the licensing board reviews his contentions and concludes that five should be admitted despite the fact that four of the five raise matters which were the subject of an earlier proceeding concerning this reactor.

RULES OF PRACTICE: COLLATERAL ESTOPPEL

The doctrine of collateral estoppel may not be used to prevent litigation of contentions which raise subjects litigated in a prior proceeding concerning the same reactor where the intervenor propounding the contentions was not in privity with the intervenor in the prior proceeding.

**RULES OF PRACTICE: SUMMARY DISPOSITION
RULES OF PRACTICE: OFFICIAL NOTICE**

In order to prevent relitigation of matters litigated in a prior proceeding concerning the same reactor, the Licensing Board invites motions

for summary disposition which rely on the record of the prior proceeding. Intervenor is, in response, to indicate why that record is inadequate and why further proceedings are necessary. The Licensing Board will officially notice the record in the prior proceeding and render a decision whether further evidentiary hearings are necessary.

MEMORANDUM AND ORDER **(Ruling on Mr. Jack Turk's Contentions)**

BACKGROUND

On September 15, 1977, there was published in the *Federal Register* (42 Fed. Reg. 46,427) a notice that the NRC had under consideration applications to renew the operating license for the General Electric Test Reactor (GETR) at the Vallecitos Nuclear Center and the special nuclear materials (SNM) license of the Vallecitos Nuclear Center. That notice provided an opportunity for interested persons to file requests for hearing by October 17, 1977.

A timely request and petition to intervene was filed by Nancy L. Lyon, Jack Turk, Alameda County Citizens Against Vallecitos, Joseph Buhowsky, Jr., East Bay Women for Peace, and California Public Interest Research Group (CalPIRG). Applicant, General Electric Company (GE), and NRC Staff filed responses to this petition. This Atomic Safety and Licensing Board was established to rule on the petition on October 21, 1977, and orally granted the petition at a Prehearing Conference of March 16, 1978 (Tr. 6-7). However, no written ruling was issued following that conference, nor were acceptable contentions identified.

On October 24, 1977, the NRC Staff issued an Order to Show Cause to GE which raised issues concerning the proper seismic and geologic design bases for the GETR and concerning whether modifications could be made to the GETR in light of these design bases. Mr. Turk did not seek to intervene in the Show Cause proceeding, although others did petition and participated in the ensuing hearing. The Show Cause proceeding was terminated by an Initial Decision (LBP-82-64, 16 NRC 596 (1982)) which was affirmed (ALAB-720, 17 NRC 397 (1983)). During the Show Cause proceeding, this license renewal proceeding was held in abeyance.

Following the issuance of LBP-82-64, this Board¹ reactivated this proceeding.² Following the affirmance of LBP-82-64, GE indicated its intent to proceed with the GETR license renewal application (it had earlier indicated a similar intent with respect to the SNM license) and Mr. Turk indicated his continuing interest in being a party to these proceedings. None of the other petitioners responded to the Board's orders. Consequently, on April 8, 1983, we issued a Memorandum and Order (LBP-83-19, 17 NRC 573) in which we admitted Mr. Turk as a party subject to the acceptance of at least one contention, and denied the petition to intervene with respect to the remaining petitioners.

Our April 8 Memorandum and Order set a deadline for filing new or amended contentions pursuant to 10 C.F.R. § 2.714(b).³ After Mr. Turk timely filed his contentions on November 28, 1983, a conference among Mr. Turk, GE, and Staff was held. As a result of this conference, these parties agreed that the proceeding on GE's application for renewal of its SNM license should be dismissed. Acting upon these parties' request, the Board dismissed the proceeding on the SNM license on January 20, 1984, and Staff renewed that license for a 5-year period expiring May 31, 1989. GE and Staff filed papers opposing Mr. Turk's contentions on January 30 and February 10, 1984, respectively. Mr. Turk replied to these papers on April 16, 1984.

A prehearing conference was held in San Francisco on August 9 and an unpublished Prehearing Conference Order issued on August 20, 1984.⁴ At that conference GE, Staff, and Mr. Turk agreed that further conversations among them with respect to the latter's contentions might be useful. However, these conversations were not successful in resolving the parties' differences. Consequently, in this Memorandum and Order we rule on Mr. Turk's contentions.

MR. TURK'S CONTENTIONS

Of his original eleven contentions, Mr. Turk has withdrawn all but Contentions 7 and 11. Additionally, he has filed six revised contentions

¹ This Board was most recently reconstituted on October 14, 1982. See 47 Fed. Reg. 46,916 (Oct. 21, 1982).

² See unpublished Memoranda and Orders of October 21, November 12, and November 19, 1982. The October 21 Memorandum and Order called on GE to indicate its intentions with respect to its two license renewal applications; the November 12 Memorandum and Order called for replies to GE's response; and the November 19 Memorandum and Order made correction in the service list and amended the reply deadlines set in the November 12 Memorandum and Order.

³ This deadline was extended on several occasions.

⁴ This prehearing conference also considered CalPIRG's request for readmission to this proceeding. We denied this request in LBP-84-54, 20 NRC 1637 (1984).

and withdrawn the first of these. Revised Contentions 3 through 6 deal with seismic matters. Original Contention 7 deals with the Price-Anderson Act and original Contention 11 concerns releases of tritiated water. Revised Contention 2 asserts that the GETR should be subject to the provisions of Appendices A to 10 C.F.R. Parts 50 and 100.⁵ We address original Contentions 7 and 11, and revised Contention 2 first.

Original Contention 7 states:

Because of the significant contamination of property that could result from a maximum credible accident at Vallecitos, I contend that the Commission should not grant a license renewal before the Applicant makes provisions for adequate insurance coverage in the event of an accident. The Price-Anderson Act was ruled unconstitutional on March 31, 1977 by the U.S. Federal District Court in North Carolina. In a strong opinion delivered March 31, 1977, Judge James B. MacMillan ruled that the provisions of the Price-Anderson Act that limits [sic] the liability of nuclear power plants and their operation violated the due process and equal protection provisions of the Fifth Amendment. The Judge held that the provisions of the Price-Anderson Act limiting liability to \$560,000,000 are unenforceable insofar as they apply to nuclear accidents inside the United States. Thus, I contend that the Applicant could be held liable for full liability in case of an accident at the Vallecitos Nuclear Center.

Both GE and Staff oppose this contention,⁶ citing *Duke Power Co. v. Carolina Environmental Study Group*, 438 U.S. 59 (1978) which reversed the District Court's judgment referred to in the contention and upheld the constitutionality of the Price-Anderson Act. We agree. The Supreme Court has clearly upheld the constitutionality of the Price-Anderson Act. Hence this contention presents nothing which may be litigated and is denied. Mr. Turk's concerns in this regard would be best addressed to Congress which has the power to deal with the ills he perceives to be wrought by the Price-Anderson Act. We have no such power.

Original Contention 11 states:

Petitioners contend that the Applicant has operated a nuclear reactor, GETR, in violation of:

- (a) 10 C.F.R. 50.34(a), that Applicant shall "[i]dentify . . . means to be employed for keeping levels of radioactive material in effluent to unrestricted areas as low as is reasonably achievable . . . in relation to benefits to public health and safety.";
- (b) 10 C.F.R. 50 Appendix A, Criterion 14, that "The reactor coolant pressure boundary shall be designed, fabricated, erected, and tested to have an ex-

⁵ See Mr. Turk's April 16, 1984 Response to our February 28, 1984 Memorandum and Order.

⁶ GE has quoted Mr. Turk's and its January 30 and April 16 statements and summarized its statements of the August 9 prehearing conference in its filing of December 19, 1984. Staff's positions are taken from its February 10 response.

tremely low probability of abnormal leakage . . ." during normal conditions of operating;

(c) 10 C.F.R. 50.34a(c)(1);

(d) 10 C.F.R. 50.36a(1).

Particularly, the Applicant has operated the GETR with abnormal leakages in valves, pipes or other components of the reactor coolant pressure boundary, which leakages have resulted in the release of tritiated water into Vallecitos Creek, causing the tritium concentration to exceed the maximum permissible concentration to unrestricted areas ($3 \times 10^{-3} \mu\text{Ci/ml}$, 10 C.F.R. 20.106).

In support of this contention, Mr. Turk refers to a March 3, 1978 newspaper article which recites that high levels of tritium have been found in Vallecitos Creek near the VNC, albeit levels not in excess of EPA's drinking water standards. GE and Staff oppose the contention on the ground that no basis has been shown. Additionally, GE points to an agreement between it and the California Water Quality Control Board under which GE will make no releases of tritium to Vallecitos Creek.

We believe GE's and Staff's positions go more to the merits of the contention than Mr. Turk's bases for it. Mr. Turk clearly states that abnormal leakages in the reactor coolant pressure boundary have resulted in these releases. We agree with Mr. Turk that while current releases are minimal (the reactor being shut down), the question posed by the contention is an appropriate one in the event the reactor is again operated. GE's assertions concerning its agreement not to release any tritium are an answer to the merits of the contention, not a bar to its admission. This contention is admitted.

Revised Contention 2 states:

I contend that the Board has erred in its Conclusions of Law at 3 and 4 (p. 101, Initial Decision [LBP-82-64, 16 NRC at 653]) by freeing the GETR and 10 C.F.R. 100. To lump the GETR into the large group of test and research reactors in contrast to large electricity generating stations is quite analogous to being able to describe the soil characteristics beneath the reactor building as rock-like or sandlike. I call your attention to a few realities: the GETR is in the middle of a great spectrum of reactor power output; from one megawatt thermal output for a Triga research reactor to the 50 mw(th) GETR to the 1150 mw(th) Oyster Creek Electrical Generating Station. The GETR consumes its fuel at the rate of one full core in three cycles of operation (105 days) and fully 16 cores of spent fuel must be stored in the spent fuel pool during an extended period of normal operation — approximately 200 kilograms of highly toxic U-235 fission product (50% burnup). A Triga research reactor is *never* refueled, and the total fission product inventory cannot exceed one core — 3.8 kilograms.

Similar to electricity generating stations, the GETR is equipped with a containment building, emergency diesel-electric generators, a pressurized reactor vessel and an emergency core coolant supply.

The NRC staff submitted its brief of 7/31/81 on this subject, observing at p. 5 that research reactors (a Triga) are vastly different from power reactors, neither of which, I might add, is the GETR. I have read 10 C.F.R., and find that there is much room to explore the applicability of the subject sections to the present case, and I would welcome the opportunity to do so, in the proper forum.

Both Staff and GE oppose this contention as a direct challenge to the Commission's regulations. We agree. Appendices A to Part 50 and Part 100 do not apply to this reactor. Thus this contention must be denied. Should he desire to pursue this matter further, Mr. Turk should follow the procedures set out in 10 C.F.R. § 2.758 or § 2.802.

Revised Contentions 3 through 6 all concern seismic matters. GE has asserted that these contentions are barred by the doctrine of collateral estoppel. GE's theory is that, because Mr. Turk could have but did not seek to litigate these contentions in connection with the Show Cause proceeding, he should be barred from asserting them now.

Staff, in its November 16, 1984 response to GE's collateral estoppel argument, expresses doubt that that doctrine may be properly applied to bar Mr. Turk's seismic contentions. We agree. Staff points out that in virtually every case which considered applying collateral estoppel to prevent litigation of a contention it was found necessary that privity exist between the intervenor proposing the contention and the intervenor which litigated it in the prior proceeding.⁷

GE quotes from *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), CLI-77-13, 5 NRC 1303, 1321 (1977) a statement of the Commission to the effect that an intervenor seeking to raise anti-trust issues pursuant to § 105 of the Atomic Energy Act may not "stand on the sidelines at the construction permit stage and raise a claim at the operating license stage that could have been raised earlier." GE cites this statement as support for its position.

South Texas is clearly distinguishable from the present case. As GE recognizes, *South Texas* was concerned with antitrust issues. Section 105(c)(2) of the Atomic Energy Act specifically sanctions the result reached in *South Texas*. There is no similar provision in the Atomic

⁷ See, e.g., *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 695-97 (1982), *criticizing* LBP-82-3, 15 NRC 61, 80-82 (1982); *Consolidated Edison Co. of New York* (Indian Point Station, Unit No. 2), ALAB-399, 5 NRC 1156, 1167 (1977); *Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), ALAB-182, 7 AEC 210, 212-16, *remanded on other grounds*, CLI-74-12, 7 AEC 203 (1974); *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1423, 1459-60 (1982); *Florida Power & Light Co.* (St. Lucie Plant, Unit No. 2), LBP-81-58, 14 NRC 1167, 1188-89 (1981); *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), LBP-79-27, 10 NRC 563, 572 (1979), *aff'd*, ALAB-575, 11 NRC 14 (1980). See also *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-78-1, 7 NRC 1, 27 (1978); but see *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-24, 14 NRC 175, 199-200 (1981).

Energy Act which would operate to bar relitigation of the seismic issues which Mr. Turk seeks to raise. We conclude that Mr. Turk's seismic contentions are not barred by the doctrine of collateral estoppel.⁸

Revised Contention 3 states:

I contend that the "Fault Deflection Analysis" (Initial Decision, Facts 65-76 [LBP-82-64, 16 NRC at 628-30]) has been *fundamental* to the acceptance by the Board and the staff of General Electric's proposed solution to the seismic problem at the site. I further contend that this "analysis" has not been subjected to the rigors of peer review sufficient to lend it such weight. Indeed, it is not clear that such a phenomenon even exists, there being cursory evidence of such occurrence in one, poorly documented instance in Managua, Nicaragua, 1976, and *no* evidence of occurrence in the event in San Fernando Valley, 1971, where thrust faults like the Verona exist. I contend that the "Fault Decision Analysis" [sic] is not applicable in this instance, and I would certainly attempt to prove such if given the opportunity in subsequent hearings, through the use of expert testimony.

Both Staff and GE oppose the admission of this contention on the ground that no basis is given to question the findings of the Show Cause Board. In his April 16, 1984 response, Mr. Turk indicates that in his opinion an insufficient discussion of this topic took place before the Show Cause Board and has specified the ways in which he views this discussion to be inadequate. We find that sufficient basis has been given and admit the contention.

Revised Contention 4 states:

Notwithstanding the questioned applicability of this "analysis," it requires the presence of an existing fault at the site. The presence of such a fault at the site renders the probabilistic analysis presented by GE useless, for the probability of a fault at the site is 1.0 a condition for the "Fault Deflection Analysis" to obtain. Conversely, the probability analysis can apply to the site only under the condition, a priori, that we do not know whether a fault exists at the site, which condition negates the applicability of the "Fault Deflection Analysis." (My letter of 1/5/83, p. 3, paragraph 1). I have strongly urged in my letter, 1/5/83, and contend that the site must be excavated to determine the presence of a fault.

Both GE and Staff argue that, because the acceptance of probabilistic and deterministic methodologies as alternative bases for expert opinion and decision is clearly appropriate, this contention must be denied. In

⁸ Where, as here, Mr. Turk's original seismic contentions were properly raised in this proceeding prior to the issuance of Staff's Order to Show Cause which also raised seismic matters, we believe that GE should have moved pursuant to 10 C.F.R. § 2.716 to consolidate the two proceedings if it wished Mr. Turk to be bound by the result of the Show Cause proceeding. Although the question of consolidation was raised by Staff, it apparently received no support. See January 5, 1981 Prehearing Conference in the Show Cause Proceeding, Tr. 143-48.

his April 16 response, Mr. Turk focuses on the need for more trenching. GE's response to this is that no basis has been given to question the conclusion reached in the Show Cause proceeding that further trenching is unnecessary. Were Mr. Turk estopped to assert this contention, GE's response would be relevant. Because Mr. Turk is free to assert this contention despite the consideration given it in the Show Cause proceeding, GE's argument must be viewed as going to the merits of the contention and hence irrelevant to the decision whether to admit it. This contention is admitted.

Revised Contention 5 states:

Regarding the several Probability Analyses (Initial Decision at Facts 52-64 [LBP-82-64, 16 NRC at 624-28]) proposed by GE, it is my contention that:

- 1) There is a consistent lack of sufficient data base to support the correctness of the calculations.
- 2) The degree of conservatism embodied in the choice of terms varies greatly, making results questionable (for example, the quantity $P_{\overline{0n}} \cdot P_{bs;\overline{0n}}$ is the product of an excessively conservative term and an excessively non-conservative term).
- 3) When choosing conditions within which models operate and conclusions result, the choice of conditions and review of results must be examined with respect to known seismic and geologic theory.
- 4) The so-called "Hazard Increasing Function" (Initial Decision at Fact 55 [LBP-82-64, 16 NRC at 625]) is incorrect; rather, it can be shown to be a decreasing function, i.e., the longer it has been since the last offset, the smaller the probability of an offset next year. Examine in light of 3), above.

I would welcome the opportunity to expand this discussion to include expert testimony, and am convinced that such expansion would shed new light on conclusions reached by the Initial Decision, and would set aside such analyses.

Both GE and Staff assert that the matters raised in this contention received adequate consideration in the Show Cause proceeding. For the reasons given above, these arguments, which in essence go to the merits of the contention, may not be considered in determining whether to admit it. However, Staff also asserts that the contention lacks basis and is overly vague, and thus fails to inform the other parties of the challenge they must meet. We disagree. While the contention would benefit from a further elaboration of the matters it puts in issue, we find that it minimally meets the requirements of § 2.714. Therefore it is admitted. Nonetheless, Mr. Turk is to furnish us and serve the GE and Staff with a further specification of the issues raised by this contention by March 8, 1985.

Revised Contention 6 states:

Barring the applicability of the "Fault Deflection Analysis" and the Probability Analyses, I contend that the staff has not applied the proper design basis seismic

load to GETR, which I believe to be 2.5 meter offset from surface rupture at the site acting co-seismically with a 0.6g maximum effective vibratory ground motion, both of these terms having occurred historically. Initial Decision at Facts 24-33, 80-105 [LBP-82-64, 16 NRC at 616-18, 631-37]. Such a seismic event would cause the design basis accident involving a core melt and a breach of containment, placing myself and family at risk from the associated hazards of radiation exposure. Initial Decision at Facts 147-180 [*id.* at 645-52].

Both GE and Staff oppose the admission of this contention on the ground that it gives no basis on which to question the conclusions of the Show Cause Board. For the reasons given above, these arguments may not be considered in determining whether to admit this contention. Consequently the contention is admitted.

EFFECT TO BE GIVEN THE SHOW CAUSE PROCEEDING

GE, Staff, and Mr. Turk all agree that we should officially notice the record in the Show Cause proceeding. We agree that this is appropriate. We also agree with GE and Staff that it would be wasteful to relitigate those portions of the Show Cause record called into question by the admitted contentions absent some basis for doing so.

We indicated in our August 20 Prehearing Conference Order (at 8) that, in addition to viewing GE's collateral estoppel argument as posing a bar to the admission of seismic contentions, we also viewed it

as asserting that nothing has been advanced in support of the contentions here at issue which justifies an inquiry over and above that which took place in the Show Cause proceeding. We do not believe that we can adequately evaluate this argument at this stage of the proceeding. Such an evaluation requires a consideration of the evidence underlying the Show Cause Initial Decision, and a comparison of that evidence with . . . Mr. Turk's arguments that it is in some respect insufficient. Only one of the members of this Board was also a member of the Show Cause Board. Consequently this Board needs a more focussed presentation of the parties' positions. It was to this end that we suggested at the prehearing conference that motions for summary disposition might provide the appropriate procedural vehicle to present this controversy for decision.

GE also argues that the standards for reopening a record should be applied to the admission of these contentions. (September 28 Response to the Prehearing Conference Order at 18-20.) We have not considered this argument because of the simple fact that Mr. Turk does not seek to reopen the Show Cause record, but rather to create a record in this license renewal proceeding pursuant to the opportunity to do so afforded him by the Commission.

Although it does not rely on the standards for reopening records, Staff takes a similar position. In its November 16 response to GE's collateral estoppel arguments, Staff states that no valid purpose would be served by relitigating matters covered in the Show Cause proceeding absent the presence of significant information which might have affected the outcome of the Show Cause proceeding.

We believe that the overall thrust of GE's and Staff's positions may be given effect through the use of summary disposition procedures. While we agree that it would be wasteful to relitigate matters covered in the Show Cause proceeding absent a substantial reason to do so, the fact remains that Mr. Turk is entitled to create a record on those issues in this proceeding. Therefore we invite motions for summary disposition of revised Contentions 3 through 6. In addition to complying with the requirements of 10 C.F.R. § 2.749, these motions must identify the specific portions of the Show Cause record on which they rely. In his response, Mr. Turk should indicate in what respects he deems those portions of the record inadequate and set forth, pursuant to § 2.749(b), the additional evidence he deems necessary to cure those inadequacies.⁹ We will then take official notice of the portions of the Show Cause record cited and determine whether there are any genuine issues of material fact which require an evidentiary hearing. If there are no such disputes, we will render a decision either for or against the movant on the merits of the contentions.

GE has cautioned that this course will place this Board in the anomalous position of sitting as a reviewer of Appeal Board's Show Cause decision. We disagree. The Commission has afforded Mr. Turk an opportunity to create a record in this license renewal proceeding and it is that record, not the Show Cause record, on which we will base our decision.

MORGAN HILL EARTHQUAKE

In April of 1984, the Morgan Hill earthquake occurred on the Calaveras Fault. This earthquake undoubtedly provided data which are relevant to revised Contentions 5 and 6. Further, we assume that, because of the relevance of this event to the GETR, GE and Staff have analyzed these data. Therefore, we wish GE and Staff to furnish us with copies of their analyses and serve them on Mr. Turk by March 8.

⁹ Mr. Turk is of course free to identify portions of the Show Cause record which he wishes officially noticed.

Order

In consideration of the foregoing, it is, this 13th day of February 1984,
ORDERED:

1. The following of Mr. Turk's contentions are admitted:
 - a) Original Contention 11, and
 - b) Revised Contentions 3 through 6.
2. The following of Mr. Turk's contentions are denied:
 - a) Original Contention 7; and
 - b) Revised Contention 2.
3. Mr. Turk is admitted as a party to this proceeding.
4. By March 8, 1985, Mr. Turk is to furnish the Board and serve GE and Staff with a further specification of the issues raised by revised Contention 5, and GE and Staff are to furnish the Board and serve Mr. Turk with copies of their analyses of the data resulting from the Morgan Hill earthquake. Also by March 8, parties are to confer with respect to a schedule for this proceeding and advise the Board of their conclusions.

Dr. Foreman concurs but was unavailable to sign this Memorandum and Order.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Gustave A. Linenberger
ADMINISTRATIVE JUDGE

John H Frye, III, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland
February 13, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

James L. Kelley, Chairman
Dr. James H. Carpenter, Member
Glenn O. Bright, Member
Dr. Harry Foreman, Alternate Member

In the Matter of

Docket No. 50-400-OL
(ASLBP No. 82-472-03-OL)

CAROLINA POWER & LIGHT
COMPANY and
NORTH CAROLINA EASTERN
MUNICIPAL POWER AGENCY
(Shearon Harris Nuclear Power
Plant)

February 20, 1985

The Licensing Board decides in the Applicants' and Staff's favor three environmental issues that had been the subject of an evidentiary hearing. The Board denies a petition for waiver of the "need for power" rule, holding that the petitioner had not shown that application of the rule in this case would be inconsistent with its intended purpose.

TECHNICAL ISSUES DISCUSSED

Appropriate Time Periods for Considering Health Effects
Effects of Attachment of Radionuclides to Fly Ash Particles
Effects of Coal Particulates Associated with the Fuel Cycle.

APPEARANCES

Thomas A. Baxter and Deborah B. Bauser, Washington, D.C., and **Richard E. Jones, Samantha Francis Flynn and H. Hill Carrow**, Raleigh, North Carolina, for the Applicants **Carolina Power & Light Company**, *et al.*

Wells Eddleman, Durham, North Carolina, *pro se.*

John Runkle, Chapel Hill, North Carolina, for Conservation Council of North Carolina.

Charles A. Barth and Janice E. Moore for the Nuclear Regulatory Commission Staff.

TABLE OF CONTENTS

	Page
I. INTRODUCTION	412
II. FACTUAL AND PROCEDURAL BACKGROUND	412
III. SUMMARY OF FINDINGS	414
A. Joint Contention II(c) — Appropriate Time Periods for Considering Health Effects	414
B. Joint Contention II(e) — Effects of Attachment of Radionuclides to Fly Ash Particles	415
C. Eddleman Contention 8F(1) — Effects of Coal Particulates Associated with the Fuel Cycle	416
IV. FINDINGS OF FACT	419
A. Joint Contention II(c) — Appropriate Time Periods for Considering Health Effects	419
B. Joint Contention II(e) — Effects of Attachment of Radionuclides to Fly Ash Particles	423
C. Contention 8F(1) — Effects of Coal Particulates Associated with the Fuel Cycle	428
V. MR. EDDLEMAN'S PETITION SEEKING WAIVER OF THE NEED FOR POWER RULE	440
VI. CONCLUSIONS OF LAW	445
VII. APPEALS	445

PARTIAL INITIAL DECISION ON ENVIRONMENTAL CONTENTIONS

I. INTRODUCTION

Carolina Power & Light Company ("CP&L") and North Carolina Eastern Municipal Power Agency (collectively "Applicants") are the joint owners and applicants for an operating license for the Shearon Harris Nuclear Power Plant. CP&L is the lead applicant and is responsible for the construction and operation of the facility.

This proceeding is contested with respect to numerous contentions which, however, can be grouped in three general categories — environmental, safety and emergency planning. The Licensing Board and parties decided at an early stage that the case would be best managed by addressing the three categories of contentions sequentially, with separate milestones for discovery, hearings, and separate partial initial decisions in each category. Order of March 10, 1983 (unpublished). The Board now decides the environmental contentions that went to hearing in June 1984 in the Applicants' favor. This decision also has the effect of making other dispositive Board rulings on environmental contentions — i.e., rulings granting summary disposition motions or rejecting proposed contentions — ripe for appellate review.

Hearings were held on safety contentions in Fall 1984, and a Partial Initial Decision on safety issues is anticipated in Spring 1985. A hearing on emergency planning contentions is scheduled for June 1985, with the final Partial Initial Decision to follow.

II. FACTUAL AND PROCEDURAL BACKGROUND

The Shearon Harris facility is located in Wake and Chatham Counties, North Carolina, about 16 miles southwest of Raleigh. The facility contains one pressurized water reactor,¹ designed to operate at core power levels up to 2785 megawatts (MW) thermal, with a net electrical output of about 950 MW. Final Environmental Statement, Staff Exh. 1 at v.

Permits to construct the facility were issued, following hearings, in 1978. In January 1982, the Commission published in the *Federal Register* (37 Fed. Reg. 3898) a notice of receipt of an application for an operating license for the Harris facility. In response to that notice, nine separate

¹ As originally proposed and authorized for construction, the facility was to contain four reactors. See LBP-78-4, 7 NRC 92 (1978). Units 2, 3 and 4 have since been canceled.

petitions to intervene were filed by different individuals and organizations. Two individuals, Mr. Wells Eddleman and Dr. Richard Wilson, were admitted and have since participated as parties. Three organizations, Conservation Council of North Carolina ("CCNC"), Chapel Hill Anti-Nuclear Group Effort ("CHANGE") and Kudzu Alliance ("Kudzu") were also admitted as parties and have since participated jointly with Mr. Eddleman in support of certain contentions. The remaining petitions to intervene were either consolidated with admitted parties, withdrawn, or denied. See LBP-82-119A, 16 NRC 2069, 2070 (1982); Order of May 3, 1983, Tr. 945.

The initial petitions for intervention proposed over 300 contentions for litigation. In addition, the parties have proposed over 200 "late" contentions assertedly based on information not previously available (particularly offsite emergency plans), subject to the "five-factor" balancing test. See *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), CLI-83-19, 17 NRC 1041 (1983). To date, the Board has admitted some sixty contentions (in whole or in part) for discovery purposes, with the remainder being withdrawn or rejected. Numerous contentions that were initially admitted were later withdrawn following negotiations, or dismissed on motions for summary disposition. In the environmental area, the subject of this Decision, the following three contentions are being determined following an evidentiary hearing:

- Environmental effects of Table S-3 coal particulates (Eddleman 8F(1));
- Environmental effects of radionuclides associated with fly ash from coal plants (Joint Contention II(e)); and
- Duration of radiological dose calculations (Joint Contention II(c)).

Hearings on the environmental contentions were conducted in Raleigh, North Carolina, for 4 days in June 1984.² Mr. Eddleman appeared and represented himself. In his dual capacity as one of the Joint Intervenor, Mr. Eddleman also represented that group, along with Mr. John Runkle, counsel for CCNC, another Joint Intervenor. The Applicants and the NRC Staff were represented by counsel. The Board heard testimony from eight witnesses, four called by the Applicants and four by the Staff. The Intervenor did not call witnesses, but sought to make

² Because of Administrative Judge Carpenter's temporary unavailability, Administrative Judge Harry Foreman served as a member of the Board, in place of Judge Carpenter, during the hearing and in the decision on Eddleman Contention 8F(1). Judge Foreman served as a technical interrogator and informal assistant to the Board under 10 C.F.R. § 2.722 for the balance of the hearing. Order of June 4, 1984 (unpublished); Tr. 1599-1600.

their case through cross-examination. Following the hearing, each party submitted proposed findings of fact and conclusions of law.

III. SUMMARY OF FINDINGS

This section summarizes the detailed findings of fact in the following section on the three environmental contentions. It provides a brief narrative description, essentially an overview, of how those contentions have been decided, and why.

A. Joint Contention II(c) — Appropriate Time Periods for Considering Health Effects

Joint Contention II(c) has as its general thrust the concern that the time periods over which exposures to radioactivity were calculated were too short. The FES generally presents an “annualized” dose to various individuals and groups rather than a total dose calculated over the length of time that the radioactivity caused by operation of the plant would last. Joint Intervenors contend that this method of presenting exposure calculations does not reveal the true magnitude of radiation exposures to the public.

In accepting this contention the Board set forth three issues which could be litigated: (1) whether a period of time subsequent to the operation of the plant should be included in exposure analyses,³ (2) whether the FES should include the total risk of exposure from operation of the plant for 40 years, and (3) whether the FES should take into account the cumulative exposure to individuals who live near the plant for many years.

As to the first issue, Applicants calculated the exposure to the population within 50 miles of the plant during plant operations, and then calculated the additional exposure which would be received over the 100 years following cessation of plant operations. The incremental exposure would add only 1.3% to the total exposure during plant operations, an amount which the Board finds to be insignificant. Applicants also presented similar calculations of the dose and incremental dose to the population of the entire United States. The incremental dose in this case would add some 40% to the risk. However, the computed risk from operation of the plant is 1×10^{-9} . For this type of calculation the Board sees

³ The Board allowed only a reasonable amount of time to be considered rather than the Joint Intervenors' argument that the analysis should extend to some 11 million years.

little difference between 1 and 1.4×10^{-9} and, considering the conservatisms in the calculation, finds the effect insignificant.

As to the second and third issues, Staff presented a calculation which was based on taking the maximum allowable dose under the appropriate regulations and multiplying it by 40, the number of years assumed for operation of the plant. The result compares favorably with Applicants' calculations of risk to the maximally exposed individual, which were made using different assumptions. We see little difference between the Applicants' calculated risk of 2×10^{-5} and Staff's 3×10^{-5} .⁴ The Board finds that Staff's annualized results, while not explicitly presenting the total dose over the life of the plant, require only a simple calculation to reveal such a result, and are therefore adequate for the purpose intended.

Joint Intervenors had further reservations in their findings on a number of subjects which are not found in the FES, such as effects on fetuses, genetic effects, birth defects and fetal losses. The record shows that these effects are insignificant. They further argued that radiation effects should be compared with a "no-plant" condition rather than naturally occurring background radiation, which seemingly implies a misunderstanding of what the calculations show; that absolute risk was used instead of relative risk, blinking the fact that use of absolute risk factors is recommended by the BEIR Committee; and, that the effect on world population should be presented, an argument in which the Board finds no merit.

B. Joint Contention II(e) — Effects of Attachment of Radionuclides to Fly Ash Particles

Joint Contention II(e) expressed the Intervenors' concern that radiological doses from the anticipated routine gaseous emissions from the Harris Plant have been underestimated because attachment of radionuclides to fly ash particles and subsequent deposition in the lung had not been explicitly considered by the Applicants or the NRC Staff. Joint Intervenors did not support their view with testimony, so that the record consists of testimony and cross-examination of the Applicants' and Staff's witnesses.

The inhalation dose would come primarily from the deposition of tritium in the form of tritiated water, which makes up over 98% of the estimated whole-body dose from inhalation. Since ordinary air contains

⁴ Both calculations were made using the BEIR Committee recommended methods and estimators, but the original assumptions made to obtain dose figures were made independently.

about 80,000 times more water vapor than particles, only an extremely small portion of the tritium can become associated with particles. Further, particle-associated water would be expected to commingle with other water at the point of lung deposition. For these reasons, tritiated water, the major dose contributor, is not significantly affected by airborne particles.

The second largest component of the estimated inhalation dose would come from the noble gases. Expected association of noble gases with fly ash particles was shown to be quite small, and possible dose underestimation of these radionuclides was found to be insignificant, particularly since the calculated doses amount to a few percent of the 10 C.F.R. Part 50, Appendix I design objectives.

The Joint Intervenors' concern would apply to the estimated doses from radioisotopes of iodine, cobalt, iron, and manganese. The Applicants and Staff assumed 75% deposition in estimating inhalation doses for these radionuclides. Applicants' testimony showed that this assumption has been borne out by recent research results. Staff points out that the dose from these radionuclides amounts to only 0.2 millirem per year (mrem/yr) and, even if one were to assume 100% lung deposition, the dose would be less than 0.3 mrem/yr. The Joint Intervenors' cross-examination makes it clear that this part of the dose estimate is not exact. However, the uncertainty is less than 1/10 of 1 mrem/yr. We conclude that the uncertainty is acceptably small.

C. Eddleman Contention 8F(1) — Effects of Coal Particulates Associated with the Fuel Cycle

Eddleman Contention 8F(1) alleges that the FES underestimates the health effects of the coal particulates — 1154 metric tons per year (MT/yr) — associated with the uranium fuel cycle for the Harris facility. The generic quantification of the environmental impacts of the uranium fuel cycle is included in Table S-3. Table S-3 values are not subject to challenge in individual licensing proceedings. However, the health effects attributable to these values are not part of the Table; consequently, they are litigable in NRC adjudications.

The health effects of Table S-3 coal particles are addressed in the Final Environmental Statement in Appendix C. The effects of the nonradiological particulate effluents associated with fuel-cycle processes are grouped together with other effluents and the following statement is provided:

The quantities of chemical, gaseous and particulate effluents associated with fuel cycle processes are given in Table S-3. The principal species are sulfur oxides, nitrogen oxides, and particulates. On the basis of the data in a Council on Environmental Quality report (CEQ, 1976), the Staff finds that these emissions constitute an extremely small additional atmospheric loading in comparison with the same emissions from the stationary fuel-combustion and transportation sectors in the U.S.: that is, about 0.02% of the annual national releases for each of these species. The staff believes that such small increases in releases of these pollutants are acceptable.

Mr. Eddleman's Contention 8F(1) is a challenge to the adequacy of the Staff summary position on the health effects of coal particulates. When he first proposed Contention 8F(1), Mr. Eddleman contended that this quantity of emissions (1154 MT/yr of coal particles, the S-3 value) may cause up to ten deaths a year. On the basis of the hearing record and certain of his assumptions, he asks us to find that these coal particulates could, under varying hypotheses, cause from 32 to 800 deaths during the life of the plant. Hence he claims the Table S-3 coal particulate health effects have not been properly considered by the NRC Staff.

The particulate emission rate of 1154 MT/yr is a hypothetical attribution. It is used in Table S-3 in order to calculate a conservative estimate of the particulate emissions that might be associated with the electrical energy produced by the equivalent of a hypothetical 45-MWe coal-fired power plant operating for 1 year. This is the estimated energy needed to support the uranium fuel cycle for 1 year of the Harris Plant's operation. Most of this energy is used in the uranium enrichment process at gaseous diffusion plants.

The three gaseous diffusion facilities used in the uranium enrichment process are supplied with electricity primarily from power grids. Thus, the particulates released from coal plants supporting the uranium fuel cycle for the Harris facility in fact are distributed in small amounts over large areas. In order to estimate an upper limit of health risks, the Applicant and Staff experts used much more conservative assumptions in their calculations, namely, that the coal particles were generated from specific plant sites in the power grid.

To calculate health effects, it was necessary to estimate the particulate concentration levels attributable to 1154 MT/yr. The Applicants' testimony made a number of assumptions about the coal particulate emissions attributable to the uranium fuel cycle, whereas the NRC Staff's experts utilized actual data and a complex model to derive the atmospheric concentration of coal particles. The Applicants' witness estimated an average daytime particulate concentration level of 0.036 to 0.042 microgram per cubic meter ($\mu\text{g}/\text{m}^3$). The Staff calculated the maximum

incremental 24-hour concentration to which the average individual in the area is exposed to be $0.105 \mu\text{g}/\text{m}^3$. This is remarkably good agreement, considering the disparate methods of analysis.

Utilizing the particulate concentration levels thus calculated, the health effects attributed to 1154 MT/yr coal particulates were assessed. Both comparative and quantitative methods were used.

The size of coal particulates that are of concern to health are the so-called respirable or Thoracic Particles (T.P.). Large particles tend to be deposited in the nose or pharynx and do not reach the lung. The Environmental Protection Agency ("EPA") staff has found that based on long-term epidemiological data, the range of annual T.P. levels of interest in health assessment is 55 to $110 \mu\text{g}/\text{m}^3$, i.e., that the lowest-level risk of health effects is approximately $55 \mu\text{g}/\text{m}^3$. The calculation of T.P. concentrations associated with prototype S-3 plant particulate emissions was $0.014\text{-}0.017 \mu\text{g}/\text{m}^3$, namely a concentration approximately 3000 times smaller than the minimum concentration expected to result in symptomatic effects.

A standard reference for evaluation of health effects of air pollution is the "1983 Harvard Report" prepared by the Health and Environmental Risk Analysis Program of the U.S. Department of Energy. The parameter for deleterious health effects used in the Harvard Report is a so-called "Fine Particle (F.P.) Damage Function," which is viewed as a surrogate for health effects of all air pollution. The F.P. Damage Function is determined as 1.3 ± 0.6 deaths/year/ 10^5 persons per $\mu\text{g}/\text{m}^3$ F.P. Using this parameter, the estimated excess deaths from population exposure to 1154 MT/yr total coal particulate emissions range from 0.001 to 0.13. This risk is indistinguishable from zero against the background of expected deaths from all causes, which ranges from 2,400 to 11,000 at the five areas studied. The upper limit of estimated expected deaths from particulate exposure corresponds to about 1/1000 of 1% of the mortality rate.

Conservative calculations of the upper limit of health risk which may be associated with the 1154-MT/yr figure indicate that atmospheric concentrations of the amount of particles attributable to a 45-MWe coal-fired plant reasonably distributed over a 50-mile radius would be 3000 times smaller than the minimum concentration determined by the EPA to present some health risk. Conservative calculations of the upper limits of risk of those particles distributed among the populations around the five fossil plants supplying the uranium enrichment facilities indicate that, at most, a tiny fraction of a death, each year those plants are in operation, could be attributed to the particulate emissions. This risk is extremely small, particularly when compared to the deaths one

would expect in those same populations from all causes. These calculations assume that exposure from particles is long standing. In summary, it is the Board's opinion that the Staff succinctly and correctly concludes in the FES that there is a miniscule incremental environmental impact from the coal particles identified in Table S-3.

IV. FINDINGS OF FACT

A. Joint Contention II(c) — Appropriate Time Periods for Considering Health Effects

1. Joint Contention II(c) as originally admitted stated that:

The long term somatic and genetic health effects of radiation releases from the facility during normal operations, even where such releases are within existing guidelines, have been seriously underestimated for the following reasons:

- * * *
- (c) the work of Gofman and Caldicott shows that the NRC has erroneously estimated the health effects of low-level radiation by examining effects over an arbitrarily short period of time compared to the length of time the radionuclides actually will be causing health and genetic damage.

2. The Final Environmental Statement expresses the health risks represented by normal operation of the Harris facility on an annual basis — e.g., the U.S. population dose is 56 person-rems per year. FES at p. 5-35. In denying Applicants' motion for summary disposition of Joint Contention II(c), the Board identified the issues to be litigated as: (1) whether the environmental impact statement should describe the total risk associated with exposure to radioactive effluents from normal operations for the 40-year life of the plant and (2) whether the environmental impact statement should take into account the incremental impact on people who live near the plant for many years. The Board left the door open for litigation of similar issues, but barred litigation of speculative impacts over geologic time periods. See LBP-84-7, 19 NRC 432, 440-41 (1984).

3. Applicants submitted testimony by Dr. John J. Mauro and Mr. Stephen F. Marschke who are employed in the Envirosphere Division of Ebasco Services, Inc., the architect-engineer for the Harris Plant (ff. Tr. 1971). Dr. Edward F. Branagan, Jr., testified on behalf of the NRC Staff (ff. Tr. 2058).⁵ Intervenors did not present witnesses on this contention.

⁵ In some transcripts Dr. Branagan's prepared testimony on Contentions II(c) and II(e) were transposed. In these cases Dr. Branagan's testimony on II(c) follows Tr. 1865.

4. The Applicants' witnesses presented testimony describing calculations of (1) the estimated doses and risks both to the human population within a 50-mile (80-km) radius of the Harris Plant and to the total U.S. population and (2) the estimated dose and risk to the hypothetical maximally exposed individual. These two different estimates were developed in order that the risk to the population might be calculated and that compliance with regulatory limits, which are designed to protect the individual, could be assessed. The calculations included consideration of residual exposures from releases during the life of the plant (40 years) and for a period of 100 years after cessation of the plant operation. Mauro-Marschke, ff. Tr. 1971, at 3.

5. The radiation dose to the population within 50 miles of the plant during a 100-year period following plant operation was computed by Applicants to be about 8 person-rem. This estimate may be compared to the computed dose of 624 person-rem for the same population during the 40 years of plant operation. Mauro-Marschke, ff. Tr. 1971, at 6. The post-operation dose was thus found to be only 1.3% of the dose during the 40-year operation of the plant.

6. The radiation dose to the U.S. population during a 100-year period following plant operation was computed by the Applicants to be 706 person-rem. The computed dose to the U.S. population during the 40 years of plant operation was 1740 person-rem. Mauro-Marschke, ff. Tr. 1971, at 6. As pointed out by the Joint Intervenors in Proposed Finding 17, the post-operation dose estimate is 40% of the dose estimate for the operational period. The Applicants testified that "this residual dose is relatively small" and, therefore, not significant. Applicants provide further perspective in their testimony by computing that the average individual dose to the U.S. population for 40 years' operation of the Harris Plant would be 7×10^{-6} rem and the associated risk would be 1×10^{-9} . Applicants testified further that the estimated doses are not significant in light of the conservatism in the calculations. Mauro-Marschke, ff. Tr. 1971, Attach. 4. The Board agrees that adding 40% of a very small number to a very small number, particularly when the unknowns in these analyses are considered, would not constitute a significant change.

7. Applicants' witnesses further testified that the total risk to both the 50-mile and U.S. populations is less than one cancer fatality. Mauro-Marschke, ff. Tr. 1971, at 8. They compared this figure with the expected number of cancer fatalities in the U.S. population over a 40-year period of over 10 million, and with the expected number within a 50-mile radius, which is over 100,000. *Id.* at 8, 9.

8. Applicants calculated the maximum whole-body dose to an individual resulting from operation of the Harris Plant. The methods used

were: (1) age-specific doses were calculated, (2) these doses were multiplied by the length of time the individual was in the specific age group during plant operation, and (3) the resulting doses were summed over the life of the plant. They then added the residual dose that the individual would receive from age 46 to 70. The maximum dose to the individual was determined to be 130 mrem. *Id.* at 12-13.

9. The risk of cancer mortality from this exposure was calculated as 2×10^{-5} or 1 chance in 50,000. The calculation was made by use of the methodology presented in the report of the Advisory Committee on Biological Effects of Ionizing Radiation (BEIR I) using age-specific cancer risk coefficients. *Id.* at 13.

10. The Staff witnesses' testimony presented calculations which, while not as detailed as those made by Applicants, provide a useful check upon whether there is a substantive difference between doses assessed over the life of the plant, rather than on an annualized basis. The method basically assumes that the dose estimate to a maximally exposed individual is the dose design objective contained in Appendix I of 10 C.F.R. Part 50. Branagan, ff. Tr. 2058 (Branagan II(c)) at 4, 5.

11. The results of Staff's calculation showed that the maximally exposed individual would receive 200 mrem over the 40-year life of the plant. *Id.* at 5. The resulting risk, calculated by the BEIR-I method for determination of absolute risk, is about 3×10^{-5} . *Id.* at 7, 8.

12. Findings 8 through 11, above, satisfy the Board's request for estimates of effects on people who live in the vicinity of the plant for many years. The Board finds that there is no undue risk to such maximally exposed individuals.

13. Intervenors raised several points in their proposed findings which the Board considered. The first point is that the effect of plant operation on fetuses from conception to birth is not considered in Applicants' analysis. Applicants agreed that this was true, but testified that further analysis had shown that such consideration would have little effect on the final conclusions. Although the risk to the fetus is 5 times higher than that to an adult, the risk occurs in only 9 months out of an assumed 70-year life span. The Applicants conclude that the addition of this risk would not have a significant effect on the sum of the risks over all age groups. Mauro, Tr. 1978, 1982. The Board agrees.

14. Intervenors consider that a proper comparison of plant effects would be to a "no-plant" condition, rather than to normal background radiation. The Board disagrees. Firstly, when the analysis results in a level of risk, the comparison with a "no-plant" or zero-radiation condition is already made. Secondly, we find that it is useful to compare with

background radiation as a means of putting the added risk into perspective.

15. Intervenors maintain effects such as fetal losses, genetic effects, birth defects, etc., occasioned by radioactive plant effluents, are not considered. Staff argues that such effects are very low and thus are insignificant. To illustrate, Staff calculated the number of potential genetic disorders which could result from operation of the plant over 40 years. It used the genetic risk estimator recommended by BEIR-I, which is based on all genetic effects that would cause some serious handicap during an individual's lifetime. The result showed that about 0.16 of a potential genetic disorder might occur in the population within a 50-mile radius of the plant, some 1.75 million people at the present time. This is compared with the normally occurring statistical value of about 11% of the population. The Board agrees with Staff that the occurrence of genetic effects from plant operation is indeed insignificant. Branagan at 9; Tr. 2135.

16. Intervenors further aver that the effects of operating the plant upon the population of the world should be included in the FES. Intervenors refer us to no statute, rule, or other legal authority that requires us to extend the FES analysis beyond United States borders. This is not a case where a significant environmental impact should be anticipated outside U.S. territory, such as a power reactor sited on the Mexican or Canadian borders. On the present record, involving a reactor sited in North Carolina, there is no reason to believe normal reactor operation will have any measurable impact outside the United States. We therefore reject Intervenor's proposal for a worldwide analysis of environmental impacts.

17. Another concern of Intervenors was the use of "absolute risk" rather than "relative risk" coefficients, as use of "relative risk" would result in values some 4 times higher. Applicants' witness testified that while the BEIR Committee discussed both forms of coefficients it recommended that the "absolute risk" coefficients be used because the data available on cancer incidence are more consistent with the use of "absolute risk" than "relative risk." Mauro, Tr. 2051. The Board finds that use of the "absolute risk" coefficients, as recommended by the BEIR Committee, is acceptable.

18. As noted previously, in the FES, Staff presents risks of the facility on an annualized basis, rather than over the total life of the plant, as the Intervenors would have it. This is done principally because applicable regulations and design objectives are set forth in annual terms. The benefits of the facility are also set forth in annual terms for direct comparison in the cost-benefit analysis. Branagan at 3. The Staff calculation

of dose to the maximally exposed individual, which is obtained by multiplying the annual dose by 40 years, the assumed life of the plant (*id.* at 3, 4), yields results which are consistent with the Applicants' results using a different, more detailed method. *Compare* Findings 8, 9, 11, *supra*.

19. Intervenors would have us require the Applicants and Staff to rework their risk analyses in the ER and FES to reflect all of the factors discussed in the findings above. The Board declines to require such an analysis. We have found that for all practical purposes the annualized results that are presented in the ER and FES are adequate to describe the risks associated with the facility. We do not find that the results shown are misleading. We believe that arguments presented by Staff and Applicants for discounting certain factors are well taken. The Board observes, however, that in future assessments of environmental impact it might be well to include life-of-the-plant risk assessments as well as annualized assessments to provide the reader with a fuller appreciation of the overall risks involved. If that were done, litigation of these points might be avoided.

B. Joint Contention II(e) — Effects of Attachment of Radionuclides to Fly Ash Particles

Introduction

1. Joint Contention II(e) states:

The long term somatic and genetic health effects of radiation releases from the facility during normal operations, even where such releases are within existing guidelines, have been underestimated for the following reasons:

* * *

- e) the radionuclide concentration models used by the Applicants and the NRC are inadequate because they underestimate or exclude the following means of concentrating radionuclides in the environment . . . radionuclides absorbed in or attached to fly ash from coal plants which are in the air around the SHNPP site

2. Applicants submitted testimony by Drs. John J. Mauro and Steven A. Schaffer, who are employed by the Envirosphere Company, a Division of Ebasco Services, Inc., the architect-engineer for the Harris Plant (ff. Tr. 1605). Dr. Edward F. Branagan, Jr., testified on behalf of the NRC Staff (ff. Tr. 1865). Intervenors did not present witnesses on this contention.

3. The Applicants' witnesses testified on various facets of the question whether doses they calculated for the inhalation route are underes-

timated because radionuclide attachment onto respirable fly ash in the ambient atmosphere was not taken into account. Joint Intervenors contend that such particle absorption and adsorption would cause more of the radionuclides in the gaseous effluent from the Harris facility to penetrate deeper into the lung and be retained for longer periods of time. This part of Contention II(e) constitutes a challenge to the inhalation dose conversion factors tabulated in Regulatory Guide 1.109.⁶

Significance of Tritiated Water

4. Applicants' witnesses testified that tritium in the form of tritiated water makes up over 98% of the estimated whole-body dose from inhalation. However, they point out that the principal concern in this contention relates to radionuclides attaching to fly ash in the atmosphere and then lodging in the lung. This hypothesized phenomenon would only be applicable to radionuclides that can take particulate form. Their view is that radionuclides that cannot take particulate form will not stay in the lung, but will be immediately exhaled or absorbed into the body fluids. They assert that tritium is not in particulate form and that it is inhaled almost exclusively as water vapor. Therefore, tritium would not be significantly involved in the concerns of this contention. Mauro-Schaffer, ff. Tr. 1605, at 4, 5.

5. Cross-examination by the Intervenors brought out the fact that only a minuscule fraction of the tritiated water emitted from the Harris Plant could become associated with fly ash particles. This is evident from consideration of the relative masses of water vapor and particles in ordinary air; i.e., 8 grams of water vapor per cubic meter of air versus approximately 100 micrograms (1/10,000 of 1 gram) of particles per cubic meter of air (Mauro, Tr. 1716). Stated another way, a volume of ordinary air contains about 80,000 times more water vapor than particles. Further, the tiny portion of the tritiated water that might become associated with fly ash particles would be expected to commingle with other water at the point of lung deposition. After that point, the tritium would be taken up by the body and behave like any other water droplet — i.e., it would commingle with other body fluids and soon be excreted. Mauro, Tr. 1682.

6. Joint Intervenors' Proposed Finding 7 complains that "Applicants did not squarely address tritium in its conclusions." This misses

⁶ See Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 C.F.R. Part 50, Appendix I," Rev. 1, U.S. Nuclear Regulatory Commission (1977).

the point of the Applicants' statement that "the phenomenon of radionuclides attaching to fly ash impacts only a small fraction of the inhaled dose" As the Applicants' testimony showed (§§ 4 and 5, above), tritiated water, the major dose contributor, is not significantly affected by airborne particles.

The Noble Gases

7. Joint Intervenors allege in Proposed Finding 9 that "there was no study done of adsorption or absorption of noble gases onto coal particulates." This statement does not reflect the record accurately. The Applicants' testimony included a calculation showing that only a very small fraction of the released noble gases could become associated with fly ash, under the very conservative assumption that fly ash might be as efficacious in taking up noble gases as activated charcoal. Mauro-Schaffer, ff. Tr. 1605, Attach. 2 at 2-4.

8. The Board notes parenthetically that the noble gases are so called because they have very little chemical reactivity. One conceivable concern would exist if the noble gas radionuclides could decay into charged daughters that might have an affinity for fly ash. However, Applicants' witness testified that the noble gas daughters would be ionized for time periods of less than seconds. Mauro, Tr. 1952. Therefore, the record, in our view, fully supports Applicants' and Staff's estimation of small doses from noble gases as presented in the FES (Shearon Harris FES at D-10). Those calculated doses are limited to a few percent of the Appendix I design objectives. 10 C.F.R. Part 50, Appendix I, § II.B.

Method of Calculating Doses

9. The calculational method used by both Applicants and the NRC Staff is in accord with Regulatory Guide 1.109. The calculation requires four pieces of information: (1) the source term; (2) the atmospheric dispersion factor at the location of the maximally exposed individual; (3) the inhalation rate of the maximally exposed individual; and (4) the inhalation dose conversion factor. The product of these four factors, with appropriate unit conversion, yields the inhalation dose, as presented in the ER and the FES. Mauro-Schaffer, ff. Tr. 1605, at 5-6.

10. The inhalation dose conversion factors in Regulatory Guide 1.109 include consideration of radionuclide lung deposition and clearance. Applicants testified that these dose conversion factors were derived using a two-compartment lung model that was first described in

ICRP-2, 1959.⁷ This model assumes that 75% of the inhaled particulate radionuclides are deposited in the lung and 25% are immediately exhaled. Of the 75% deposited, it is assumed that 50% is deposited in the upper respiratory tract and 25% is deposited in the deep lung. Mauro-Schaffer, ff. Tr. 1605, at 7.

11. Several recent studies using human subjects have reported measurements of particle deposition in the lung as a function of particle aerodynamic diameter. Respirable fly ash particles in ambient atmospheres have a median aerodynamic diameter of 2 micrometers. A recent EPA review⁸ states that the deposition fraction for particles in the size range of fly ash ranges from 30% to 60%. Comparison of these experimental results with the 75% deposition assumed in the ICRP model shows the model to have a conservative assumption regarding deposition in the lung. *Id.* at 8.

Lymph Node Concerns

12. Cross-examination by Intervenors raised the issue whether the dose to the lymph nodes resulting from transfer of particles from the lung to the lymph nodes had been taken into account. Eddleman, Tr. 1701. Applicants' witness testified that the dose to the lung calculated using the ICRP-2, 1959 approach is higher than the dose to the lymph nodes or the lungs that would be obtained using the more recent models. Mauro, Tr. 1724. The basis for this view was stated to be a publication in Health Physics, 1966⁹ in which an analysis was done on the significance of not separately treating lymph nodes. The conclusion was that the dose to the lung was more important or comparable to the dose and risk to the lymph nodes. *Id.*, Tr. 1709.

13. The hypothetical concern with the dose to the lymph nodes would involve particulate material deposited in the lung which was not rapidly cleared by other mechanisms, but cleared by phagocytosis to the lymph nodes. *Ibid.* The insoluble radionuclides that might be involved are isotopes of manganese, iron, cobalt and strontium. Mauro-Schaffer, ff. Tr. 1605, Table 1 and at 10. The dose to the lung from these radionuclides had been computed to be approximately 0.005 millirem. Thus,

⁷ ICRP-2, 1959. Recommendations of the International Commission on Radiological Protection. Report of Committee 2 on Permissible Dose for Internal Radiation. ICRP Publication 2, Pergamon Press, London.

⁸ EPA 1982. NTIS-PB84-120419, "Air Quality Criteria for Particulate Matter and Sulfur Oxides," Vols. II and III, Environmental Protection Agency (1982).

⁹ ICRP 1966. "Deposition and Retention Model for Internal Dosimetry of the Human Respiratory Tract," *Health Physics*, 12, 173-207 (1966).

even if some increase were to be postulated as a result of retention of particulates in the lymph nodes, rather than the lungs, the magnitude of the dose would be small compared to the regulatory guidance for dose design objectives — 15 millirems, as specified in 10 C.F.R. Part 50, Appendix I, § II.C.

Staff Calculation of Thyroid Dose

14. The NRC Staff witness testified that the dose to the critical organ (i.e., the thyroid) of the maximally exposed individual was estimated to be 0.2 mrem/yr from inhalation of iodines and particulates in gaseous effluents. Branagan, ff. Tr. 1865, at 3. The thyroid was designated as the critical organ because the doses to all other organs were found to be less than the calculated dose to the thyroid. Branagan, Tr. 1905. The dose calculations by the Staff follow the 1959 ICRP report and assume that 75% of the particles that were inhaled would be deposited in the respiratory tract. Branagan, ff. Tr. 1865, at 4.

15. Staff points out that even if it is assumed that fly ash and the iodines and particulates formed particles of an optimal size such that *all* of the inhaled particles were deposited in the respiratory tract, the dose estimates would increase only by a factor of one-third. Under this assumption, the dose to the thyroid of the maximally exposed individual from inhalation of iodines and particulates would be increased from 0.2 mrem/yr to about 0.3 mrem/yr. Branagan, ff. Tr. 1865, at 4.

16. The Board finds that less than 100% lung deposition has been observed in several observational studies cited by the Applicants. Mauro-Schaffer, ff. Tr. 1605, Figure 1. The Joint Intervenor's hypothesis of radionuclide association with fly ash, even with complete deposition in the lungs, would result in increased dose estimates of some hundredths of a millirem per year. The Board finds that the dose estimates in the FES associated with the normal operation of the Harris facility have not been significantly underestimated, and Joint Contention II(e) is resolved in favor of the Applicants and Staff.

17. The Joint Intervenor's Proposed Finding 8 asserts that the assumptions used in the Applicants' dose estimates "were found deficient upon cross-examination." The Board agrees with Joint Intervenor's that (1) the exact concentration and size distribution of atmospheric particulate matter at the Harris site has not been determined and (2) the degree to which radioactive particulate isotopes to be emitted from the Harris Plant may become associated with the atmospheric particulate matter has not been determined. Further, the Board agrees with the Joint Intervenor's Proposed Finding 12 that the exact extent of lung

deposition has not been established and that it cannot be estimated with great exactitude since it varies with "mouth vs. nose breathing, shallow vs. deep, rapid vs. slow and whether one is awake or asleep."

18. However, the Board observes that these facts produce a possible uncertainty in the dose estimate of less than 1/10 of 1 mrem/yr. Comparison of this value with the 500-mrem/yr dose limit specified in 10 C.F.R. § 20.105 and the dose design objective of 15 mrem/yr specified in 10 C.F.R. Part 50, Appendix I, § II.C to meet the "As Low As is Reasonably Achievable" criterion leads the Board to conclude that the uncertainty is acceptably small.

Doses Via the Crop-Food Chain Pathway

19. Applicants' witnesses also testified with regard to whether the hypothesized phenomenon of radionuclides attaching to fly ash could impact the calculations for the food pathway dose for the Harris Plant. Their calculations were made in accordance with Regulatory Guide 1.111.¹⁰ The particle deposition velocities in Regulatory Guide 1.111 range from 0.12 centimeter per second (cm/s) to 1.81 cm/s. The median size of fly ash is about 2 micrometers which is expected to have a deposition velocity of approximately 0.2 cm/s. The deposition velocities used in the calculations appear to be appropriate for fly ash particles and such particles are appropriately accounted for in the calculation of doses from the crop-food chain pathway. Applicants' testimony on the food chain pathway dose estimates for the Harris Plant were not controverted by the Joint Intervenors during cross-examination, nor did the Joint Intervenors file any proposed findings on this question. This aspect of the contention is also resolved in favor of the Applicants.

C. Contention 8F(1) — Effects of Coal Particulates Associated with the Fuel Cycle¹¹

1. Eddleman Contention 8F(1) states that:

Appendix C of the FES underestimates the environmental impact of the effluents in Table S-3 for the following reasons:

- (1) health effects of the coal particulates 1154 MT per year, are not analyzed nor given sufficient weight.

¹⁰ See Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Rev. 1, U.S. Nuclear Regulatory Commission (1977).

¹¹ The Board drew extensively on the Findings of Fact presented by the Applicants on this contention.

The generic quantification of the environmental impacts of the uranium fuel cycle is presented in Table S-3. Table S-3 values are not subject to challenge in individual licensing proceedings. *Baltimore Gas and Electric Co. v. Natural Resources Defense Council*, 103 S. Ct. 2246 (1983). However, the health effects attributable to these values are not part of the Table; consequently, they are litigable in NRC adjudications. See 10 C.F.R. Part 51, Table S-3, n.1. One of the values in Table S-3 is 1154 MT/yr of coal particles.

2. The health effects of Table S-3 coal particles are briefly addressed in Appendix C of the FES. In that Appendix C, the effects of the nonradiological particulate effluents associated with fuel-cycle processes are grouped together with other effluents and the following statement is provided:

The quantities of chemical, gaseous and particulate effluents associated with fuel-cycle processes are given in Table S-3. The principal species are sulfur oxides, nitrogen oxides, and particulates. On the basis of the data in a Council on Environmental Quality report (CEQ, 1976), the staff finds that these emissions constitute an extremely small additional atmospheric loading in comparison with the same emissions from the stationary fuel-combustion and transportation sectors in the U.S.; that is, about 0.02% of the annual national releases for each of these species. The staff believes that such small increases in releases of these pollutants are acceptable.

FES, Appendix C, § 4 at C-2.

3. Mr. Eddleman's Contention 8F(1) is a challenge to the adequacy of the Staff summary position on the health effects of coal particulates. He initially contended that this quantity of emissions, i.e., 1154 metric tons of coal particles, may cause up to ten deaths a year, a number which is "[n]ot trivial." See Eddleman Response to Staff DEIS, June 20, 1983, at 14.

4. Evidence on behalf of the NRC Staff was presented by a panel consisting of Dr. Loren J. Habegger, Dr. A. Haluk Ozkaynak, and Mr. Ronald L. Ballard. See Testimony of Habegger, Ozkaynak and Ballard, the NRC Staff Panel, ff. Tr. 1380. Dr. Habegger is Manager of the Environment and Natural Resources Section, Energy Environmental Systems Division, Argonne National Laboratory. He has a Ph.D. in Nuclear Engineering and had published extensively in the field of air pollution. Dr. Ozkaynak has M.S. degrees in Physics and in Air Pollution Control and a Ph.D. in Mathematical Physics. He is a Research Fellow and Project Director of long-term multi-disciplinary study at Harvard University investigating the health effects of population exposures to ambient particulate matter. Mr. Ballard is Chief of the Environmental and Hydrologic Engineering Branch of NRC's Division of Engineering. He oversees the NRC Staff's preparation of nonradiological environmental assessments

for nuclear power plants. Mr. Ballard was responsible for developing agency guidelines for use in responding to NEPA.

5. Evidence on behalf of Applicants was presented by Dr. Leonard D. Hamilton. Dr. Hamilton is Head of the Biomedical and Environmental Assessment Division in the National Center for Analysis of Energy Systems at Brookhaven National Laboratory. He received his B.A. degree from Oxford University, a Ph.D. from Cambridge, and an M.D. degree from Oxford. Dr. Hamilton has published more than 150 scientific papers, including many reports assessing the hazards of various energy sources. Hamilton Testimony, ff. Tr. 1178.

6. Mr. Eddleman presented no witnesses in support of his Contention 8F(1).

Particulate Concentration Levels

7. The particulate emission rate of 1154 MT/yr is a hypothetical attribution. *Id.* at 3. It is used in Table S-3 in order to calculate a conservative estimate of the particulate emissions that might be associated with the electrical energy produced by the equivalent of a hypothetical 45-MWe coal-fired power plant operating for 1 year. This is the estimated energy needed to support the uranium fuel cycle for 1 year of the Harris Plant's operation. Most of this energy, i.e., approximately 96%, is used in the uranium enrichment process at gaseous diffusion plants.¹²

8. The three gaseous diffusion facilities used in the uranium enrichment process are located at (1) Paducah, Kentucky; (2) Oak Ridge, Tennessee; (3) Portsmouth, Ohio. These facilities are supplied with electricity primarily from power grids. Thus, the impact of the particles released from coal plants supporting the uranium fuel cycle in fact are distributed in small amounts over large areas. *Id.* at 4; NRC Staff Panel at 5. For purposes of their respective calculations to estimate an upper limit of health risks, the Applicant and Staff experts used much more conservative assumptions, namely that the coal particles were generated by specific plant sites in the power grid.

9. Similar methods were used by the Staff's panel of experts and by the Applicants' expert to calculate the health effects attributable to the particulate emission rate of 1154 MT/yr. To calculate health effects, it was necessary to estimate the particulate concentration levels attributable

¹² Although the FES was written in support of a two-unit facility, Applicants cancelled construction of one of these units on December 21, 1983. As a result, those environmental impacts that are not expressed in "per reactor" units in the FES must be halved to accurately reflect the impact of the Shearon Harris facility.

to 1154 MT/yr. Dr. Hamilton made a number of assumptions about the coal particulate emissions attributable to the uranium fuel cycle, whereas the NRC Staff's experts utilized actual data and a complex model to derive the atmospheric concentration of coal particles. Tr. 1223-24, 1362 (Hamilton); Tr. 1591 (Ozkaynak); Tr. 1590-91 (Habegger); Tr. 1591 (Ballard).

10. Specifically, from the TVA's grid system, Dr. Hamilton assumed the Bull Run Plant to be the only plant serving Oak Ridge, the Shawnee and Joppa Plants to be serving Paducah, Kentucky, and the Kyger and Clifty Plants supplying Portsmouth, Ohio. He then assigned the hypothetical 1154 MT of particles individually to each of these five power plants on the basis of two different assumptions: first, that any one of these coal plants may be singly responsible for the electricity used to produce the entire enrichment of uranium needed to supply the Shearon Harris Plant; and second, that the source of energy to support the uranium enrichment process may be divided equally among these coal plants. Hamilton at 4.

11. The Staff's point sources were limited to the three existing coal-fired power plants in utility grids that are known to serve the gaseous diffusion plants, i.e., the Joppa, Clifty and Kyger Plants. NRC Staff Panel at 4. Each of these coal-fired stations was also assumed by the Staff's experts to generate the total uranium fuel cycle electrical energy requirements, and thus to emit the entire 1154 MT/yr of coal particles specified in Table S-3.

12. In his calculation of particulate concentration levels attributable to 1154 MT/yr, Dr. Hamilton assumed that in the region (50-mile radius) near the coal plant supplying power for each enrichment facility, emissions are uniformly mixed in the volume of air contained in a cylinder with a radius of 50 miles and a height equal to the average height of the mixing layer of air. The concentration of particles in the 50-mile region is a function of the quantity of emissions released by the coal plants and the wind speed. Thus, the total emissions mixed in this volume are related to the time it takes for the wind to blow the particles 50 miles from the stack to the edge of the cylinder. This calculation yields a rough estimate of the long-term average coal particulate exposure over the 50-mile-radius area. On an individual basis, persons closer to the plant would receive greater exposures than those farther away. Similarly, individuals living downwind from the plant would receive larger exposures than those living upwind. Hamilton at 5. Using available annual average daytime conditions for the specific vicinities in question Dr. Hamilton estimated daytime particulate concentrations for the five

plants. Hamilton at 6-7 and Table 1. In summary, he found that the estimated average daytime particulate concentration varies from 0.036 to 0.042 $\mu\text{g}/\text{m}^3$ at the five sites analyzed.

13. The Staff's estimated particulate concentration levels at the three plant sites studied relied on much more site-specific information than did Dr. Hamilton's analysis. Specifically, site-specific information on the ground-level dispersion in the vicinity of the emitted particles was utilized. NRC Staff Panel at 7. Dr. Habegger also utilized site-specific meteorological conditions, i.e., hourly data on wind speed and direction, temperature, and height of the surface mixing layer. *Id.* at 10. These data are collected in routine measurements by the U.S. National Weather Service (NWS). The available data collected at the NWS station nearest the Joppa, Clifty, and Kyger Plants were obtained for use in the analysis. In addition, because topography can affect ground-level concentrations and is an input to the air pollutant dispersion model, at each location where the atmospheric particulate concentration was estimated, the elevation relative to the power plant was obtained from area maps compiled by the U.S. Geological Survey. *Id.* at 11.

14. Using the Industrial Source Complex (ISC) computer model,¹³ Dr. Habegger estimated ambient particulate concentration and population exposure analysis for each of the three fossil power plants which covered a circular area of a 50-mile radius with the power plant emission source at the center. The circular areas were divided into 360 grid cells. Particulate concentrations for each hour were computed with the ISC model for receptors at the geographic centroid of each of the 360 grid cells surrounding each power plant. *Id.* at 12. For long-term (annual) particulate concentration levels, such as those calculated here, the ISC model predictions are quite accurate. *Id.* at 13.

15. The results of Dr. Habegger's analysis, using both annual and maximum 24-hour averages, were as follows: For the Clifty Power Plant, the computed maximum increment at any of the 360 receptor points was 0.022 $\mu\text{g}/\text{m}^3$ for the annual average and 0.70 $\mu\text{g}/\text{m}^3$ for the maximum 24-hour average. For the Kyger Plant, the maximum annual average was 0.013 $\mu\text{g}/\text{m}^3$, and the 24-hour maximum was 0.71 $\mu\text{g}/\text{m}^3$. For the Joppa Plant, the maximum annual average was 0.038 $\mu\text{g}/\text{m}^3$,

¹³ ISC is a standard model recommended by the EPA for use in air dispersion analysis for regulatory purposes. NRC Staff Panel on Contention 8F(1) at 12 (citing "Industrial Source Complex (ISC) Dispersion Model User's Guide," EPA-450/4-79-030, U.S. Environmental Protection Agency, Research Triangle Park, N.C. (1979)). The concentrations are computed at different receptor locations for each hour over the simulated time period using the input meteorological data, stack and emission parameters, and receptor elevations. The basic model assumes steady-state movement of the atmospheric pollutants in the downwind direction with Gaussian horizontal and vertical cross-wind dispersion. The vertical dispersion is limited by the height of the mixing layer given as a meteorological input.

and the 24-hour maximum was $1.3 \mu\text{g}/\text{m}^3$. These are conservative estimates since they give no credit for particle removal by deposition.

16. The health effects of atmospheric particles on exposed populations are dependent on the size distribution of the particles. In general, smaller size particles are potentially more harmful, largely because of deeper penetration into the lungs. *Id.* at 6. Table S-3 does not provide data on particle size distribution. However, using the data on which Table S-3 was based, and making a number of conservative assumptions about particulate emissions and controls, Dr. Habegger conservatively calculated that 790 MT/yr of the 1154 MT/yr of particulate emissions are less than 2.5 micrometers, and 364 MT/yr of emissions are in the 2.5- to 15-micrometer size range. *Id.* at 9.

17. Using the annual average particulate concentrations, Dr. Habegger also calculated the total computed population exposure in the coal plant vicinities. These exposures are 5567 persons- $\mu\text{g}/\text{m}^3$ in the 50-mile vicinity of Joppa, 5625 for Clifty, and 2174 for Kyger. The total computed population exposure using the maximum 24-hour concentration is 100,800 persons- $\mu\text{g}/\text{m}^3$ in the 50-mile vicinity of Joppa, 103,000 for Clifty, and 47,200 for Kyger. *Id.* at 16-17. The population-weighted average (sum of exposures divided by population) of the incremental annual average particulate concentration is $0.011 \mu\text{g}/\text{m}^3$ for Joppa, 0.0038 for Clifty, and 0.0025 for Kyger. The population-weighted average of maximum incremental 24-hour concentration is $0.19 \mu\text{g}/\text{m}^3$ for Joppa, 0.071 for Clifty, and 0.054 for Kyger. *Id.* at 17. These figures are consistent with Dr. Hamilton's estimated average daytime particulate concentration level of 0.036 to $0.042 \mu\text{g}/\text{m}^3$.

Health Effects of Calculated Particulate Concentration Levels

18. Utilizing the particulate concentration levels calculated by Dr. Hamilton and by Dr. Habegger, health effects attributable to 1154 MT/yr can be estimated. Dr. Hamilton utilized both a comparative and a quantitative method to assess health impacts. Hamilton at 8-16. Dr. Hamilton's quantitative method is a simplified version of the method used by Dr. Ozkaynak in the Staff's analysis. Tr. 1590-91 (Habegger).

19. Characterizing the prototype pulverized coal-fired plant (the basis for the Table S-3 figure of 1154 MT/yr) as essentially "uncontrolled," Dr. Hamilton estimated the concentration of respirable or thoracic particles (TP) in this mass of total particles. From such an uncontrolled plant, TP constitutes only about 40% of the mass of the total particles. Hamilton at 8. Larger particles tend to be deposited in the

nose or pharynx and do not reach the lung. Thus, only 40% of the particles released are potentially damaging to health. Dr. Hamilton then calculated that the concentration of TP that would penetrate the thoracic region would be about 0.014-0.017 $\mu\text{g}/\text{m}^3$. *Id.* at 8-9. For perspective, Dr. Hamilton compared this concentration of TP (0.014-0.017 $\mu\text{g}/\text{m}^3$) with the EPA's estimate of potentially injurious concentrations of TP. In a critical review of the available scientific and technical information most relevant to primary (health) National Ambient Air Quality Standards (NAAQS) for particulate matter, EPA found that, "[b]ased on a staff assessment of the long-term epidemiological data, the range of annual TP levels of interest are 55 to 110 [micrograms per cubic meter]."

20. Thus, EPA has concluded that from both short- and long-term exposures to particles, the "bottom line" or lowest level of TP at which there may be some risk of health effects is approximately 55 $\mu\text{g}/\text{m}^3$. *Id.* at 10. As stated above, the concentration of such particles in the atmosphere, assuming a reasonable distribution of the entire 1154 MT in a 50-mile radius around a single uncontrolled pulverized coal plant, would be 0.014-0.017 $\mu\text{g}/\text{m}^3$. This means that even if the 1154 MT were all distributed by a single coal plant in one place, which obviously is not the case since three different gaseous diffusion plants are used in the enrichment process, the concentration would be approximately 3000 times smaller than the minimum concentration having some risk of symptomatic effects. While the 0.014-0.017 $\mu\text{g}/\text{m}^3$ of TP is an incremental concentration to a pre-existing background concentration of TP, there is no reason to doubt that its proportional responsibility for any biological effect is equally miniscule. *See id.* at 10; Tr. 1364 (Hamilton). Thus, Dr. Hamilton's comparative analysis suggests virtually no health impacts from 1154 MT/yr of coal particles.

21. Dr. Hamilton performed a numerical assessment of health effects of coal emissions attributable to the Shearon Harris Plant's uranium fuel cycle needs. This calculated risk relied upon a damage function for fine particles developed recently by the Harvard University Energy and Environmental Policy Center, i.e., the group that is headed by Dr. Ozkaynak. *See* "Analysis of Health Effects Resulting from Population Exposures to Ambient Particulate Matter" October 1983 ("1983 Harvard Report"), prepared for the Health and Environmental Risk Analysis Program of the U.S. Department of Energy. This fine particle damage function is a surrogate for the health effects of all air pollution. The damage function encompasses health effects that may in fact not be caused merely by coal particles but, rather, by SO_2 or other pollutants. Tr. 1224-25, 1233-37

(Hamilton); Tr. 1391-95 (Ozkaynak). Thus, for example, this risk coefficient includes health effects (including unknown effects) that may be caused by trace metals in the coal particles — an issue of particular concern to Mr. Eddleman. Tr. 1234, 1323, 1326, 1350-51 (Hamilton); Tr. 1384-86 (Ozkaynak); Tr. 1419-20 (Habegger).

22. In his calculation, Dr. Hamilton used a damage function for respirable particles in a linear, nonthreshold way, thereby conservatively assuming that even the smallest incremental particulate dose has an incremental health effect. Tr. 1238 (Hamilton); Hamilton at 11. This linearity assumption is particularly conservative in view of the fact that one of the two schools of thought on this subject among the scientific community believes that at ambient levels, much less the miniscule increment to ambient levels under consideration here, the health effects are zero. Tr. 1229, 1238 (Hamilton); Tr. 1577-78 (Ozkaynak).

23. The 1983 Harvard Report recommends, for quantitative risk assessment, use of only a fine particles (FP) risk coefficient, or particles smaller than 2.5 micrometers. See 1983 Harvard Report (Staff Exh. 3) at 8 and Table 1 at 5. FP represent a small portion of the thoracic particles (TP) previously described. FP are about 10% of the total particulate emissions from an uncontrolled pulverized coal-burning power plant. Hamilton at 12. The FP damage function, which is 1.3 ± 0.6 deaths/year/ 10^5 persons per $\mu\text{g}/\text{m}^3$ FP, is derived from available cross-sectional mortality analyses. *Id.* at 12 (citing 1983 Harvard Report (Staff Exh. 3) at 45-50).

24. Using this damage function and the 10% FP, Dr. Hamilton calculated the expected excess deaths per year from population exposure to 1154 MT/yr total particulate emissions around each of the coal plants. Hamilton, Table 3. These estimated excess deaths should be compared with the expected deaths from all causes in the population around each of these plants. In summary, the estimated excess deaths from population exposure to 1154 MT/yr total particulate emissions range from 0.001 to 0.13. This risk is indistinguishable from zero against the background of expected deaths from all causes, which ranges from 2,400 to 11,000 at the same five areas studied. The upper limit of estimated expected deaths from particulate exposure corresponds to about 1/1000 of 1% of the mortality rate. Hamilton at 12-13, Table 3.

25. Dr. Ozkaynak performed a similar but much more complex analysis. Using the results of the dispersion modeling study and the population data described above, and taking into consideration the socio-demographic information (e.g., age, race, education, etc.) available from the 1980 Census, Dr. Ozkaynak calculated both mortality and morbidity

health effects attributable to 1154 MT/yr. NRC Staff Panel at 19. Chronic as well as acute effects were considered. Acute (respiratory) morbidity indicates short-term illness such as pneumonia, influenza and common coughs, while chronic (respiratory) morbidity indicates persistent, long-term illness such as chronic bronchitis, bronchial asthma or other obstructive lung disease. *Id.* at 19, unnumbered footnote. These calculations relied primary upon airborne particulate risk coefficients developed by the Harvard group under Dr. Ozkaynak's direction. *Id.* at 22-24, 27, 28-29.

26. There are a number of factors which contribute to the uncertainties of the Staff's morbidity and mortality risk estimation. The health effect calculations done by Dr. Habegger and Dr. Ozkaynak use 95% confidence limits. Tr. 1447, 1449 (Ozkaynak, Habegger); NRC Staff Panel, Table 3. This means that one can have 95% confidence that the actual effects of 1154 MT/yr fall within the (large) bounds of uncertainty or error band stated in the testimony. Tr. 1506 (Habegger). Thus, the analysis subsumes a number of issues of concern to Mr. Eddleman, such as whether the calculation adequately considers coefficient of haze (*see* Tr. 1516-20 (Ozkaynak, Habegger)), the different compositions of particles in different areas (*see, e.g.*, Tr. 1410, 1418-20 (Habegger)), and failure to make progress in identified areas of research (Tr. 1506 (Habegger)). Stated another way, all uncertainties were captured in the analysis through the use of a range of results which encompasses the impact of these uncertainties. *See* Tr. 1449 (Habegger).

27. In summary, for the area surrounding the Joppa and Clifty facilities, Dr. Ozkaynak estimates the incremental excess emergency room visits for respiratory disease would be about 3 cases every 2 years (1.4 per year). In contrast, the expected number of incremental annual acute respiratory disease incidents for the same areas are about thirty per year. In the vicinity of the Kyger facility, the projected risks are about one-third the values predicted for the areas surrounding the Joppa and Clifty Plants (0.5 per year excess emergency room visit for respiratory disease and 11 acute respiratory disease incidents per year). For all of these projections, the lower-bound estimate always includes zero or no incremental health effects. The upper-bound estimate is either twice or 1.5 times the most likely or central estimates presented. The most likely annual mortality risks associated with emissions from either the Joppa or the Clifty Plants are less than 0.09 per year within the 50-mile radius of each plant. The likely mortality risks near the Kyger facility, on the other hand, can be expected to be less than 0.03. NRC Staff Panel at 31, 34 and Tables 2 and 3. These figures are consistent with Dr. Hamilton's estimated range of excess deaths of 0.001 to 0.13. *See* ¶ 24, *supra*.

28. Dr. Hamilton performed an alternative calculation of the health (mortality) effects of coal particulate emissions attributable to the uranium fuel cycle by assessing the health risk for the entire United States due to the long-range transport of these particles. Based on the Brookhaven National Laboratory's Biomedical and Environmental Assessment Division's matrix results, Dr. Hamilton estimated that the average total U.S. exposure to fine particles from all coal power plants is 90 person- $\mu\text{g}/\text{m}^3$ per MT emissions. Using the FP damage function cited above, the calculated additional deaths in the entire U.S. population from coal particles associated with the uranium fuel cycle would be 0.13, with a 95% statistical range of 0.013-0.26. In the entire U.S., roughly 2 million die annually from all causes. Hamilton at 12; Tr. 1279-81 (Hamilton).

Assessment of the Significance of the Projected Health Effects of 1154 MT/yr

29. The Applicant and the Staff witnesses reached the same conclusion about the significance of the health effects they determined to be attributable to the 1154 MT/yr of coal particulates specified in Table S-3.

30. Conservative calculations of the upper limit of health risk which may be associated with the 1154 MT/yr figure indicate that atmospheric concentrations of the amount of particles attributable to a 45-MWe coal-fired plant reasonably distributed over a 50-mile radius would be 3000 times smaller than the minimum concentration determined by the EPA to present some health risk. Conservative calculations of the upper limits of risk of those particles distributed among the populations around the five fossil plants supplying the uranium enrichment facilities indicate that, at most, a tiny fraction of a death, each year those plants are in operation, could be attributed to the particulate emissions. This risk is extremely small, particularly when compared to the deaths one would expect in those same populations from all causes. This upper limit of risk is confirmed by an alternative calculation of the impact of the Table S-3 particulates over the population of the entire United States. Moreover, these calculations assume that exposure from particles is long standing; otherwise, the calculated impact is inapplicable. Thus, in summary, it is the Board's opinion that the Staff succinctly and correctly concludes in the FES that there is a minuscule incremental envi-

ronmental impact from the coal particles identified in Table S-3 (Hamilton).¹⁴

Mr. Eddleman's Proposed Findings

31. Mr. Eddleman in his Proposed Findings 10-12 contends that one can arrive at an upper limit of deaths associated with the 1154 MT/yr of coal particulates resulting from operation of the Harris facility by the following equation:

by taking the fraction of emissions of Table S-3 air pollutants nationwide, which is represented by the Harris plant fuel cycle (0.02% or 2/10,000, Staff Exhibit 1 p. C-2) and multiplying it by Dr. Hamilton's upper limit of total deaths due to air pollution (100,000 a year, *see* finding 7A, *supra*, Tr. 1309-10) times a 40 year plant operating life (as set in Staff Exhibit 1 for radioactive effluent estimates).

This equation produces a result of approximately 800 deaths. Mr. Eddleman concedes that the 800 number is "conservative" because "not all deaths are solely due to particulates." There are at least two other deficiencies in Mr. Eddleman's estimate which further limit its validity. First, as Mr. Eddleman himself notes in a subsequent proposed finding (17), only about two-thirds of the coal particulates in the atmosphere are respirable. More fundamentally, there is no valid basis for relating Dr. Hamilton's offhand high estimate of 100,000 deaths, due to all kinds of air pollution and based on a sulfate damage function, to the Staff's 0.02% estimate of the amount by which the quantity of coal particulates in the United States from certain sources would be increased. Coal particulates are only one component of the total quantity of air pollutants nationwide. In view of these several deficiencies in the manner of its derivation, the "800 deaths" cost estimate is not useful in estimating the risk from the coal particulate exposure.

32. In his Proposed Finding 15, Mr. Eddleman is concerned that the calculations of health effects were limited to the populations within a 50-mile radius of the emission sites. He suggests that health effects outside of a 50-mile radius should be considered. The Board disagrees. The 50-mile radius encompasses the area most affected by the coal particulates. Use of that radius amounts to a "worst case" analysis and places

¹⁴ It appears that there is yet another conservatism included in these calculations which, if recognized, would make this "minuscule effect" even smaller. It seems likely that the Harris facility will take the place of several of the Applicants' existing coal-fired plants some substantial part of the time. *See* pp. 442-44, below. When that happens, presumably there will be a net *decrease* in coal particles being released into the atmosphere. This approach could be viewed as an impermissible attack on the Table S-3 rule. We need not decide that question on this record, but we think it useful to take note of what is probably going to happen in the real world.

the particulate lung deposition phenomenon in perspective. Even in those limited areas, the calculated health effects are very small.

33. In his Proposed Findings 15-18, Mr. Eddleman uses a variation of Dr. Hamilton's particulate exposure formula along with the Harvard fine particles damage function to estimate deaths to be expected from the 1154 MT/yr of coal particulates associated with normal operation of Shearon Harris. In his use of similar formulas, Dr. Hamilton had arrived at an estimated number of deaths to be expected annually in the United States from those particulates — i.e., 0.13, with a 95% statistical range of 0.013-0.26. For perspective, Dr. Hamilton notes that "in the entire United States roughly 2 million die annually from all causes." In other words, the risk of death from the particulates in any year is on the order of 1 in 20 million. Mr. Eddleman, in his calculations, arrived at a range of deaths from 32 to 180 over the 40-year operating life of the plant. However, Mr. Eddleman used a damage coefficient of 2.3 deaths/10⁵ persons per $\mu\text{g}/\text{m}^3$ year of exposure (from Staff testimony, ff. Tr. 1380, at 33) rather than the value of 1.3 that Hamilton used. And, as Mr. Eddleman acknowledges, his estimate "may be too high" since he omits the part of the computation that reflects the fact that the gross mass emission value in Table S-3 is not appropriate for use with the damage coefficient which applies only to the concentration of "fine particles." Neglect of this factor makes Mr. Eddleman's estimate unrealistically high.

34. We recognize that consideration of the larger value for the damage coefficient and the 40-year time period might produce a statistical estimate of roughly ten to seventy deaths, depending on what fraction of the Table S-3 value is material with diameters less than 2.5 microns. From a statistical perspective, the 80 million deaths that can be anticipated in the United States population of roughly 240 million people over the next 40 years corresponds to a risk of death of 1 in 3 or 0.33. The estimate of ten to seventy deaths over 40 years corresponds to a risk increment of 0.00000004 to 0.0000003. We find that such postulated health effects do not pose an undue risk to the population of the United States, and that, in fact, Mr. Eddleman's mortality estimates are subsumed in the error bounds of the mortality calculations for the United States.

V. MR. EDDLEMAN'S PETITION SEEKING WAIVER OF THE NEED FOR POWER RULE

Introduction

In the early stages of this case, Mr. Eddleman filed numerous contentions seeking, in various ways, to challenge the Applicants' need for power projections and to show that certain alternative sources of power would be economically and environmentally preferable to the Shearon Harris facility. The Commission has adopted a rule which states that —

Presiding officers shall not admit contentions proffered by any party concerning need for power or alternative energy sources for the proposed plant in operating license hearings.

10 C.F.R. § 51.53(c). The Licensing Board held that Mr. Eddleman's contentions were barred by this "need for power rule," as it is commonly called, and rejected them on that basis. LBP-82-119A, *supra*, 16 NRC at 2092, 2099; LBP-83-27A, 17 NRC 971 (1983). Thereafter, Mr. Eddleman filed a petition and supporting affidavits under 10 C.F.R. § 2.758 seeking a waiver of the need for power rule in order to permit litigation of his contentions. The Applicants and the NRC Staff filed responses in opposition to Mr. Eddleman's petition, and we authorized a reply to the responses.¹⁵ We announced some time ago our conclusion that the petition would have to be denied, saying that the formal order of denial, accompanied by a statement of our reasons, would be included in this Partial Initial Decision. LBP-84-29B, 20 NRC 389, 424 (1984). Our basic reason for denying the petition is that it fails to make the required showing that application of the need for power rule to this case would not serve the purposes for which the rule was adopted. On the contrary, as discussed below, the purposes underlying the need for power rule fit this case precisely.

Standards and Procedures Governing Waiver of Rules

Commission rules may not be attacked in an adjudicatory proceeding involving initial licensing, such as this operating license proceeding. 10 C.F.R. § 2.758(a). However, a party may petition the Licensing Board

¹⁵ In addition, on March 7, 1984, Mr. Eddleman filed a motion to allow filing of an additional affidavit from another expert. The Applicants and Staff opposed that motion, essentially on timeliness grounds. Given our ruling on the petition, it makes no practical difference how we rule on this motion and we therefore deny it as moot. On August 16, 1984, Mr. Eddleman filed a supplemental pleading, which we had authorized, concerning the effect of canceling Unit 2. We have considered this supplement and it does not affect our conclusion.

for waiver of a rule on the sole ground that “special circumstances . . . are such that application of the rule . . . would not serve the purposes for which the rule . . . was adopted.” 10 C.F.R. § 2.758(b). The petition must be supported by affidavits which are to “set forth with particularity the special circumstances alleged to justify the waiver . . . requested.” *Ibid.* If the Board determines that the petition and affidavits make a “*prima facie*” showing that the purposes of the rule would not be served under the circumstances, it is to certify to the Commission the question whether the rule should be waived. 10 C.F.R. § 2.758(d). If, on the other hand, the Board determines that no such showing has been made, it is to deny the petition. 10 C.F.R. § 2.758(c).

Background of the Need for Power Rule

In proposing the need for power rule, the Commission recognized that a waiver under 10 C.F.R. § 2.758 might be obtained, for example, if it were shown that an “environmentally and economically superior alternative existed.” Need for Power and Alternative Energy Issues in Operating License Proceedings, 47 Fed. Reg. 12,940, 12,941 (1982). However, in response to concerns that the quoted language might reopen the door to just the kind of contentions the rule was intended to exclude, the Commission emphasized that a party seeking waiver under § 2.758 would still have to make a “*prima facie* showing that application of the regulation to . . . the proceeding would not serve the purpose for which the rule was adopted.” *Ibid.* Our earlier order rejecting Mr. Eddleman’s need for power and alternative energy source contentions sketched the background and purpose of the need for power rule. We repeat relevant portions below:

The NRC considers need for power and alternative energy sources (*e.g.*, a coal plant) as part of its NEPA cost/benefit analysis at the construction permit stage for a nuclear power reactor. *See Niagara Mohawk Power Corp.* (Nine Mile Point Nuclear Station, Unit 2), 1 NRC 347, 352-72 (1975); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 522 (1977). If need for power is not demonstrated, or if, for example, a different type of generating plant is preferable from cost and environmental standpoints, then not building any plant, or building that different type of plant, may be a realistic alternative. Such an analysis is practical before a nuclear power plant has been built. Until about a year ago, however, need for power and alternative energy sources were also being litigated in some operating license cases, after construction of the nuclear reactor had been substantially completed.

The Commission became concerned that litigation of these issues at the operating license stage was a waste of time and resources, at least in the absence of exceptional circumstances. As the Commission had determined years earlier, once a plant is

built, there is little reason to consider the environmental and economic costs associated with construction. At that point, those construction costs are so much water over the dam; in NEPA terms, they are "sunk." See *Public Service Co. of New Hampshire, supra*, at 530-36. The Commission accordingly initiated a rulemaking to determine whether such issues should be barred at the operating license stage. 46 Fed. Reg. 39940.

The rulemaking record, as subsequently developed, showed that a constructed nuclear plant is virtually certain to be used as a base load plant, replacing other less efficient generating capacity, if not to meet increased demand. It is also very likely to be preferable to any realistic alternative, given the nuclear plant's typically lower cost of operation compared to coal and oil. In April 1982, in recognition of these realities and to promote efficiency in the licensing process, the Commission adopted [the need for power rule.]

LBP-83-27A, *supra*, 17 NRC at 971-72.

Positions of the Parties

Mr. Eddleman puts forward an alternative to the Shearon Harris Plant in four affidavits accompanying his petition. He argues that an alternative consisting of a combination of load shifting, energy storage, solar power, and conservation measures (ranging from more efficient home air conditioners to space heating by leaving water standing in the bathtub until it cools to room temperature) would be economically and environmentally superior to operating the Harris Plant. These arguments are elaborated in considerable detail. Given the view we take of the question, it is unnecessary for us to do more than sketch the outlines of Mr. Eddleman's argument. What is most significant for us is what the petition does *not* address — i.e., the likelihood that the Harris Plant will be used to displace existing baseload fossil fuel capacity if it is not needed to meet increased demand for power.

The Applicants focus their argument on the petition's failure to show that the purpose of the need for power rule would not be served by its application here. They note that the petition does not dispute the necessity of all of their existing baseload fossil fuel capacity, with the exception of one unit. They argue that —

even assuming the viability of the alternative energy-saving measures proposed by Mr. Eddleman and the resulting decrease in system load projections, the premise of the Commission's regulation would dictate operation of the Harris units in order to displace existing fossil baseload generation (an alternative not even addressed in Mr. Eddleman's petition). The purpose served by the regulation would thus remain unaltered.

The Staff advances much the same argument. Response at 9. However, the Staff devotes most of its response to disputing the merits of certain of Mr. Eddleman's claims of economic and environmental superiority for his alternative. For example, it raises questions about the petitioner's computation of cost savings and seemingly optimistic predictions about people switching to more efficient air conditioners. Response at 9-10. As we next discuss, we believe that the Applicants' basic argument is not only sound but dispositive of the petition, without reference to the range of economic and environmental issues that might otherwise have to be addressed. As to those issues, we merely note that many of the Staff's points appear to be well taken and we question whether the petition would have satisfied the "prima facie" showing requirement, had we reached those issues.¹⁶

Discussion

Mr. Eddleman compares his alternative to operating Harris under four different scenarios, the principal variables being cancellation or postponement of Unit 2 or Unit 1. In each of these scenarios, however, operation of Harris or implementation of the alternative is considered only with reference to meeting increased demand or peak loads. These scenarios do not take account of the fact — as Mr. Eddleman himself points out — that about two-thirds of the Applicants' existing baseload plants (3500 of 5000 MW) are coal-fired plants. Presumably, these coal plants are of varying ages and efficiencies, both in terms of operating costs and effects on the environment. It was just this situation that the Commission had in mind when it adopted the need for power rule. The Commission's statement bears repeating:

[A] constructed nuclear plant is virtually certain to be used as a base load plant, replacing other less efficient generating capacity, if not to meet increased demand. It is also very likely to be preferable to any realistic alternative, given the nuclear plant's typically lower cost of operation compared to coal and oil.

¹⁶ Section 2.758 requires the petitioner to make a "prima facie" showing, a term it does not define. Analogies to meanings given this phrase in civil litigation, particularly in association with jury trials, are not controlling here. *Cf. Consumers Power Co. (Midland Plant, Units 1 and 2), CLI-74-5, 7 AEC 19, 32 (1974)*. In the context of § 2.758, it seems reasonable to equate "prima facie" showing with "substantial" showing. This would mean that the affidavits supporting a petition for waiver should present each element of the case for waiver in a persuasive manner and with adequate supporting facts from a qualified expert, where appropriate. Mr. Eddleman's response of September 30, 1983, suggests his view, with which we disagree, that mere assertions in an affidavit by a putative expert are, in and of themselves, sufficient for a "prima facie" showing and binding on the Board.

Thus, the burden is on Mr. Eddleman, as the petitioner for a waiver, to show that the Harris facility would not be used to displace existing coal-fired capacity.

Mr. Eddleman's petition does not address this probable use of the Harris facility.¹⁷ To be sure, Mr. Eddleman appears to concede that a nuclear plant would have some operating cost advantage over a coal plant. Petition at 10. And his argument suggests that the nuclear plant might also be environmentally preferable to an older coal plant, at least with respect to emissions. *Id.* at 20-21.¹⁸ At least the petition makes no attempt at "prima facie" showings to the contrary. Particularly given these cost and environmental advantages, it is apparent that Mr. Eddleman's alternative would only be considered as a substitute for meeting incremental needs for power for peak loads. In any event, such a conservation-oriented alternative cannot meet historic baseload needs to the extent that *all* coal-fired units of a heavily coal-dependent utility would be displaced by it.¹⁹

In light of the foregoing discussion, Mr. Eddleman has not shown "special circumstances . . . such that application of the [need for power] rule would not serve the purpose for which it was adopted." 10 C.F.R. § 2.758. That new nuclear units, with their cost and environmental advantages, would be run as baseload units, possibly replacing old coal units, was a basic premise of the rule. Given that premise, the "purpose" of the rule (within the meaning of § 2.758) was to avoid pointless litigation about need for power projections and minor environmental effects where there was no realistic prospect of tilting the NEPA cost/benefit balance. That purpose is served by application of the rule in this case.

For the foregoing reasons, Mr. Eddleman's petition seeking waiver of the need for power rule is denied.²⁰

¹⁷ Indeed, Mr. Eddleman in his response (at 3) seems to question the relevance of the comparison, where he asserts that "[i]t is illogical to combine Harris with the alternative to it"

¹⁸ In that regard, we agree with the Staff that we may consider the FES for the facility in judging environmental effects of its operation. The FES concludes that those effects will not be significant (FES at 6-3), and there is nothing in Mr. Eddleman's petition to call that conclusion into question.

¹⁹ In this case some 3500 MW of coal-fired baseload capacity — more than half the Applicants' baseload — would have to be displaced by Mr. Eddleman's alternative before the purpose of the need for power rule might be deemed inapplicable. Even assuming for the sake of argument Mr. Eddleman's claim that his alternative can displace 2600 MW of electricity, and subtracting the capacity of the Harris unit it would displace, about half of the Applicants' present coal-fired capacity would still be needed.

²⁰ We reject the Applicants' alternative argument that the petition was untimely. Section 2.758 sets no time limit for filing petitions for waiver. Mr. Eddleman met the filing limit set by the Board, which was reasonable in the circumstances of this case.

VI. CONCLUSIONS OF LAW

The environmental matters in controversy in this proceeding are limited to those raised by the Intervenors. 10 C.F.R. § 2.760a. As reflected in the foregoing findings of fact, each of those matters has now been resolved in favor of the Staff and the Applicants and against the Intervenors. Based on those findings of fact, the Board concludes that as to all contested matters the Final Environmental Statement for the Harris facility satisfies the Staff's obligations under the National Environmental Policy Act.

VII. APPEALS

Pursuant to 10 C.F.R. §§ 2.760(a) and 2.762, an appeal from this Partial Initial Decision or from any prior Board Order granting a motion for summary disposition, in whole or in part, of an environmental contention or excluding a proposed environmental contention from litigation may be taken by filing a notice of appeal with the Atomic Safety and Licensing Appeal Board within 10 days after service of this Decision. A brief in support of an appeal must be filed within 30 days after the filing of the notice of appeal (40 days if the appellant is the NRC Staff). Within 30 days after the period for filing and service of the briefs of all

appellants has expired (40 days if the appellant is the NRC Staff), any other party may file a brief in support of or in opposition to an appeal.

**THE ATOMIC SAFETY AND
LICENSING BOARD**

**James L. Kelley, Chairman
ADMINISTRATIVE JUDGE**

**Dr. James H. Carpenter, Member
ADMINISTRATIVE JUDGE**

**Glenn O. Bright, Member
ADMINISTRATIVE JUDGE**

**Dr. Harry Foreman, Alternate
Member (by JLK)
ADMINISTRATIVE JUDGE**

**Bethesda, Maryland
February 20, 1985**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Charles Bechhoefer, Chairman
Dr. James C. Lamb
Ernest E. Hill**

In the Matter of

**Docket Nos. STN 50-498-OL
STN 50-499-OL
(ASLBP No. 79-421-07-OL)**

**HOUSTON LIGHTING AND
POWER COMPANY, et al.
(South Texas Project,
Units 1 and 2)**

February 26, 1985

The Licensing Board grants an intervenor's request for a hearing on the effect (if any) on the lead Applicant's character and competence of its asserted failure to notify NRC (including the Licensing Board) on a timely basis of a report by Quadrex Corporation (a consultant) on the engineering design activities of the project's former architect-engineer-constructor. The Board also denies reconsideration of an earlier order which, *inter alia*, dismissed the same intervenor's attempt to litigate certain substantive issues derived from the Quadrex Report.

REGULATIONS: REPORTS OF DEFICIENCIES

Insofar as it relates to reports required to be furnished by construction permit holders, the coverage of 10 C.F.R. Part 21 is similar, albeit somewhat narrower, than the coverage of 10 C.F.R. § 50.55(e). Items reported pursuant to § 50.55(e) need not again be reported to satisfy Part 21.

REGULATIONS: REPORTS OF DEFICIENCIES

Certain deficiencies representing a significant breakdown in a quality assurance program are reportable under 10 C.F.R. § 50.55(e)(1)(i) but not under 10 C.F.R. Part 21.

REGULATIONS: REPORTS OF DEFICIENCIES

Under 10 C.F.R. § 50.55(e), a construction permit holder must notify NRC of certain deficiencies in design or construction. The deficiencies specified by 10 C.F.R. § 50.55(e)(1)(i) and (ii) apply to design or construction, whereas the deficiencies specified by 10 C.F.R. § 50.55(e)(1)(iii) and (iv) are only deficiencies in construction, not design.

REGULATIONS: REPORTS OF DEFICIENCIES

Deficiencies representing a significant breakdown in any portion of the quality assurance program, within the meaning of 10 C.F.R. § 50.55(e)(1)(i), may include deficiencies in designs which are not final and have not been "approved and released for construction," within the meaning of 10 C.F.R. § 50.55(e)(1)(ii).

REGULATIONS: REPORTS OF DEFICIENCIES

Even though several quality assurance deficiencies may not in themselves be reportable as significant quality assurance breakdowns, collectively they may nevertheless be greater than the sum of their individual parts and be reportable as a significant quality assurance breakdown under 10 C.F.R. § 50.55(e)(1)(i).

OPERATING LICENSE HEARINGS: ISSUES FOR CONSIDERATION

Operating license proceedings are not NRC's primary vehicle for ascertaining the existence of, or penalties for, violations of 10 C.F.R. § 50.55(e). But such violations may be considered in such proceedings in the context of an applicant's character or competence to complete and/or operate a nuclear plant.

OPERATING LICENSE(S): MANAGERIAL CHARACTER AND COMPETENCE

A failure to adhere to the reporting requirements of 10 C.F.R. § 50.55(e) does not *per se* reflect an operating license applicant's lack of managerial character or competence, particularly where the NRC Staff believes that the reporting requirements have been satisfied. But a party is nevertheless free to attempt to demonstrate that any particular failure to report was motivated by deficiencies in character or competence.

RULES OF PRACTICE: RESPONSIBILITIES OF PARTIES

A long line of Appeal Board decisions has obligated applicants to keep licensing or appeal boards informed of newly developing information bearing on issues pending before such boards. *Duke Power Co.* (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-143, 6 AEC 623, 625-26 (1973); *Georgia Power Co.* (Alvin W. Vogtle Nuclear Plant, Units 1 and 2), ALAB-291, 2 NRC 404, 408-12 (1975); *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 NRC 397, 406 n.26 (1976); *Tennessee Valley Authority* (Browns Ferry Nuclear Plant, Units 1, 2 and 3), ALAB-677, 15 NRC 1387, 1394 (1982); *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), ALAB-774, 19 NRC 1350, 1357-60 (1984). Where there is "reasonable doubt" about the materiality of information, it should be disclosed "for the board to decide its true worth." *TMI, supra*, 19 NRC at 1358.

MEMORANDUM AND ORDER **(Phase II Hearings on Quadrex Report Issues)**

The Quadrex Report is a review of the engineering design activities on the South Texas Project performed by Brown & Root (B&R), the project's former architect-engineer-constructor. It is a 3-volume, 514-page report, prepared by Quadrex Corporation, entitled "Design Review of Brown and Root Engineering Work for the South Texas Project," dated May 1981. The report had been initiated by Houston Lighting and Power Co. (HL&P) in January 1981. This Board was first informed of the report by letter from the Applicants dated September 28, 1981 (almost 5 months after HL&P received the report).

Citizens Concerned About Nuclear Power, Inc. (CCANP), an intervenor in this operating license proceeding, is seeking to litigate various

issues derived from the Quadrex Report. In our Fifth Prehearing Conference Order (Consideration of Issues for Phase II), dated November 16, 1984 (unpublished), we considered, *inter alia*, whether CCANP had set forth adequate bases warranting a Phase II evidentiary hearing on any Quadrex Report issues. We observed that there are essentially two types of issues raised by the Quadrex Report — the substantive questions discussed therein, and the reportability to NRC (including this Board) of the Report or portions thereof. We reached no conclusions in that Order with respect to the reportability questions, but we held that CCANP had not satisfactorily set forth any substantive Quadrex issues for adjudication. Since we did not find a need to raise substantive Quadrex issues *sua sponte* (see 10 C.F.R. § 2.760a), we dismissed all Quadrex-related issues except those concerning reportability, upon which we deferred ruling. We also denied CCANP the further discovery it had requested on certain Quadrex issues.

In this Memorandum and Order, we consider the reportability questions on which we previously deferred ruling. In addition, we are ruling on CCANP's December 4, 1984 Motion for Reconsideration of the Quadrex-related rulings in our Fifth Prehearing Conference Order. For the reasons which follow, we find certain reportability questions appropriate for adjudication in Phase II but we decline to reconsider our previous rulings with respect to substantive Quadrex issues and Quadrex-related discovery.

I.

A. CCANP first sought to raise formally the reportability issues in its proposed contentions on the Quadrex Report, dated November 21, 1981. CCANP claimed that HL&P's failure, at the time it first received the Quadrex Report, to report more than three of the "hundreds" of Quadrex findings pursuant to 10 C.F.R. § 50.55(e) — indeed, its failure to submit the entire Report — demonstrated noncompliance with NRC regulations. CCANP also at that time submitted proposed contentions (numbers 4 and 5) seeking to raise the reportability questions. Specifically, it claimed that various items in the Quadrex Report, and the entire Report, should have been reported pursuant to 10 C.F.R. § 50.55(e)(1)(i), (ii) or (iii).¹

¹ CCANP cited one finding as reportable under subsection (iii) (Nov. 21, 1981 Motion at 17) but, from the context, we assume CCANP meant to refer to subsection (iv). See also *infra* p. 453, where we observe that subsections (iii) and (iv) are applicable to construction but not to design deficiencies.

In our Fourth Prehearing Conference Order, dated December 16, 1981 (unpublished), we ruled that all Quadrex Report issues, including reportability, would be deferred until Phase II of this proceeding. Subsequently, in our Memorandum and Order dated March 25, 1982 (unpublished), we denied CCANP's motion for reconsideration of that ruling insofar as it dealt with the reportability issues. Thereafter, without objection from any party, we adopted a suggestion of the Staff and declined to admit CCANP's proposed contentions on the Quadrex Report, on the ground that, to the extent relevant to this proceeding, they were already encompassed within existing issues or within the scope of examination of the Quadrex Report outlined in the Fourth Prehearing Conference Order. Memorandum dated June 24, 1982 (unpublished). Reflecting those determinations, our Phase I Partial Initial Decision (PID), dated March 14, 1984, LBP-84-13, 19 NRC 659, subjected our rulings on HL&P's character and competence to the results of our examination of Quadrex Report issues in Phase II. 19 NRC at 668, 686, 691. (In ALAB-799, 21 NRC 360 (1985), the Appeal Board declined to review our holdings on HL&P's character and competence, on grounds of lack of finality reflecting, *inter alia*, the unresolved Quadrex Report issues.)

On June 25, 1982, the NRC Staff transmitted to the Board and parties copies of I&E Report 82-02, dated June 3, 1982, dealing with an I&E investigation as to whether the Quadrex Report had been properly reported to the Staff. I&E Report 82-02 concluded that HL&P was not required to submit the entire report to the NRC pursuant to 10 C.F.R. § 50.55(e), and that all reportable items in the report had been submitted to NRC. It further concluded that two items had not been reported on a timely basis (i.e., within 24 hours of discovery) inasmuch as HL&P had been aware of those items prior to its receipt of the final Quadrex Report but had reported them only after receipt of that final report. Later, in its final review of the Quadrex Report, dated January 7, 1983 (I&E Rept. 82-12, NUREG-0948), the Staff reiterated that conclusion. It found six items to be potential § 50.55(e) matters but, on the basis of a later detailed assessment undertaken by Bechtel Corp. for HL&P, determined that three were not reportable.

Because of our belief that questions concerning the reportability of the Quadrex Report might present legal rather than factual issues, we asked the Staff to provide further analysis of its determination that most items under the Quadrex Report were not reportable. Memorandum and Order, dated June 22, 1983 (unpublished), at 6-7. We permitted other parties to file responses. Specifically, we sought the views of the parties on reportability not only under 10 C.F.R. § 50.55(e) but also under 10 C.F.R. Part 21 and under the Licensing Board notification requirement

spelled out in decisions such as *Duke Power Co.* (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-143, 6 AEC 623, 625-26 (1973) and *Georgia Power Co.* (Alvin W. Vogtle Nuclear Plant, Units 1 and 2), ALAB-291, 2 NRC 404, 408-12 (1975).

The Staff filed its brief on the reportability questions on August 24, 1984. Responses were filed by the Applicants on September 28, 1984 and by CCANP on October 1, 1984. We heard oral argument on the reportability questions at the prehearing conference on October 16, 1984 (Tr. 10,766-68, 10,774-825, 10,830-58).

In its brief on reportability, the Staff took the position that, insofar as 10 C.F.R. Part 21 relates to construction permit holders (such as the Applicants here), its coverage is similar, albeit somewhat narrower, than the coverage of 10 C.F.R. § 50.55(e). The Staff also cited certain Staff guidance documents to the effect that items reported pursuant to § 50.55(e) need not again be reported to satisfy Part 21. See NUREG-0302, Rev. 1 (October 1977), at p. 21.21(b)(1)-15; and I&E Guidance on Section 50.55(e), dated April 1, 1980, at 10. Since CCANP's claims concerning the reportability of the Quadrex Report do not invoke 10 C.F.R. Part 21, and inasmuch as we see no basis for disagreeing with the Staff's conclusion that, insofar as the Quadrex Report is concerned, any reportability under Part 21 would be encompassed by the requirements of 10 C.F.R. § 50.55(e), we will not further discuss any Part 21 requirements.² We turn now to reportability under 10 C.F.R. § 50.55(e) and under the *McGuire* (and related cases) doctrine.

B.1. The reporting requirement of 10 C.F.R. § 50.55(e), with respect to holders of a construction permit for a nuclear power plant, provides for notification of NRC

of each deficiency found in design and construction, which, were it to have remained uncorrected, could have affected adversely the safety of operations of the nuclear power plant at any time throughout the expected lifetime of the plant, and which represents:

- (i) A significant breakdown in any portion of the quality assurance program conducted in accordance with the requirements of Appendix B to this part; or
- (ii) A significant deficiency in final design as approved and released for construction such that the design does not conform to the criteria and bases stated in the safety analysis report or construction permit; or
- (iii) A significant deficiency in construction of or significant damage to a structure, system, or component which will require extensive evaluation, extensive redesign, or extensive repair to meet the criteria and bases stated in the safety analysis

² We note that a significant breakdown in a quality assurance program, which CCANP advances as its major basis for reportability of the Quadrex Report, is reportable under 10 C.F.R. § 50.55(e)(1)(i) but not under Part 21. See NUREG-0302, Rev. 1, at p. 21.21(b)(1)-16.

report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function; or

(iv) A significant deviation from performance specifications which will require extensive evaluation, extensive redesign, or extensive repair to establish the adequacy of a structure, system, or component to meet the criteria and bases stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.

10 C.F.R. § 50.55(e)(1). The section further calls for notification "of each reportable deficiency" to be provided to the appropriate NRC regional office (here, Region IV) "within 24 hours," with followup written reports to be submitted within 30 days. 10 C.F.R. § 50.55(e)(2) and (3).

To assist construction permit holders in complying with the reporting requirements of 10 C.F.R. § 50.55(e), and I&E inspectors in enforcing those requirements, the NRC Division of Inspection and Enforcement has issued guidelines. The Staff, through its August 24, 1984 brief, has provided copies of the guidelines, dated April 1, 1980. The Applicants indicated their awareness of the guidelines as of the time frame in which the Quadrex Report was issued (Tr. 10,777).

In their briefs on reportability, both the Staff and Applicants described a three-element test for reportability: first, a deficiency in either design or construction; second, a potential for the deficiency, if left uncorrected, to affect adversely the safety of plant operations; and third, the deficiency must fall within one of the four categories of deficiencies spelled out in subsections (e)(1)(i)-(iv) of the regulation. Staff Brief at 2-4; Applicants' Brief at 2-3. CCANP does not dispute that, to be reportable, an item must satisfy each of the three criteria. Further, all parties seem to agree that, to the extent the Quadrex Report may include deficiencies, they relate to design but not construction, within the meaning of the first of these criteria. That being the case, subsections 50.55(e)(1)(iii) and (iv) also would not be applicable to the Quadrex Report.³

2. The Quadrex Report was provided to HL&P on May 7, 1981 (I&E Rept. 82-02, at 3, 5). Three items apparently were reported on May 8, 1981; as we understand it, they were said to fall within the terms of 10 C.F.R. § 50.55(e)(1)(ii) (deficiency in final design "approved and released for construction").⁴ The essence of CCANP's claims concerning

³ In its November 21, 1981 motion, CCANP suggested that Quadrex item 3.1(g) should have been reported under 10 C.F.R. § 50.55(e)(1)(iii) (which, we believe, was intended to be iv, see *supra* note 1). We disagree with CCANP's suggestion, inasmuch as we read subsection (iv), as well as (iii), to be applicable to deficiencies in construction, not design. To the same effect, see CCANP October 1, 1984 brief on reportability, at 6.

⁴ Those items apparently were Findings 4.2.2.1(a) (Computer Code Verification), 4.4.2.1(a) (HVAC Design Basis) and 4.4.2.1(b) (HVAC System Classification). HL&P reported three other items as "potentially reportable" but later determined them not reportable. NUREG-0948, at 19-20.

reportability under 10 C.F.R. § 50.55(e) is that (1) many more Quadrex Report items — indeed, the report in its entirety — reflected a significant breakdown in a portion of the quality assurance (QA) program and hence were reportable under 10 C.F.R. § 50.55(e)(1)(i); and (2) there has been demonstrated no adequate basis for the Staff's and Applicants' determinations that various items had or had not in fact been released for construction at the time of the Quadrex Report.

In its review of the Quadrex Report in NUREG-0948, at pages 2 and 20, the Staff took the position that the primary reason why the entire report was not reportable under 10 C.F.R. § 50.55(e) was that the designs in question had not been released for construction, except for the specific items reported. Specifically, the Staff indicated that, "with the exception of the reported items, the design efforts which are the subject of the Quadrex Report had not been released for construction and *thus* do not meet the criteria of 10 C.F.R. 50.55(e)" (Quadrex Report at 20, emphasis supplied). Nowhere in NUREG-0948 (or in I&E Report 82-02, the Staff's earlier investigation of the reporting of the Quadrex Report) is any consideration given to whether any Quadrex items (individually or collectively) might have been reportable as a significant breakdown in QA, pursuant to 10 C.F.R. § 50.55(e)(1)(i).

In its brief on reportability, however, the Staff explained why it determined that no Quadrex item, or the Report itself, was reportable as a QA breakdown. It explained that "[w]hile significant quality assurance breakdowns could conceivably be indicated in a design effort review, such breakdowns *would not have the potential* to adversely affect the safe operation of the plant *unless* the designs had received approval to be released for construction" (Staff Brief at 4, emphasis supplied). The Staff went on to state that, as a result, it concentrated its reportability review on whether there were significant deficiencies in "final design" (*ibid.*). At oral argument, the Staff reiterated essentially the same view (Tr. 10,774-76). For their part, the Applicants in their September 28, 1984 brief did not discuss the question of whether Quadrex Report findings reflected one or more significant QA breakdowns; they merely indicated general agreement with the Staff's analysis and conclusions on reportability of the Quadrex Report. Earlier, however, they had indicated that they had considered whether items documented by the Quadrex Report, or portions thereof, reflected a significant QA breakdown, but they gave no details as to how or on what basis they reached a negative conclusion. See Applicants' Response to Texas' Interrogatories on Quadrex, dated August 26, 1983, at 11 (Interrogatory 9(b)) and 23 (Interrogatory 26)).

For its part, CCANP claims — and we agree — that the Staff used improper standards in evaluating reportability under 10 C.F.R.

§ 50.55(e)(1)(i). The Staff, while admitting that theoretically there could be a significant QA deficiency irrespective of whether a design had been released for construction, appears to have used the "released for construction" criterion as a threshold for determining the significance of a QA violation. By treating every design not released for construction as not sufficiently significant to be reported, the Staff has effectively eviscerated the requirement of 10 C.F.R. § 50.55(e)(1)(i) that a construction permit holder report significant QA breakdowns in design engineering.

The Staff's failure properly to evaluate reportability under 10 C.F.R. § 50.55(e)(1)(i) is equally apparent in its lack of evaluation of the Quadrex Report's so-called "generic" findings. CCANP claims that those seventeen "generic" findings represented evidence of a QA breakdown and should have been reported on that basis. The Staff declined to evaluate the reportability of any of the "generic" items on the grounds that those items were based solely on the individual discipline findings, the reportability of which it did evaluate, and hence that the "generic" findings did "not represent new findings" (Staff Brief at 9). The Applicants agree with that treatment (or lack of treatment) of the "generic" findings (Applicant's Brief at 3-4 & n.6).⁵

That approach may be valid for purposes of ascertaining the adequacy of proposed corrective action — i.e., if each of the discipline findings comprising a generic finding has been satisfactorily considered, and if the particular generic finding is solely the product of identified discipline findings, then the generic finding perforce has also been satisfactorily addressed. But, in our view, at least for reportability purposes under 10 C.F.R. § 50.55(e)(1)(i), a "generic" finding may indeed be greater than the sum of its parts; it may document a significant QA breakdown where no component discipline finding rises to that stature. *See* Staff I&E Guideline, at 5, distinguishing between an inadequate record-keeping system and occasional incomplete or otherwise inadequate records. Moreover, a Bechtel Task Force ascertained that at least one portion of one of the "most serious" generic findings, as well as one of the "serious" findings, were not wholly the product of discipline findings, although it did not determine those findings to be reportable or potentially reportable. *See* Bechtel Task Force Report, included in Bechtel review, dated August 26, 1982 (Work Package EN-619), Appendix D, at A-5 (Finding 3.1(b)), A-22 (Finding 3.2(1)), and at p. 4-9 of Task Force

⁵ In responding to Texas' interrogatories, the Applicants observed that "[t]he extent of the problems suggested by the generic findings may be assessed by reviewing underlying discipline findings." Applicants' Response, dated August 26, 1983, at 22 (Interrogatory 26).

Report, dated March 1982. Thus, for purposes of ascertaining the existence of a significant QA breakdown for reportability under 10 C.F.R. § 50.55(e)(1)(i), the "generic" findings should have been considered apart from, and in addition to, the discipline findings. The material before us suggests that this method of procedure was not in fact followed by either the Applicants or Staff.

CCANP has set forth several examples of both generic and discipline findings which, it claims, should have been reported as significant QA breakdowns under 10 C.F.R. § 50.55(e)(1)(i). Specifically, in its November 21, 1981 submission (at 15-16), it lists the following generic findings as reportable on that basis:

- 3.1(h) (asserted violation of 10 C.F.R. Part 50, Appendix B, Criterion II)
- 3.1(a) (asserted violation of Part 50, Appendix B, Criterion III)

Although CCANP did not specify the subsection of 10 C.F.R. § 50.55(e)(1) under which it would be reportable, we also read CCANP's allegations with respect to discipline finding 4.3.2.1 (at 14-15) as asserting a QA breakdown, within the meaning of 10 C.F.R. § 50.55(e)(1)(i).

In addition, CCANP has also specified additional particular generic findings as reflecting violations of 10 C.F.R. Part 50, Appendix B — namely:

- 3.1(b) (asserted violations of Part 50, Appendix B, Criteria I, IV, X, XVIII)
- 3.1(c) (asserted violations of Appendix B, Criteria V, VI)
- 3.1(d) (asserted violations of Appendix B, Criteria I, II)
- 3.1(e) (asserted violation of Appendix B, Criterion V)
- 3.1(f) (asserted violations of Appendix B, Criteria VI, X)
- 3.1(g) (asserted violations of Appendix B, Criteria I, II, V, VII, XVIII)
- 3.1(j) (asserted violations of Appendix B, Criteria I, II, VII, XVIII)

(*id.* at 39-43, Contentions 13-22). If the findings in fact suggested significant violations of Part 50, Appendix B, failure to have reported such findings would potentially be inconsistent with 10 C.F.R. § 50.55(e)(1)(i).

Finally, in its November 21, 1981 proposed contentions (Contention 5) as amplified by its October 1, 1984 brief on reportability (at 2), CCANP asserts that the entire Quadrex Report should have been reported to NRC under 10 C.F.R. § 50.55(e)(1)(i) inasmuch as the report documented a significant breakdown in a portion of the STP QA program. Indeed, CCANP claims that the draft report received by HL&P should have been submitted to NRC within 24 hours after HL&P became aware of the report's prospective findings (prior to the time the report was issued in final form) (October 1 Brief at 6-7).

3. CCANP also questions the Staff's determinations that various design items included in the Quadrex Report had or had not been released for construction, within the meaning of 10 C.F.R. § 50.55(e) (ii). The Staff in its August 24, 1984 brief indicated that it had been unable to reconstruct the method it had used in developing NUREG-0948 to evaluate this question. The Staff, however, referred to B&R's system for designation of the status of design drawings, in terms of "issued preliminary," "issued for use," "issued for construction," or "issued for review" (Staff Brief at 9). According to the Staff, "[t]he use of a drawing was dependent on its status; to be involved in construction, drawings must have been designated as 'issued for construction'." Only items so designated, according to the Staff, would be comprehended by 10 C.F.R. § 50.55(e) (ii).

If we assume that the Staff may have relied on B&R's designations, we must also point out that the Quadrex Report itself includes findings which might undercut any reliance on B&R's designation of its design drawings. For example, Finding 3.1(j) asserts that the B&R design verification process permitted the use of preliminary data up to the point of STP fuel loading, and that, in the structural area, the final verification would likely occur after construction has been completed. (See also Finding 4.1.2.1(h).) Similarly, Findings 4.2.2.1(b)-(e) identify computer code verification problems. The Bechtel Task Force review of the Quadrex Report, dated March 1982, at B-21 and B-22, refers to one of those findings (4.2.2.1(e)) in terms of improper verification and also as a "documentation" problem, suggesting that improperly verified codes, or improperly marked documents dealing with such codes, may in fact have been utilized for construction. The final Bechtel Report (EN-619), dated August 26, 1982, refers to this finding as a "deficiency" and also suggests that certain calculation packages were not acceptably documented. At oral argument, CCANP advanced a similar claim (Tr. 10,811). In sum, it appears that documents which may not have been marked as being final or "released for construction" may in fact have been used for construction purposes.

4. As can be seen from the above discussion, CCANP has identified a number of findings of the Quadrex Report, as well as the report itself, which it claims should have been reported under 10 C.F.R. § 50.55(e)(1)(i) and/or (ii). We believe that CCANP's claims have a substantial basis. In reaching this conclusion, we have not in fact determined that any additional Quadrex Report items, or the Report itself, were in fact reportable. We need not go that far in order to ascertain that CCANP has properly advanced questions concerning the adequacy of HL&P's reporting under 10 C.F.R. § 50.55(e).

In reaching this conclusion, we are placing no weight on the Staff's conclusions on reportability of particular Quadrex findings set forth in its August 24, 1984 filing. The Staff's conclusions appear to be based on improper factors. For example, as CCANP has pointed out (Tr. 10,776-78; *see also* Tr. 9078-79, 9114), 10 C.F.R. § 50.55(e) contemplates reporting significant information within 24 hours. But the Staff has based many of its conclusions on lack of significance of various findings not on information available when the Report was issued but, rather, on information developed at a much later date (e.g., on the analysis in Bechtel's review (EN-619), released in final form more than 15 months after the submission of the Quadrex Report to HL&P). Moreover, as far as we can tell, the Staff has based some of its significance determinations on a design's asserted lack of release for construction — a factor, as we have pointed out, which may have no bearing on matters representing a possibly significant QA breakdown. *See* Staff August 24, 1984 Brief at 9 (item 3) and Enclosure (twenty-seven findings designated as nonreportable on that basis alone).

5. For the Quadrex Report questions to be litigable in Phase II, however, CCANP must advance more than that 10 C.F.R. § 50.55(e) has been violated. For operating license proceedings such as this one are not NRC's primary vehicle for ascertaining the existence of, or penalties for, such violations. In the context of the issues before us, CCANP must additionally demonstrate that a violation, if it occurred, reflects a deficiency in the character or competence of HL&P to complete and/or operate the South Texas facility. As pointed out earlier in this Memorandum and Order, our Phase I PID left open, *inter alia*, questions concerning HL&P's character and competence (as comprehended particularly by Issues A and B) to the extent that the rulings in the PID might be affected by HL&P's reporting practices with regard to the Quadrex Report.

In an earlier order, we also noted that a failure to report under 10 C.F.R. § 50.55(e) would not necessarily reflect a character deficiency where (as here) HL&P maintained, and the NRC Staff agreed, that reporting was not required. We pointed out that, were we to disagree on reportability, the failure to have reported would not reflect adversely on HL&P's character (although HL&P might bear responsibility in other ways for the deficient reporting). Memorandum and Order dated July 10, 1984, at 8 (unpublished).

Although a failure to report would not, under those circumstances, indicate a character deficiency *per se*, it also would not perforce suggest character adequacy. A party would still be free to attempt to demonstrate that any particular failure to report was motivated by character deficiencies. CCANP has advanced certain information which could lead to the

conclusion that HL&P's failure to advise NRC pursuant to 10 C.F.R. § 50.55(e) of many findings of the Quadrex Report beyond those actually reported does indeed reflect a character deficiency. Our July 10, 1984 Memorandum and Order (cited above) was intended only to state a general proposition. It did not consider CCANP's claims, first advanced as early as November 21, 1981, that one of HL&P's witnesses had testified as to the particular design engineering matters from the Quadrex Report actually reported but had failed to mention that those items either stemmed from a much broader report or that such a report even existed (Tr. 2404-06 (Goldberg)). In other words, if CCANP is correct, that witness may not have been telling this Board the "whole truth" about the matters as to which he was testifying. Further, CCANP pointed out that the § 50.55(e) reports themselves failed to mention the Quadrex Report or the circumstance that the reported items were derived from a broader report which included more interrelated items. CCANP attributed these asserted circumstances to a lack of candor on the part of HL&P. See CCANP November 21, 1981 Motion at 19-21, 25. At oral argument, CCANP reiterated this position (Tr. 10,806).

We recognize, of course, that, as the Applicants claim, 10 C.F.R. § 50.55(e) does not provide precise definitions of reportable items and leaves much "to the judgment of the licensee's staff and of the NRC Staff." *Virginia Electric and Power Co.* (North Anna Power Station, Units 1 and 2), LBP-78-10, 7 NRC 295, 299 (1978). We also recognize that the NRC Staff was advised of the existence of the Quadrex Report (although not through normal 10 C.F.R. § 50.55(e) channels) at a relatively early date, although we are not certain as to the content or completeness or even the nature of that report. I&E Report 82-02, at 2. Such advice would not affect HL&P's responsibility under 10 C.F.R. § 50.55(e), although it would have a bearing on HL&P's character. Nonetheless, as we stated earlier in our March 25, 1982 Memorandum and Order (at 7-8), it is important to determine whether HL&P has been forthright in its dealings with the Commission, including this Board, and whether the Applicants have satisfied both the letter and the spirit of various applicable reporting requirements. That being so, and given our reliance in our Phase I Partial Initial Decision on HL&P's openness and candor, we believe that the points raised by CCANP could, if proved, undercut to some degree our earlier findings. We accordingly conclude that there is sufficient uncertainty concerning HL&P's reporting of the Quadrex Report to NRC to warrant a hearing on the effect, if any, on HL&P's character of its reporting with respect to the Quadrex Report.

We note that, at such hearing, we would expect HL&P to address, *inter alia*, (1) the apparent inconsistency of the Quadrex Report with testimony presented by HL&P during the Spring and Summer of 1981 concerning the adequacy of B&R's services and HL&P's satisfaction with B&R's services, and (2) the failure of HL&P witnesses to mention the Quadrex Report, or the pendency of a far-reaching review of B&R's design engineering services, in response to questions where such a reference would have at least been appropriate if not specifically mandated. *See, e.g.*, Tr. 1095-96, 1143-52, 1158-59, 2404-06 (Goldberg); Tr. 1269-70, 1294, 1337, 1402-05 (D. Jordon); Tr. 3249-50, 3527-28, 5419-22 (Frazar); Tr. 3469-73, 3486, 3527, 5458-74 (Oprea).

Beyond those character questions which we deem appropriate for litigation in Phase II, CCANP also claims that HL&P's failure to have reported more segments of the Quadrex Report, and the report itself, as a QA breakdown reflects a lack of competence on the part of HL&P (October 1, 1984 Brief at 6-7). From our discussion of the reporting requirements of 10 C.F.R. § 50.55(e)(1)(i), it appears that the Applicants (as well as the Staff) may well have failed to give any serious consideration to whether the findings of the Quadrex Report indicated a QA breakdown. From the record to date, it appears that what the Applicants and the Staff both have apparently done is looked at each finding narrowly and hence avoided considering the broader implications of individual QA deficiencies. *Cf. City of Rochester v. U.S. Postal Service*, 541 F.2d 967, 972 (2d Cir. 1976); *Kleppe v. Sierra Club*, 427 U.S. 390, 409-10 (1976). If that be the case, and if the Applicants' current methodology for evaluating 10 C.F.R. § 50.55(e) deficiencies reflects the methodology used in 1981, that methodology may well represent a defect in competence.

The foregoing competence question may represent the most significant of the Quadrex reportability questions raised by CCANP. HL&P's system for ascertaining § 50.55(e) deficiencies, including the level and competence of the persons charged with that responsibility, are matters appropriate for adjudicatory consideration in Phase II. Changes (if any) since 1981 would also be pertinent. In that connection, HL&P's current method for trending QA violations or deficiencies to ascertain their significance, including changes (if any) since 1981, would be a matter on which we would expect the Applicants (as well as other parties who wish to do so) to present testimony.

C. A long line of Appeal Board decisions, extending as far back as 1973, has obligated applicants to keep licensing or appeal boards informed of newly developing information bearing on issues pending before such boards. *See, e.g., Duke Power Co.* (William B. McGuire

Nuclear Station, Units 1 and 2), ALAB-143, 6 AEC 623, 625-26 (1973); *Georgia Power Co.* (Alvin W. Vogtle Nuclear Plant, Units 1 and 2), ALAB-291, 2 NRC 404, 408-12 (1975); *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 NRC 397, 406 n.26 (1976); *Tennessee Valley Authority* (Browns Ferry Nuclear Plant, Units 1, 2 and 3), ALAB-677, 15 NRC 1387, 1394 (1982); *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), ALAB-774, 19 NRC 1350, 1357-60 (1984). The information covered by this obligation is

- (i) new information that is relevant and material to the matters being adjudicated;
- (ii) modifications and rescissions of important evidentiary submissions; and (iii) errors [in evidence upon which a board might otherwise rely].

Browns Ferry, supra, 15 NRC at 1394. Moreover, where there is “reasonable doubt” about the materiality of information, “the information should be disclosed for the board to decide its true worth.” *TMI, supra*, 19 NRC at 1358.

In its August 24, 1984 brief on reportability (at 8), the Staff claims that, under the foregoing principles, the Quadrex Report should have been provided to the Board when issued (i.e., during the early hearings in May 1981). CCANP agrees (October 1, 1984 Brief at 26-28). CCANP also cites the obligation of the Applicants’ counsel (as distinct from that of the Applicants themselves) to have advised the Board of the report prior to September 28, 1981 (citing *Public Service Co. of Oklahoma* (Black Fox Station, Units 1 and 2), ALAB-505, 8 NRC 527, 532 (1978)).

For their part, the Applicants deny that the *McGuire* reporting obligation was violated. They claim that the report was not material or relevant to the matters before this Board, distinguishing between design QA (the subject of the report) and construction QA (at issue in these proceedings). Further, they assert that the Applicants advised at least certain Staff members of the report soon after its issuance and that, as soon as Staff counsel suggested that it be turned over to the Board, they did so. They rely on the statement in *TMI, supra*, that an applicant should have a reasonable time (there, 2-4 months) to evaluate the materiality of a complex report before turning it over to a board under the *McGuire* doctrine. Finally, they claim that, even if the report should have been turned over to the Board under the *McGuire* doctrine, the failure to do so should be attributed to inadequate advice by HL&P’s attorneys and not to a defect in HL&P’s character or competence.

We agree with the Staff and CCANP that the Quadrex Report was relevant and material to matters before the Board and, as a matter of law, should have been turned over under the *McGuire* doctrine shortly

after its receipt by HL&P. Construction and design QA are not so disparate as to be considered unrelated subjects; indeed, some of HL&P's Phase I testimony discussed the engineering of the project, including statements by Mr. Goldberg describing the direction of design engineering by HL&P and the reporting of certain design deficiencies to NRC pursuant to 10 C.F.R. § 50.55(e) (Goldberg/Frazar, ff. Tr. 906, at 10-14; Tr. 2404-06). As the Appeal Board has recently observed, topics such as management integrity or quality assurance may not be able to be treated fairly or reasonably by reference to only one part of a plant or to QA in only one area. "[I]nquiry into quality assurance in one area . . . may necessarily spill over into other areas of quality assurance performance." *Louisiana Power & Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-797, 21 NRC 6, 9 (1985) (emphasis in original).

Furthermore, HL&P's reliance on *TMI* is misplaced. Although some period of time may normally be permissible to evaluate the materiality of information, such as outside reports submitted by consultants, such leeway is not available "for reports and the like that could have an immediate effect on matters being pursued at hearing." *TMI, supra*, 19 NRC at 1359 n.8. The latter situation was present in this proceeding around the time of the Quadrex Report's receipt by HL&P. Under *McGuire, supra*, it should have been furnished to the Board and parties in May or June of 1981.

As in the case of the reporting under 10 C.F.R. § 50.55(e), however, the mere failure to inform a Board does not, by itself, reflect a deficiency in character or competence. As the Applicants suggest, that failure may reflect the advice which counsel provided or failed to provide to them. On the present record, however, we cannot so hold as a matter of law. We agree with CCANP (Tr. 10,849-51) that at least HL&P's knowledge (if any) of the *McGuire* reporting requirements (as applied to the Quadrex Report) is relevant and material to HL&P's character and competence and, together with a consideration of potential penalties or remedial measures (if any) for the early failure to report, warrants an adjudicatory hearing.

D. The broad issues on which we will hold a Phase II hearing are derived from statements in CCANP's October 1, 1984 brief (at 6-7, 26), as follows (although the Quadrex issues bear on Issues A and B, to facilitate their identification they have been renumbered to follow contentions already introduced into this proceeding):

9. The Applicants' failure to notify the NRC (Region IV) of the Quadrex Report, and of many findings beyond those actually reported, within 24 hours from the time HL&P became aware of the findings or prospective findings of the Report (including drafts), violates 10 C.F.R. § 50.55(e)(2) and reflects adversely on

the character and competence of the Applicants and on their ability to manage the construction and operation of a nuclear power plant.

10. The Quadrex Report was relevant and material to issues of character and competence addressed in Phase I of this proceeding and should have been furnished to the Licensing Board and parties shortly after its receipt by HL&P, under obligations imposed by the *McGuire* line of decisions. Failure to have furnished this Report reflects adversely on the character and competence of the Applicants and on their ability to manage the construction and operation of a nuclear power plant.

We expect that the foregoing issues would be litigated during the same time frame as other issues (if any) regarding HL&P's competence. We will rule on those issues shortly after receiving the final submissions of parties (now scheduled for filing on March 11, 1985). We anticipate convening a prehearing conference, no later than the last week of April 1985, to discuss the particular matters to be heard. No later than 10 days prior to that conference, we will require CCANP to specify, *inter alia*, the particular findings of the Quadrex Report which it claims should have been reported pursuant to 10 C.F.R. § 50.55(e)(1)(i) or (ii), together with a basis for its claim; otherwise, CCANP may challenge reportability under those subsections only of the findings listed in this Memorandum and Order (including the entire report) or of additional findings (if any) as may be identified by the Board. (We will do so no later than the prehearing conference.) In addition, at the conference, we will expect the Applicants and Staff to advise us of their progress in preparing for the hurricane issue (Contention 4). We currently anticipate the Phase II evidentiary hearings on all matters (including Contention 4) to be held during the period from July 9-August 16, 1985. At the forthcoming prehearing conference, we intend to review with the parties and thereafter set hearing dates for particular Phase II issues.

For reasons set forth in Part II of this Memorandum and Order, we are denying CCANP's request for further discovery on Quadrex matters. But as a predicate for litigation of Contentions 9 and 10, we direct the Applicants to furnish this Board (with copies to all parties that wish to receive them) copies of internal documents or other records (in any form, including drafts), or correspondence or other communications with outside persons (including but not limited to B&R), concerning (1) the reportability or potential reportability to NRC (including this Board) of the Quadrex Report or any particular findings therein; and (2) the potential existence in the Quadrex Report or drafts thereof of information reflecting significant QA violations. Those records should cover the time frame from March 1, 1981 through September 28, 1981. (Records already furnished to any party or the Board need not again be furnished to

the prior recipients. For this purpose, records previously furnished to Texas shall also be considered to have been furnished to CCANP.) If the Applicants claim attorney-client privilege for any record, they should so advise us, setting forth an identification of the particular record (sender, recipient, date, general subject matter).

II.

Through its December 4, 1984 Motion for Reconsideration of our November 16, 1984 Fifth Prehearing Conference Order, CCANP asks us to reconsider our dismissal of all Quadrex issues other than reportability, as well as our denial of CCANP's request for discovery on certain of the Staff's reportability determinations. By Order dated December 10, 1984 (unpublished), we invited other parties to respond. By filings dated December 31, 1984 and January 14, 1985, the Applicants and Staff, respectively, opposed CCANP's motion.

1. With respect to substantive issues, CCANP claims that we have shifted our position as to what Phase II would encompass. CCANP states that it had submitted Quadrex Report contentions in November 1981; that it withdrew its contentions on the basis that we would look at all matters relating to the Quadrex Report; but that, thereafter, we dismissed all the substantive Quadrex issues for lack of any contentions. CCANP also disagrees with our conclusions expressed in our Memoranda and Orders of May 22, 1984 and July 10, 1984 (both unpublished) to the effect that further examination of B&R design engineering practices would be unproductive with respect to HL&P's character and cumulative with regard to HL&P's competence.

As pointed out by the Applicants and Staff, we believe that CCANP has mischaracterized or ignored our efforts in the period between the Fourth and Fifth Prehearing Conference Orders to attain a reasonable definition of the Quadrex Report issues. Our expressed willingness to examine "all aspects" of the Quadrex Report indicated that we would entertain appropriate issues derived from any portion of the report, but it also anticipated that such examination would be tempered by the results of the Bechtel and NRC Staff reviews of the Quadrex Report and that, based on those reviews, Quadrex Report issues could be narrowed. Following receipt of the Bechtel and NRC reviews (and more than a year prior to our Fifth Prehearing Conference), we explicitly advised parties that Quadrex-related issues would have to be further delineated. June 22, 1983 Memorandum and Order, at 5. The same point was reiterated in our May 22, 1984 and July 10, 1984 Memoranda and Orders.

CCANP's October 1, 1984 statement of issues, and its presentation at the Fifth Prehearing Conference, completely failed to narrow the Quadrex Report issues, as we had earlier advised must be accomplished. CCANP has provided little more than an index to the report (except in the area of reportability, as to which we are granting CCANP's hearing request). CCANP has made no attempt to eliminate any Quadrex matters, despite the obvious lack of safety significance of some of them.

For example, the Quadrex Report itself denominates many of its findings as impacting (or appearing to impact) "the generation of reliable power" or as "contribut[ing] to project schedule and/or cost increases" or as "relatively minor items" (Quadrex Report at 3-1, 4-1 and 4-2). Our June 22, 1983 Memorandum and Order (at 4) explicitly pointed out that much Quadrex Report information had no bearing on safety issues and that it was important, prior to hearing, to designate the portions of the report impacting the safety issues before us. We specifically directed CCANP, *as a predicate to litigation*, to

identify particular safety questions which it claims arise from the Quadrex Report and have not, in its opinion, been adequately resolved through the Bechtel or NRC Staff reviews.

Thereafter, in our May 22, 1984 Memorandum and Order, we reiterated that general requirement. CCANP has not complied; as far as we can ascertain, it has provided no basis for litigating any substantive Quadrex issues or findings. As a result, we dismissed all such issues.

We acknowledge that our May 22, 1984 and July 10, 1984 Memoranda and Orders limited the scope of substantive Quadrex issues which we would entertain. Those limitations reflect our belief that, with B&R no longer responsible for design engineering, it would serve little purpose to litigate the matters of B&R design engineering dealt with by the Quadrex Report. As is reflected in the Bechtel and NRC reviews of the Quadrex Report, Bechtel's design engineering methods and systems are significantly different from those employed by B&R. We viewed the adequacy of corrective action (if needed) as important; but, absent any claims by CCANP or other parties to the contrary, we also viewed the Staff's comprehensive review in NUREG-0948 as resolving (or setting the stage for resolution) of all substantive Quadrex issues. Moreover, we have been presented with no information (other than that on HL&P's reporting practices) which could raise questions as to HL&P's character or competence sufficient to effectuate a significant change in the findings or conclusions we reached in our Phase I Partial Initial Decision. That being so, we viewed litigation of substantive Quadrex issues as likely to be unproductive of information which either could

cause us to modify our earlier findings and conclusions or could significantly enhance the acceptability of the project. Absent any additional information which could alter that view, we deny CCANP's request for reconsideration of our earlier ruling on substantive Quadrex issues.

2. With respect to further discovery, we wish to stress that the main subject which CCANP wishes to pursue is the Staff's decisionmaking process with respect to reportability of Quadrex Report findings under 10 C.F.R. § 50.55(e). We stated earlier, and we repeat, that the Staff's procedures are not relevant to HL&P's character and competence. Beyond that, as set forth above, we are placing no reliance in determining reportability of Quadrex Report items on the analysis set forth in the Staff's August 24, 1984 brief. Finally, we repeat that CCANP failed to take advantage of several opportunities for discovery on reportability questions and has hence forfeited its opportunity for further discovery. Accordingly, we are denying CCANP's motion for reconsideration of our discovery ruling. (CCANP will, of course, receive copies of any records which the Applicants provide under our ruling in Part I of this Memorandum and Order, to the extent it has not already received or had access (through Texas) to those records.)

III.

In our Memorandum and Order dated September 16, 1983 (unpublished), we denied CCANP's request to conduct cross-examination of Mr. Jerome H. Goldberg, then HL&P's Vice President Engineering and Construction, at a deposition conducted by the State of Texas. We agreed with CCANP that it had a right to such cross-examination but, because of scheduling considerations, we precluded such cross-examination at that time. We took into account the Applicants' expressed intent to present Mr. Goldberg's testimony at an evidentiary hearing and deferred CCANP's cross-examination of Mr. Goldberg until such hearing.

We expect the Applicants to present the testimony of Mr. Goldberg at the reportability hearings which we have authorized. At that time, Mr. Goldberg may be cross-examined by CCANP not only on matters pertinent to the reporting of the Quadrex Report to NRC but, in addition, on all matters upon which Mr. Goldberg was questioned at Texas' deposition.

For the foregoing reasons, and taking into account the entire record on the matters discussed herein, it is, this 26th day of February 1985,

ORDERED

1. That CCANP's request for a hearing on the reporting to NRC (including this Board) of the Quadrex Report, or portions thereof, is *granted*, to the extent indicated in Part I of this Memorandum and Order;

2. That the Applicants are *directed* to provide records to the Board and parties, as described on pp. 463-64 of this Memorandum and Order. These records are to be provided no later than 10 days prior to a prehearing conference to be scheduled during April 1985 (the exact date and location to be specified in a later order);

3. That CCANP's motion for reconsideration of portions of our November 16, 1984 Fifth Prehearing Conference Order is *denied*.

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

**Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Marshall E. Miller, Chairman
Dr. Peter A. Morris
Dr. David R. Schink**

In the Matter of

Docket No. 50-354-OL

**PUBLIC SERVICE ELECTRIC AND
GAS COMPANY, *et al.*
(Hope Creek Generating Station)**

February 28, 1985

In this Order, the Licensing Board grants the parties' Joint Motion, dismissing all remaining contentions and terminating the proceeding.

ORDER TERMINATING PROCEEDING

On February 19, 1985, the Public Advocate of the State of New Jersey ("Public Advocate") and Public Service Electric and Gas Company, *et al.* ("Applicants") submitted a pleading entitled "Joint Motion to Dismiss Proceeding." Therein these parties requested the following relief based upon a settlement agreement which had been executed between the Public Advocate and Public Service:

1. The Public Advocate requested leave to withdraw as a party to this proceeding and dismissal of its admitted contentions.
2. The Public Advocate and Applicants moved for the entry of an order approving the withdrawal of the Public Advocate as a party to this proceeding and dismissal of its contentions.

The movants stated that the NRC Staff, the only other party to the proceeding, had no objection to their motion.

Upon consideration of the Joint Motion and the entire record in this matter and pursuant to the authority contained in 10 C.F.R. Part 2, the motions of the parties are granted, and this proceeding is terminated.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Marshall E. Miller, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 28th day of February 1985.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

In the Matter of

Docket No. 50-382-OL

**LOUISIANA POWER & LIGHT
COMPANY**
**(Waterford Steam Electric Station,
Unit 3)**

March 15, 1985

The Commission authorizes the issuance to the Applicant of a full-power operating license for the Waterford Steam Electric Station, Unit 3. At the same time it declines to stay the effectiveness of its Decision for a 2-week period as requested by Intervenors. Issuance of the Decision is without prejudice to the Intervenors' motions to reopen that are currently before the Atomic Safety and Licensing Appeal Board.

OPERATING LICENSE: CRITERIA

The standard for an operating licensing decision is whether there is reasonable assurance of public health and safety to allow plant operation, either for the full licensing term or until additional analysis is completed that would provide additional assurance for the full-term license.

MEMORANDUM AND ORDER

INTRODUCTION

For the reasons discussed below, the Nuclear Regulatory Commission ("NRC" or "Commission") has determined that the current record in this proceeding provides the necessary basis for authorizing the issuance to Louisiana Power and Light Company ("LP&L") of a full-power operating license for the Waterford Steam Electric Station, Unit 3 ("Waterford"). This Decision is without prejudice to the motions to reopen which have been filed by the Joint Intervenors and which are currently pending before the Atomic Safety and Licensing Appeal Board ("Appeal Board"). Should the Appeal Board ultimately decide to reopen the record in this proceeding, it would, undoubtedly, also address the effects of such a decision on the continuing viability of the full-power generating license, and we would have an opportunity to review that determination. In the interim as explained below, we have determined that the pending motions do not support a stay of our authorization of a full-power operating license.

STATUS OF ADJUDICATION

The first partial initial decision (PID) — on synergistic (radiation and atmospheric pollutants) health effects and on all but one aspect of emergency preparedness — was issued by the Licensing Board on November 3, 1982. LBP-82-100, 16 NRC 1550 (1982), *as amended*, LBP-82-112, 16 NRC 1901 (1982). In ALAB-732, on June 29, 1983, the Appeal Board completed its merits review on this PID and affirmed the Licensing Board's findings. 17 NRC 1076 (1983). The Commission let the Appeal Board decision stand.

A second and final PID on the offsite emergency planning brochure was issued on May 26, 1983. LBP-83-27, 17 NRC 949 (1983). No petitions for review were filed; the Appeal Board conducted its usual *sua sponte* review. During that time, Joint Intervenors filed with Appeal Board two motions to reopen the hearing on synergism and basemat cracking. In particular, Joint Intervenors moved to reopen the hearings on renewed allegations regarding basemat cracks and the water found seeping through them — issues which had been resolved previously in the Applicant's favor by the Licensing Board. LBP-81-48, 14 NRC 877 (1981). On December 9, 1983, the Appeal Board denied the motions to reopen, and completed its review of the Licensing Board's final decision.

ALAB-753, 18 NRC 1321 (1983). However, Joint Intervenors' motion to amend and supplement their motion to reopen on the basemat issue was received the same day ALAB-753 was issued.¹ In response, the Appeal Board requested the NRC Staff to provide additional information on the issue. ALAB-786, 20 NRC 1087 (1984). That information, which is described below, has been provided. The basemat motion is still pending before the Appeal Board.

In the meantime, on February 22, 1984, the Joint Intervenors moved, largely based on allegations, to reopen the hearing on quality assurance (QA) issues. On April 11, 1984, by Memorandum and Order (unpublished), the Appeal Board denied the motion but stated that the intervenors were free to file another motion if the hearing was reopened on other grounds prior to plant operation. Subsequently on November 8, 1984, the intervenors moved to reopen on three QA contentions: (1) failure to maintain an adequate QA program during construction; (2) lack of basic character and competence by Louisiana Power and Light (LP&L) to operate Waterford safely; and (3) failure of the NRC to provide the necessary degree of confidence that the plant has been constructed properly and can be operated safely. That QA motion is also still pending before the Appeal Board.

BASEMAT CRACKING

In July 1977, a number of cracks were identified by the Applicant at the top of the basemat within the ringwall for the containment structure. The ground water seepage rate was low, just enough to show the cracks and to moisten surrounding concrete. The cracks were sealed with epoxy grout as approved by NRC. In May 1983, an NRC inspector found small amounts of water seepage on the Reactor Auxiliary Building part of the basemat, but no cracks were visible. However, a special NRC inquiry team was set up to investigate concerns about cracking and, in a report on July 14, 1983, recommended that LP&L obtain "an independent engineering evaluation of the common basemat cracking and seepage matters." Harstead Engineering Associates, Inc., hired by the Applicant to evaluate the cracking and associated moisture, submitted a report in September 1983, concluding that "hairline" cracking was expected in reinforced concrete structures and is generally caused by tensile forces,

¹ The Commission has determined not to review ALAB-753. This determination is without prejudice to the Appeal Board's current consideration of the motions to reopen.

drying shrinkage, thermal gradients and settlement. The report concluded that the cracks were of little concern to the structural adequacy of the basemat and that there was no evidence of and little potential for corrosion of the steel reinforcing bars (rebar). The Staff agreed with the Harstead Report. However, recognizing the possibility that the loads on the basemat could change over the course of time, the Staff required the Applicant to establish a surveillance program to assure the continuing integrity of the mat.

In April 1984, the NRC initiated another review of the basemat issue further to assure itself that no significant safety issues had been overlooked with regard to the design implications of basemat cracking at Waterford. The Staff hired Robert E. Philleo, an independent consulting engineer with outstanding credentials in concrete construction, to respond to QA concerns about basemat construction. The Staff required the Applicant to conduct additional studies which involved nondestructive testing (NDT), i.e., sonar analyses, to better characterize the cracks and additional analytical analyses of the basemat structural capability. Staff's Brookhaven National Laboratory (BNL) and City University of New York (CUNY) consultants conducted laboratory studies (breaking of concrete beams) to provide additional confirmation of the adequacy of the basemat. The Applicant's prime contractor, Ebasco Services, Inc., provided analyses of shear slippage associated with cracked concrete under dynamic loading. Ebasco also referenced Cornell University tests on slippage along cracks in concrete under dynamic loading conditions as providing further support of the conclusion that the basemat was adequate to resist earthquakes.

Although Mr. Philleo did not unqualifiedly endorse all of the technical details of the NDT analysis, he found that LP&L's NDT studies supported the Staff conclusions. Both the Staff and BNL also found that the NDT results substantiated their conclusions. However, two Staff members, Drs. John S. Ma and John Chen differed from the NRC Staff majority opinion on technical details of the causes and possible consequences of basemat cracks.

After reviewing the final submittals by the Applicant in November, the Staff and its consultants, taking into account the differing views of Drs. Ma and Chen, concluded that there remains no question as to the adequacy of the soil backfill and basemat to resist all imposed loads, including seismic effects. However, at the recommendation of BNL, the Staff has identified areas in which further analysis might be useful. The Staff has determined that, even in the absence of further analysis, Waterford is a safe facility even under design basis earthquake loads. The Staff

now considers this issue closed, and has concluded that the basemat cracks do not raise a significant safety issue.

In Supplemental Safety Evaluation Report (SSER) 7 and SSER 9, Staff provided evidence that the foundation soils, concrete and rebar meet their design capacities. Moreover, documentation establishes that, even though there was a breakdown in the QA program, adequate inspection and quality controls were applied subsequently. Also, the NDT testing and the Cornell tests provide some additional assurance of basemat adequacy. The Staff, consistent with the recommendation of its consultants and with commitments by the Applicant (SSER 9, at A-121 and A-122), has recommended that Waterford-3 be licensed with two confirmatory conditions — a basemat cracking surveillance program and additional confirmatory analyses of basemat structural strength.

ASSESSMENT

Under these circumstances, the Commission believes that there is no need to defer full-power operation pending the Appeal Board's disposition of the pending motion to reopen on basemat issues.

The standard for a licensing decision is whether there is reasonable assurance of public health and safety to allow plant operation, either for the full licensing term or until additional analysis is completed that would provide additional assurance for the full-term license. The current record has provided a reasonable basis to conclude that the plant can be operated safely at full power, pending resolution of the issues currently before the Appeal Board and we so find. Confirmatory analyses to which the Applicant has committed will address the response of the plant to a low-probability, design basis seismic event and the possibility of longer-term deterioration of basemat structural capability.

QUALITY ASSURANCE

The Joint Intervenors alleged on November 9, 1984, that the breakdown of QA throughout Waterford's construction prevents reasonable assurance that the plant has been constructed in accordance with NRC requirements and that the public health and safety can be protected. In support of this contention, the Joint Intervenors have submitted specific allegations and documentation derived largely from docket files, allegations by three anonymous persons, and magazine stories. Intervenors further alleged that LP&L's lack of character and competence to operate a nuclear plant is shown by the mere fact that the Office of Investigation

investigated falsification of records and harassment of Quality Assurance/Quality Control personnel, and by alleged misstatements of LP&L to the financial community and the Securities and Exchange Commission regarding plant status. Joint Intervenors also amended the basemat cracking motion based on a magazine article alleging extensive quality assurance problems and falsification of information regarding basemat analyses.

In March 1984, the Staff initiated a broad inquiry by an NRC special review task force to address over 350 such allegations, and other open items from the Construction Assessment Team ("CAT") inspection on quality assurance and basemat cracking. The task force assessed the validity of the allegations, their safety significance and any generic implications, as well as Applicant's responses to CAT inspection findings. In SSERs 7 and 9, the Staff concluded that nothing in the allegations warranted delaying full-power operation.

Solely for the purposes of determining whether the pending motions warrant the Commission's staying issuance of a full-power operating license for Waterford, Joint Intervenors' motions and supporting arguments, Staff and Applicant responses, and the Staff safety evaluations associated with the hundreds of allegations, particularly those related to QA and the basemat, have been reviewed. Under the circumstances described above, we find no reason to stay authorization of a full-power operating license. Of course, this determination is without prejudice to the Appeal Board's substantive decision on the merits of the pending motion to reopen the record on these issues.

REQUEST TO STAY EFFECTIVENESS OF WATERFORD'S FULL-POWER LICENSE

By letters dated March 8 and 11, 1985, Intervenors have requested a 2-week stay of the effectiveness of this Order. The utility, by letters of March 12 and 14, 1985, has opposed this request.

In our view, the utility has offered persuasive reasons why the Commission should not delay the effectiveness of this Order. Ascension to full power is a gradual process. During the first 12 days of this process, Waterford will not exceed 20% of its full-power level of operation. The public health and safety risks of these low levels of power are far less than the theoretical risks of full-power operation. Nor is the level of contamination which results from such levels of operation significantly different than those associated with, and already reached as a result of, Waterford's low-power operation. Moreover, in the event that a stay is

sought and ordered by a court the utility can reverse this process and reduce power levels to below the 5% level. Finally, it appears that every day of delay in commercial operation of Waterford will cost the Applicant and the public it serves 1 million dollars.

Intervenors have offered little to balance against these facts. Nor have they presented the Commission with a formal request to stay Waterford full-power operation. Thus, they have not offered to the Commission any legal arguments which would support a stay and they have not made us aware of any significant legal issues that a reviewing court might have to resolve with regard to any judicially requested stay.

Accordingly, this Order is being made immediately effective by the Commission.

CONCLUSION

For the reasons set out above, the Commission finds that the Director, Nuclear Reactor Regulation, may issue the full-power operating license for Waterford, Unit 3.

Commissioner Asselstine dissents from this Order.

It is so ORDERED.

For the Commission

JOHN C. HOYLE
Assistant Secretary of the
Commission

Dated at Washington, D.C.,
this 15th day of March 1985.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

**Christine N. Kohl, Chairman
Dr. W. Reed Johnson
Howard A. Wilber**

In the Matter of

Docket No. 50-382-OL

**LOUISIANA POWER & LIGHT
COMPANY
(Waterford Steam Electric Station,
Unit 3)**

March 22, 1985

Finding the existing record inadequate on which to rule on a motion to reopen made by intervenors, the Appeal Board defers ruling on the motion. With limited exception, it strikes the brief and affidavits submitted by the NRC staff in opposition to the motion and calls for additional information from the staff and the applicant.

RULES OF PRACTICE: RESPONSIBILITIES OF PARTIES

It is each party's job — applicant, intervenor, and staff alike — to present its respective position in an intelligible form to the decisionmaker. An appeal board is neither advocate nor clerk for any party that appears before it.

RULES OF PRACTICE: RESPONSIBILITIES OF PARTIES

An appeal board is required to state "the reasons or basis" for its conclusions. See Administrative Procedure Act, 5 U.S.C. § 557(c). It

cannot properly fulfill this responsibility if the raw material with which it must work — i.e., the pleadings and other matter that make up the record — is grossly inadequate.

RULES OF PRACTICE: RESPONSIBILITIES OF COUNSEL

Legal counsel — through whom a party expresses its position — must bear a large responsibility for the form and quality of submissions made in licensing proceedings.

RULES OF PRACTICE: RESPONSIBILITIES OF STAFF

The NRC staff's conduct and contribution must conform to the same standards applicable to other parties.

RULES OF PRACTICE: RESPONSIBILITIES OF PARTIES

Where a party (particularly, where represented by legal counsel) submits a helter-skelter collection of materials, it must live with the consequences. *See Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-775, 19 NRC 1361, 1368 n.22 (1984).

APPEARANCES

Lynne Bernabei and George Shohet, Washington, D.C., for joint intervenors Oystershell Alliance and Save Our Wetlands, Inc.

Bruce W. Churchill, Dean D. Aulick, and Alan D. Wasserman, Washington, D.C., for applicant Louisiana Power & Light Company.

Bernard M. Bordenick and Sherwin E. Turk for the Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

On November 8, 1984, Joint Intervenors filed their fifth motion to reopen the record in this proceeding.¹ By this motion, Joint Intervenors seek a hearing on three proposed contentions. One alleges a breakdown in applicant Louisiana Power & Light Company's (LP&L) construction quality assurance (QA) program. The second claims that LP&L does not have the character and competence necessary to operate the Waterford facility in a safe manner. The third asserts that the NRC staff's inspection and investigation efforts are not adequate to assure that the alleged construction deficiencies at Waterford have been corrected and that the plant can be operated safely. Joint Intervenors have submitted over 60 documents and made scores of more specific charges in asserted support of their motion. LP&L and the staff have filed reply briefs, affidavits, and exhibits in opposition.

After lengthy consideration of the motion, we are unable to rule on the entirety of it on the basis of the existing record. While we have found that many of Joint Intervenors' charges are unsupported or provide no basis for reopening this record,² some of the more serious remaining ones have not been addressed adequately in the responsive pleadings, especially that of the staff.³ We therefore call for additional information from the staff and LP&L and offer Joint Intervenors the opportunity to respond to these submissions.⁴

I.

As noted above, our preliminary view is that much of Joint Intervenors' motion to reopen falls of its own weight. In some instances, the exhibits submitted in support of a particular charge are incomprehensible

¹ We ruled on two of these motions in ALAB-753, 18 NRC 1321, 1323-31 (1983), and on another in our Order of February 28, 1984 (unpublished). A fourth, concerning the concrete basemat on which the Waterford facility rests, is still under consideration.

Two additional motions are also pending before us. One is Joint Intervenors' motion for a protective order (filed with the November 8 motion to reopen); the other is Joint Intervenors' January 25, 1985, request for leave to reply to applicant's and the NRC staff's responses to the November 8 motion to reopen. We rule on the latter at pp. 487-88, *infra*. Two more motions filed by Joint Intervenors were recently disposed of in our Order of March 14, 1985 (unpublished).

² See *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-598, 11 NRC 876, 879 (1980); *id.*, CLI-82-39, 16 NRC 1712, 1714-15 (1982); and *id.*, ALAB-775, 19 NRC 1361, 1365-67 (1984), for the requirements that must be satisfied for reopening on new issues.

³ Unfortunately, this is not the first such occasion in the course of this protracted proceeding. See ALAB-786, 20 NRC 1087, 1091-95 (1984).

⁴ In ALAB-792, 20 NRC 1585 (1984), *clarified*, ALAB-797, 21 NRC 6 (1985), we found that we had jurisdiction to consider the entirety of Joint Intervenors' motion.

(for a variety of reasons), or irrelevant to the charge, or both. In other instances, the arguments have no apparent relation to the point being pressed. Other charges that appear to have at least limited validity have been effectively refuted by LP&L.⁵ But broad questions raised principally by Joint Intervenors' first proposed contention — alleging a breakdown in construction QA — appear on their face to have some merit. These are important matters that could bear directly on plant safety. LP&L's response to these charges is similarly persuasive but necessarily self-serving. Thus, we regard thorough staff input as essential to our resolution of such issues. Therein lies the problem. The staff's reply in opposition to Joint Intervenors' motion (both the brief and the affidavits) is so confusing and internally inconsistent that we are unable to make a reasoned judgment on whether to reopen. See ALAB-786, *supra* note 3, 20 NRC at 1091. Indeed, the deficiency of the staff response compels us to strike all but a small portion of it.

To be sure, the staff's legal brief addresses seriatim the criteria that Joint Intervenors' motion must satisfy in order to obtain reopening of the record. See note 2, *supra*. The staff's position on the most important criterion from the standpoint of plant safety — whether the motion raises a significant safety issue — is based on seven attached affidavits. In the staff's view, these affidavits fully address the issues raised by the motion to reopen, show that they have been satisfactorily resolved, and demonstrate their lack of safety significance. NRC Staff's Response to Joint Intervenors' Motion to Reopen (Dec. 21, 1984) at 8 (hereafter, Staff Brief). But as we show below, these affidavits in large measure neither fully address nor satisfactorily resolve the issues. To the extent the staff's brief relies on the affidavits, it suffers from the same infirmity and is of no value to our consideration.

As a general matter, instead of a readable narrative that addresses in sequence the myriad charges in Joint Intervenors' motion, the staff has provided us with a "matrix" that purports to tell us where to find the staff's response(s) to each of the charges. The matrix is keyed to six subject matter categories (quality assurance, civil/structural, etc.). For example, the answer for charge A(1)(a)(i) can be found in "QA," "Civil/Struct.," and "RIV Insp. Activ." The code for the matrix tells us that team leaders J. Harrison, R. Shewmaker, and W. Crossman are responsible for these categories and that their affidavits can be found in Attachments 2, 3, and 7. After turning to the affidavits, however, it is apparent

⁵ Our ultimate decision on the motion to reopen, of course, will explain more fully our reasons for accepting or rejecting — as the case may be — Joint Intervenors' numerous charges.

they are not really affidavits at all, as that term is generally understood in legal parlance. They are signed and notarized but the “substance” of the statements for the most part is more code, such as “A-229, A-48, A-306g,” with an occasional accompanying cryptic comment, or a terse memorandum between two members of the staff. That code generally refers us in turn to Supplement No. 7 to the staff’s Safety Evaluation Report for Waterford (SSER-7). This time-consuming, convoluted, and confusing process must be repeated at least once for each of the Joint Intervenors’ charges.

Overall, in both format and content, this material amounts to nothing more than individuals’ worksheets. They have been gathered up and filed as a formal submission in a legal proceeding, leaving it to us and the parties to put the pieces of the puzzle together. This is wholly unacceptable. It is each *party’s* job — applicant, intervenor, and staff alike — to present its respective position in an intelligible form to the decision-maker. We are neither advocate nor clerk for *any* party that appears before us. We are obliged, however, to state “the reasons or basis” for our conclusions. See Administrative Procedure Act, 5 U.S.C. § 557(c). We cannot properly fulfill this responsibility if the raw material with which we must work — i.e., the pleadings and other matter that make up the record — is in such an inchoate condition.

Despite this difficulty with the matrix format of the staff’s presentation, we made a serious effort at cryptography to learn the underlying basis for the staff’s conclusion that “the joint intervenors’ motion does not contain any significant new safety issues that have not been previously reviewed by the staff and brought to a satisfactory resolution.” Affidavit of Dennis M. Crutchfield (Dec. 21, 1984) at 7. We found this to be a largely futile endeavor. For, apart from problems associated with its form, as discussed above, the staff’s submission is of negligible value for at least seven reasons.

First, the matrix and affidavits themselves are inaccurate and sloppy.⁶ Second, in many instances no information at all (not even a cross-reference to another source) can be found in the affidavit identified by the matrix.⁷ Third, documents (some of which are described as in “draft”) that have not been submitted to us and therefore are not part of this record are relied upon and cross-referenced.⁸ Fourth, entire, large docu-

⁶ See, e.g., A(1)(b), A(1)(m), A(1)(4) [sic], B(1), B(2) - Crossman; A(a)(d) [sic] - Shewmaker.

⁷ See, e.g., A(1)(a)(i), A(1)(d), A(3)(b), A(4)(e), A(6)(b), A(6)(c), A(7)(a), D(3), B(3)(e) - Shewmaker; A(1)(p), B(1) - Crossman.

⁸ See, e.g., A(1)(m), A(1)(n), A(2)(a), A(2)(d), A(2)(e), A(3)(g), A(7)(a), B(6) - Crossman; B(4), C, D - Staff Brief at 15, 17.

ments are cited with no reference to any specific page(s).⁹ Fifth, the material cited does not always respond directly to the *specific* charges in Joint Intervenors' *motion*, or it does so in a confusing and disorganized manner.¹⁰ Sixth, the answer is substantively inadequate or erroneous.¹¹ Seventh, and by far most important, the cross-referenced material often concludes that the charges *do raise issues of safety significance*, entirely contrary to the staff's general conclusion with respect to Joint Intervenors' *motion*.¹² It is this unexplained inconsistency that is at the heart of our dissatisfaction with the staff's response. See pp. 485-86, *infra*.¹³

We are at a loss to understand the reason for the gross inadequacy of the staff's response to this motion to reopen. If it is a lack of either the resources or the desire to participate as a party in formal adjudicatory proceedings, the staff should communicate that to the Commission and seek to alter its role before us. But for the time being, the staff is a party in this and other adjudicatory proceedings, and its conduct and contribution must conform to the same standards we apply to other parties. Where an applicant or intervenor (particularly, where represented by legal counsel) submits a helter-skelter collection of materials comparable to that served up here by the staff, that party must live with the consequences. See *Diablo Canyon*, ALAB-775, *supra* note 2, 19 NRC at 1368 n.22. So too must the staff.

We express this criticism of a party with considerable reluctance. Indeed, had our effort to parse through the staff's filing been more fruitful, any remaining deficiencies perhaps could have been dealt with less severely. But the level of frustration with this submission felt by each member of this Board is so great that we are left with no other choice. We therefore strike the staff's brief and all of the supporting affidavits, except insofar as they respond to Joint Intervenors' charges A(1)(n) (Crossman) and A(6)(b) (Shao).¹⁴

⁹ See, e.g., A(2)(d), A(2)(e), A(3)(g), A(7)(a), A(10)(e), A(11)(d) - Crossman; A(1)(b) - Peranich; A(1)(c), B(1) - Harrison.

¹⁰ See, e.g., A(1)(l), A(2)(d), A(2)(f), A(3)(c), A(3)(e), A(4)(e), A(6)(b), A(8)(d), A(8)(e), A(10)(a), A(11)(a), B(3)(e) - Harrison; A(2)(f) - Thatcher; B(6) - Crossman.

¹¹ See, e.g., A(1)(b) - Peranich; A(1)(b), A(1)(o), A(7)(e), A(8)(a), D(3) - Harrison; A(7)(e) Shao; B(2) - Crutchfield Affidavit at 4, Staff Brief at 14; D(4), E (*no* information provided).

¹² See, e.g., A(1)(d), A(1)(h), A(1)(m), A(1)(p), A(10)(e), A(12)(a), A(12)(b), A(12)(c) - Harrison; A(7)(a), A(10)(e) - Crossman; A(2)(f) - Thatcher.

¹³ Though our criticism here is directed mostly to the affidavits of the technical staff, legal counsel — the voice through whom the staff expresses its position — must bear a large responsibility for the form and quality of these submissions.

¹⁴ To be sure, other portions of the staff's submission — namely the Shewmaker Affidavit — contain understandable and, in the abstract, useful information. But such instances mostly involve charges that are without merit on their face and are adequately refuted by LP&L's response. It is in those areas where the staff's expertise and judgment are essential to our ruling on the motion to reopen that the staff's filing is most deficient. See p. 482, *supra*.

II.

With almost all of the staff's submission stricken, there is a large void in many areas. The void can be filled to a substantial degree, however, by Supplement 9 to the Safety Evaluation Report (SSER-9). That document contains the staff's conclusions on 23 safety issues raised by a staff letter to LP&L on June 13, 1984 (the "Eisenhut Letter"). Each of those 23 issues concerns an aspect of LP&L's construction QA program and many overlap with numerous charges in Joint Intervenors' motion. The staff served SSER-9 on the parties and us on January 14, 1985, via Board Notification No. 85-006 — subsequent to the staff's reply to Joint Intervenors' motion to reopen. Thus, SSER-9 has been available to all the participants here for some two months, and, indeed, Joint Intervenors have moved for leave to reply to it. See p. 488, *infra*. The only impediment to our adopting SSER-9 as the staff's official response to Joint Intervenors' motion is the absence of any staff affidavit attesting to the validity of the factual matter contained there. We therefore request the staff to provide us with such affidavit(s).

But even with the incorporation of SSER-9 into the record for the purpose of deciding the instant motion to reopen, significant gaps remain — most notably with respect to Joint Intervenors' broad assertion of a serious, systematic breakdown in LP&L's construction quality assurance program. See pp. 486-87, *infra*. Issue 23 in SSER-9 ("SSER-9/Issue 23") is directed to this matter:

The results of the NRC task force effort indicate that an overall breakdown of the QA program occurred. Most problems identified by the NRC had been previously identified by the QA programs of LP&L, EBASCO [LP&L's architect-engineer] and Mercury [the instrumentation subcontractor]. But the failure to determine root cause and the lack of corrective action allowed the problem to persist.

SSER-9 at 84.

The genesis of SSER-9/Issue 23 is Allegation A-48, discussed in SSER-7 ("SSER-7/A-48").¹⁵ Although A-48 initially refers to a breakdown in the QA program between Ebasco and Mercury Construction Company, the staff's assessment of that allegation contains the following sweeping indictment of LP&L's QA program:

- (1) LP&L did not thoroughly evaluate, determine the root cause, and take effective corrective action to preclude recurrence of the identified problems; and
- (2) LP&L

¹⁵ The nearly 350 "allegations" dealt with in SSER-7 are to be distinguished from the specific allegations in Joint Intervenors' motion to reopen, which we term "charges" in order to avoid confusion.

did not take action to implement the recommendations of its consultants and the NRC to increase its manpower and involvement with the Waterford 3 Project. LP&L's failure to effectively implement their QA Program has potential safety significance and the inadequate management controls which led to this QA breakdown, [have] generic implications on the question of management's ability to safely operate the Waterford 3 facility. Other NRC Task [F]orce findings identified in this SSER are further indications of the QA program breakdown between EBASCO and Mercury and are indicative of a breakdown of the LP&L QA program.

SSER-7 at 100. In Issue 23 of the Eisenhut Letter, the staff requested LP&L to address this situation. LP&L has done so in three separate submissions, dated September 28, October 31, and November 21, 1984. See SSER-9 at 84.¹⁶ Despite all the deficiencies in LP&L's QA program discussed in SSER-7/A-48, the staff addresses them in less than one page and concludes that LP&L's corrective action was "comprehensive" and its revised QA program is "sound." SSER-9 at 85. That may well be the case, but SSER-9 utterly fails to provide the elaboration necessary to justify such a favorable assessment just months after the damning language of SSER-7/A-48.

This informational void is all the more significant because the staff relied on SSER-7/A-48 no fewer than 27 times in attempting to respond to Joint Intervenors' charges in their motion to reopen. As we have seen, A-48 concludes that the breakdown in LP&L's QA program "has potential safety significance" — a conclusion squarely at odds with the staff's overall position on the motion to reopen. SSER-7 at 100. And little reliance can be placed on the subsequent favorable staff conclusion on this subject in SSER-9/Issue 23 because that conclusion is not adequately explained.

It is therefore essential that the staff clarify and explain its current position on SSER-7/A-48 and SSER-9/Issue 23. In preparing its comments, the staff should bear in mind the following concerns:

- Why is the QA breakdown described in SSER-7/A-48 not so "pervasive . . . as to . . . raise legitimate doubt as to the plant's capability of being operated safely?" See *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-756, 18 NRC 1340, 1354-55 (1983).
- In view of the apparently serious QA deficiencies identified, what is the basis for the staff's conclusion (SSER-9 at 85) that "the As-Built plant was adequately designed, constructed, inspected, and tested and can be operated without undue risk to the public health and safety"?

¹⁶ The September 28 LP&L comments have been filed with us as LP&L Exh. 5 in reply to Joint Intervenors' motion to reopen. The other two documents have not been provided.

- In view of the apparently inadequate implementation of LP&L's QA program during the course of construction, what is the basis for the staff's conclusion (*ibid.*) that LP&L's corrective actions and the modifications to its QA program, "together with proper management attention and oversight, and attention to detail, provide reasonable assurance that LP&L can safely operate and properly manage" Waterford?

The staff should also focus particular attention on Joint Intervenors' charges A(1)(b), A(1)(h), A(1)(p), A(10)(e), A(12)(a), A(12)(b), A(12)(c), B(4), and B(5).¹⁷ LP&L, if it chooses, may supplement its existing response on these matters. Joint Intervenors as well are provided an opportunity to respond, but must limit their comments to the arguments made by the staff and LP&L.

III.

On January 25, 1985, Joint Intervenors moved for leave to reply to the staff's and applicant's responses to the motion to reopen. The ostensible purpose of the reply is to correct "misstatements and misleading statements" by LP&L and the staff. Joint Intervenors' Motion for Leave to File Reply (Jan. 25, 1985) at 1. We grant the motion in part.

Joint Intervenors first argue that the staff's brief should be rejected because portions of it are virtually identical to that of LP&L. In their view, this shows the staff's lack of independent thought. Joint Intervenors also claim that there are misstatements in certain of the staff's affidavits. Our *sua sponte* decision to strike all but a small part of the staff's total filing, for the reasons discussed at pp. 482-84, *supra*, moots the Joint Intervenors' request in this regard.

Joint Intervenors imply that it is necessary to correct misleading statements by LP&L in the latter's reply to the motion to reopen. Joint Intervenors, however, actually seek to correct certain shortcomings, identified by LP&L, in the supporting documentation for their motion to reopen. To this end, they tender four more exhibits, each of which is of dubious value and was available well before they filed their motion to reopen. Joint Intervenors have provided no good cause for permitting this belated attempt to rehabilitate their motion.¹⁸ Moreover, as we said in our Order of March 14, 1985, *supra* note 1, at 6, "[w]e are capable of reading legal argument, examining exhibits, and deciding the matters

¹⁷ The staff's reply in each of these instances was essentially "A-48."

¹⁸ Joint Intervenors' motion for leave to reply to LP&L is itself untimely as well: LP&L's response was filed almost two months before Joint Intervenors sought permission to reply to it.

before us without the extended volleying of the parties.” Accordingly, Joint Intervenors’ motion for leave to reply to LP&L is denied.

A large part of Joint Intervenors’ tendered reply consists of new argument, critical of the staff’s conclusions on certain allegations addressed in SSER-7. Our striking of most of the staff’s reply, which relied heavily on SSER-7, renders Joint Intervenors’ argument on this point largely academic. In addition, SSER-7 was issued almost a full month before Joint Intervenors’ November 8 motion to reopen. *See* Board Notification No. 84-170 (Oct. 12, 1984). Hence, any criticism specifically directed to SSER-7 should have been encompassed in Joint Intervenors’ motion to reopen. As in the case of their unsuccessful attempt to rehabilitate a part of their motion to reopen in the guise of a reply to LP&L, it is too late now for Joint Intervenors to supplement, in effect, their motion with argument on SSER-7. Joint Intervenors’ motion for leave to reply, insofar as it concerns SSER-7, is therefore denied.

Finally, another segment of Joint Intervenors’ reply addresses three issues in SSER-9 (Issues 1, 6, and 22). Unlike SSER-7, SSER-9 was not issued until after both Joint Intervenors’ motion to reopen and the staff’s reply were filed. *See* Board Notification No. 85-006 (Jan. 14, 1985), *supra*. The SSER-9 issues discussed in Joint Intervenors’ tendered argument relate to charges in the motion to reopen. Moreover, we have indicated our intent to treat SSER-9 as though it were the staff’s reply to that motion. *See* p. 485, *supra*. In these circumstances, we grant that part of Joint Intervenors’ motion for leave to reply that includes argument on SSER-9. The comments of LP&L and the staff, filed in response to Joint Intervenors’ January 25 motion, will also be considered insofar as they concern SSER-9.¹⁹

IV.

Several of the charges in Joint Intervenors’ motion to reopen appear to concern matters that are before the NRC’s Office of Investigations (OI).²⁰ The response to these charges provided by the staff and LP&L is minimal. This is understandable, given that LP&L is not in a position to know what OI might be investigating, and the staff, if it knows, might be precluded from disclosing information about such ongoing investigations.

¹⁹ We note that the staff’s comments in this regard are substantially better and more understandable than its original reply to the motion to reopen.

²⁰ *See, e.g.*, A(1)(g), B(1).

In our Order of December 19, 1984 (unpublished), we noted the possible overlap of matters being investigated by OI and raised in Joint Intervenors' motions to reopen. Invoking the Commission's policy for handling conflicts between the need to protect investigative material from premature public disclosure, and the need for disclosure of information potentially relevant and material to a pending adjudication, we sought information from OI — in writing and on an ex parte, in camera, basis — that bears on the motions pending before us. See 49 Fed. Reg. 36,032 (1984). OI responded to our request on January 15, 1985. Much of the information provided was sketchy because many of the 12 investigations in question were still under way. By a separate order issued today, also on an ex parte, in camera, basis (as contemplated by the Commission's policy), we request additional and updated information from OI concerning the issues before us.

1. The NRC staff's December 21, 1984, reply (including the affidavits) to Joint Intervenors' motion to reopen is *stricken*, except to the extent noted in this opinion.

2. The staff's affidavit(s) attesting to the validity of the statements of fact in SSER-9, and its clarification and explanation of its current position on SSER-7/A-48 and SSER-9/Issue 23 shall be filed by *April 10, 1985*. LP&L also may file supplementary comments on this matter by the same date. Joint Intervenors may submit comments in reply to these staff and LP&L filings by *April 22, 1985*. All such filings shall be *delivered* to us and the parties by *close of business (5:00 p.m.)* on the dates specified.

3. Joint Intervenors' January 25, 1985, "Motion for Leave to File Reply to Applicant and NRC Staff's Responses to Joint Intervenors' Motion to Reopen" is *granted insofar as it concerns SSER-9* and is otherwise denied.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Dr. W. Reed Johnson
Gary J. Edles

In the Matter of

Docket Nos. 50-440-OL
50-441-OL

**CLEVELAND ELECTRIC ILLUMINATING
COMPANY, et al.**
**(Perry Nuclear Power Plant,
Units 1 and 2)**

March 26, 1985

The Appeal Board in this operating license proceeding denies intervenor's request to reopen the record to receive further evidence on the issue of quality assurance, and affirms the Licensing Board's partial initial decision (LBP-83-77, 18 NRC 1365 (1983)), which found applicants' quality assurance program for the Perry Plant adequate.

RULES OF PRACTICE: REPRESENTATION

Neither the Administrative Procedure Act nor the Commission's Rules of Practice require an adjudicatory tribunal to ensure that a party appearing before it is represented by counsel. Rather, it is the responsibility of the party itself not merely to decide whether it wishes to be represented by counsel but, in addition, to take the necessary measures to implement its decision. *See generally Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-772, 19 NRC 1193, 1246-47 (1984), rev'd in part on other grounds, CLI-85-2, 21 NRC 282 (1985).*

LICENSING BOARD: DISCRETION IN MANAGING PROCEEDINGS

There is not a bright line separating proper and excessive involvement on the part of the tribunal hearing the evidence. A trial judge must have great latitude in that regard, especially where certain of the parties are represented by lay persons and the judge concludes that they are in need of assistance.

RULES OF PRACTICE: SUBPOENAS (STAFF WITNESSES)

More than a mere disagreement among staff members is necessary to compel testimony by staff witnesses not otherwise scheduled to testify. *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), ALAB-715, 17 NRC 102 (1983).

RULES OF PRACTICE: HEARSAY EVIDENCE

The Commission's Rules of Practice do not prohibit the admission of hearsay evidence. *Duke Power Co.* (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-669, 15 NRC 453, 477 (1982); *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 NRC 397, 411-12 (1976).

QUALITY ASSURANCE: DEFICIENCIES (RESOLUTION)

The requirement in 10 C.F.R. Part 50, Appendix B, Criterion XVI, that quality assurance deficiencies be identified and corrected promptly does not mean that they must all be corrected as quickly as humanly possible.

QUALITY ASSURANCE: DEFICIENCIES (RESOLUTION)

Although ultimately all deficiencies of potential safety significance must be corrected, it is not necessary to rectify all of them at once. How rapidly a particular deficiency need be cured will depend upon such factors as its nature and significance, the stage of plant construction, and whether the deficiency might shortly be covered up by further construction work.

APPEARANCES

Terry Jonathan Lodge, Toledo, Ohio, for intervenor Sunflower Alliance.

Jay E. Silberg and **Harry H. Glasspiegel**, Washington, D.C., for applicants, The Cleveland Electric Illuminating Company, *et al.*

Colleen P. Woodhead for the Nuclear Regulatory Commission staff.

DECISION

Before us is the appeal of intervenor Sunflower Alliance (Sunflower) from the Licensing Board's disposition of one of the matters in controversy in this operating license proceeding — Sunflower's contention challenging the adequacy of the applicants' quality assurance program for the Perry plant.¹ Through a series of rulings that culminated in a partial initial decision, the Licensing Board found the program adequate "to continue to prevent unsafe conditions at the plant."² Claiming that the Board committed numerous errors, Sunflower asks us to overturn that result and to reopen the record for the taking of additional evidence on the quality assurance issue.³ The applicants and the NRC staff oppose that relief. For the reasons hereafter discussed, we deny Sunflower's request for a further hearing and affirm the partial initial decision.⁴

I.

Under Commission regulations, a utility building a nuclear power plant is required to have an effective quality assurance program to the end that the plant is constructed properly.⁵ Among other things, the program must provide for control over activities affecting the quality of "structures, systems, and components, to an extent consistent with

¹ As used in this opinion, the term "quality assurance" (QA) includes "quality control." See 10 C.F.R. Part 50, Appendix B, Introduction.

² LBP-83-77, 18 NRC 1365, 1396 (1983).

³ Sunflower Alliance's Brief in Support of Exceptions to "Partial Initial Decision" (March 20, 1984) (hereafter Sunflower's Brief) at 14-15.

⁴ In doing so, as will be seen, we reject Sunflower's attack upon certain interlocutory rulings that preceded the partial initial decision.

⁵ 10 C.F.R. Part 50, Appendix B.

their importance to safety.”⁶ The program must also include provisions requiring that the applicant regularly review its status and adequacy.⁷ The regulations further mandate that the program establish measures to assure that conditions “adverse to quality” are promptly identified and corrected.⁸

Prior to the hearing below, Sunflower raised the issue (among others not relevant here) of the adequacy of the applicants’ quality assurance program. Following a prehearing conference, the Licensing Board cast Sunflower’s quality assurance contention in the following terms and admitted it for trial:

ISSUE #3. Applicant has an inadequate quality assurance program that has caused or is continuing to cause unsafe construction.⁹

The applicants questioned the Board’s ruling on the ground that the contention represented a baseless and unfocused attack on the entire Perry quality assurance program.¹⁰ The Board responded by limiting the scope of this issue “to the quality assurance implications” arising from a February 1978 “stop work order issued to [the applicants] and the steps taken by [the applicants] to remedy deficiencies leading up to the stop work order.”¹¹

Some four months later, Sunflower moved to broaden the scope of the issue because “quality assurance deficiencies and resultant unsafe construction” assertedly were continuing to occur at the Perry site.¹² The Licensing Board denied the motion as not “ripe.” It declared that Sunflower might uncover other possible quality assurance deficiencies during discovery. For this reason, the Board thought it “preferable” to defer any consideration of the enlargement of the contention until it could become “more fully informed of the available evidence.”¹³ In this regard, the Board stressed that the discovery the intervenor was already authorized to conduct should be “broadly interpreted in the interest of

⁶ *Id.* § II.

⁷ *Ibid.*

⁸ *Id.* § XVI.

⁹ LBP-81-24, 14 NRC 175, 210 (1981).

¹⁰ Applicants’ Requests for Clarification of, and Objections to, Special Prehearing Conference Memorandum and Order (Aug. 7, 1981) at 13-14.

¹¹ LBP-81-35, 14 NRC 682, 687 (1981). The February 1978 stop work order was issued by the Director of NRC’s Region III. It followed the applicants’ decision to cease certain construction work until specified deficiencies were corrected. See LBP-82-114, 16 NRC 1909, 1913 (1982).

¹² Intervenor Sunflower Alliance *et al.* Motion to Expand Quality Assurance Contention (Jan. 8, 1982) at 1.

¹³ LBP-82-15, 15 NRC 555, 564 (1982).

full disclosure” and that the intervenor could add to its contention later, if necessary, or could even file a new one.¹⁴

On October 29, 1982, the staff moved for summary disposition of the quality assurance issue against Sunflower, asserting that there was no genuine issue of material fact respecting that issue. The Licensing Board granted the motion in large measure. It nonetheless concluded that certain “management deficiencies” remained in question, which left four “issues of fact” for trial:¹⁵

The existence, cause, severity, duration and extent of an alleged instance in which applicant’s quality assurance program failed by not properly controlling its electrical contractors.

Whether the alleged deficiencies in properly controlling electrical contractors extend to the proper control of other contractors.

Whether deficiencies in the control of contractor activities have resulted in unsafe conditions at Perry.

Whether applicant has an adequate system for periodically reviewing its program for assuring the quality of contractor performance and ascertaining and correcting deficiencies that have arisen, particularly in systems essential to safe plant operation.

Subsequently, the applicants moved for reconsideration of this conclusion.¹⁶ The motion rested on the claim that Sunflower’s assertions respecting construction deficiencies related to only one of the project contractors: L.K. Comstock, which was responsible for the electrical work. According to the applicants, the identified deficiencies did not establish a significant breakdown in Comstock’s quality assurance program or in the performance of the applicants’ own responsibilities with regard to the review of their contractors’ work. Hence, as applicants saw it, there were no issues warranting evidentiary exploration and the staff’s motion should have been granted in its entirety.¹⁷

The Licensing Board rejected this thesis.¹⁸ In doing so, it explained that its specification of the four factual issues for hearing did not mean that the “quality assurance of all contractors’ performances is as yet at issue.”¹⁹ Rather, in the Board’s view, the adequacy of the applicants’ review program for overseeing the quality assurance performance of

¹⁴ *Ibid.*

¹⁵ LBP-82-114, *supra*, 16 NRC at 1917.

¹⁶ Applicants’ Motion for Reconsideration of the Licensing Board’s December 22, 1982 Memorandum and Order on Summary Disposition of Issue No. 3 (Jan. 6, 1983).

¹⁷ *Id.* at 13-14.

¹⁸ LBP-83-3, 17 NRC 59 (1983).

¹⁹ *Id.* at 64.

²⁰ *Id.* at 64-65.

their contractors was in question.²⁰ The Board went on to limit consideration of the four issues “[i]n the first instance” to the review program’s effectiveness *vis-a-vis* the work of Comstock.²¹ In this connection, it disclaimed any interest in evidence respecting “individual instances of non-conformances.”²² Those issues, according to the Board, “will be of concern to us only if [it were to find] that management’s role in QA has been sufficiently suspect to require that [it] descend to that further level of detail.”²³

About two months after the hearing on the four quality assurance “issues of fact,” as thus refined, intervenor Ohio Citizens for Responsible Energy (OCRE) moved to reopen the record. OCRE referred to quality assurance deficiencies assertedly substantiated by documents it had recently received from the NRC under the Freedom of Information Act. The Licensing Board denied the motion as untimely but found two matters of sufficient potential safety significance to call for additional consideration. The Board ordered the record reopened “for the limited purpose of receiving written evidence from the parties” on certain questions posed by the Board on the matters OCRE had raised.²⁴ After receiving the requested information, the Board concluded that the deficiencies cited by OCRE were not safety-significant and thus warranted no further inquiry.²⁵

Meanwhile, following the submission of proposed findings of fact and conclusions of law by the parties, the Licensing Board opted to rule on three procedural matters raised in Sunflower’s proposed findings before deciding the ultimate substantive quality assurance issues ventilated at the May hearing. These matters involved claims of prejudice to the intervenors because of (1) the withdrawal of Sunflower’s lead counsel on the eve of the hearing; (2) the Board’s assertedly unduly active role during the intervenors’ cross-examination of applicants’ and staff’s expert witnesses; and (3) the Board’s refusal to require the staff to reveal the identity of an NRC inspector who purportedly disagreed with the views expressed in the staff’s testimony. Upon considering these matters in detail, the Licensing Board rejected each of the claims.²⁶

The Licensing Board subsequently issued its partial initial decision on the aspects of Sunflower’s quality assurance contention not covered by

²¹ *Id.* at 65.

²² *Ibid.*

²³ *Ibid.*

²⁴ LBP-83-52, 18 NRC 256, 258, 263-64 (1983).

²⁵ LBP-83-74, 18 NRC 1241, 1252-53 (1983).

²⁶ Memorandum and Order (Procedural Objections and Staff Witness Question) (Aug. 30, 1983) (unpublished).

the Board's earlier summary disposition ruling. It found the applicants' "overview and control of Comstock's activities at Perry" adequate, and that the applicants' quality assurance program "has prevented, and will continue to prevent, unsafe conditions at the plant." The Board concluded by declaring that no serious safety issue was present that required it "to undertake further inquiry into the applicant's QA control of Comstock or other safety-related contractors at Perry."²⁷

This appeal by Sunflower followed.²⁸

II.

Sunflower seeks both a reversal of the partial initial decision and a reopening of the record to receive evidence concerning the applicants' "oversight of *all* safety related contractors at Perry."²⁹ In support of its claim of entitlement to this relief, it argues in essence that the Licensing Board: (1) conducted the hearing in an unfair manner; (2) unduly limited the scope of the hearing; (3) incorrectly interpreted certain regulatory requirements; and (4) erroneously concluded that the applicants' oversight of their electrical contractor was adequate. We discuss these claims *seriatim*.³⁰

A. 1. Sunflower's charge of Licensing Board unfairness stems in large part from developments in the wake of the last-minute resignation of its lead counsel. Prior to the commencement of the evidentiary hearing on the quality assurance issue, Sunflower Alliance's lead counsel

²⁷ LBP-83-77, *supra*, 18 NRC at 1396. Just a few days before the Licensing Board issued its decision, OCRE moved for an investigation of allegations of the improper firing of two Perry QA inspectors (later amended to include a third QA inspector). The Licensing Board denied the motion as a request for an investigation that is more properly an NRC staff function, and for failure to demonstrate the existence of a "significant safety issue" or a "breakdown of the quality assurance program." LBP-84-3, 19 NRC 282, 286 (1984).

²⁸ Although OCRE actively supported Sunflower at the hearing below on the quality assurance issue, it seemingly has not joined Sunflower's appeal.

²⁹ Sunflower's Brief at 14-15.

³⁰ The Commission's Rules of Practice provide that "[a]n appellant's brief must clearly identify the errors of fact or law that are the subject of the appeal. For each issue appealed, the precise portion of the record relied upon in support of the assertion of error must also be provided." 10 C.F.R. 2.762(d)(1).

Although 12 in number, only seven of Sunflower's enumerated assertions warrant our consideration. As to the remaining five (numbered 4, 9, 10, 11 and 12), Sunflower has either failed to supply any record references or has provided only general references such as "to the evidence in the record" or to its "proposed findings." In addition, with respect to each, Sunflower has failed to provide any explanation why its claim of error is correct. For example, as to one of the assertions, it merely invites us "to weigh the evidence in the record, and as a result to require the QA/QC record be reopened." The explanation on the other four assertions is no more informative. In the circumstances, we treat them as waived or abandoned. See 10 C.F.R. 2.762(g); *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-270, 1 NRC 473, 475 (1975).

³¹ Another attorney, Terry Jonathan Lodge, had also entered an appearance on behalf of Sunflower and on occasion had represented its interests. Tr. 1710.

was Daniel D. Wilt.³¹ On the eve of the hearing, however, Mr. Wilt withdrew his representation of Sunflower, citing “irreconcilable differences and professional responsibility.”³² Upon being so advised, the Licensing Board informally discussed with two of Sunflower’s representatives, Amy Hubbard and Jay Abramson, the implications of the withdrawal respecting the hearing scheduled to begin the following morning.³³ Recognizing that Sunflower would be without counsel at the hearing,³⁴ the Board offered “limited assistance” to Sunflower’s representatives with the further offer of additional assistance later if “they identified concerns that they wanted followed up at the hearing.”³⁵

Sunflower did not request a postponement of the hearing and, as scheduled, it began the next morning with the testimony of the applicants’ witnesses. Initially, Sunflower was slated to start the cross-examination of those witnesses. When Mr. Wilt withdrew, however, OCRE agreed at Sunflower’s request to conduct its cross-examination first in order to give Ms. Hubbard and Mr. Abramson additional preparation time. This agreement led Ms. Hubbard to acknowledge that Sunflower “would be able to present half-decent cross-examination.”³⁶

On the second day of the hearing, Ms. Hubbard and Mr. Abramson began their cross-examination of applicants’ witnesses.³⁷ Two days later, Sunflower’s remaining counsel, Mr. Lodge, appeared on its behalf and participated in the cross-examination of the staff’s witnesses as well as in other aspects of the proceeding.³⁸

Notwithstanding the absence of any request for a postponement of the hearing to accommodate the last-minute withdrawal of Mr. Wilt, Sunflower maintained in its proposed findings of fact that that withdrawal required a reopening of the record.³⁹ The Licensing Board rejected this claim on the ground that Sunflower had not demonstrated that it had suffered prejudice.⁴⁰

Before us, Sunflower complains that it was “deprived of a fair hearing by the withdrawal of its lead counsel on the eve of the hearing.”⁴¹ As we

³² Tr. 1000.

³³ *Ibid.* Also participating in the discussion was a representative of OCRE, Susan Hiatt.

³⁴ Its other counsel (*see* note 31, *supra*) apparently was not immediately available to replace Mr. Wilt.

³⁵ Tr. 1001.

³⁶ Tr. 1002-03. Sunflower did not plan to put on an affirmative case but was to rely on cross-examination for its case.

³⁷ Tr. 1230, 1282-1325, 1326-1435.

³⁸ Tr. 1710-30, 1760, 1800, 1808-09, 1813-14, 1820-35, 1844, 1852-53, 1855-77.

³⁹ Sunflower Alliance’s Proposed Findings of Fact and Conclusions of Law (July 15, 1983) at 14-15.

⁴⁰ Memorandum and Order (Aug. 30, 1983), *supra*, at 2, 15, 17-18.

⁴¹ Sunflower’s Brief at 4.

understand its thesis, Sunflower believes that it is unimportant that the Licensing Board was not asked by it to postpone the hearing. For, according to Sunflower, the Board nonetheless was required to order such a postponement on its own motion. This is said to be so because both the Administrative Procedure Act (APA)⁴² and the Commission's Rules of Practice⁴³ entitled Sunflower to be represented by counsel at the hearing. In this connection, we are told that there was no need for conducting the hearing expeditiously and are referred to an asserted Commission policy of being "solicitous of intervenors' foreseeable needs for additional time for case preparation" in recognition of the disparity between their resources and those of the staff and applicants.⁴⁴

The difficulty with this line of argument is that it rests on a faulty premise. Indisputably, Sunflower had an entitlement under both statute and Commission regulation to be represented by counsel. See notes 42 and 43, *supra*. But even given that entitlement, it scarcely follows that the Licensing Board was obliged to order a postponement *sua sponte*.

Contrary to Sunflower's apparent view, neither the APA nor the Commission's Rules of Practice require an adjudicatory tribunal to ensure that a party appearing before it is represented by counsel. Rather, it is the responsibility of the party itself not merely to decide whether it wishes to be represented by counsel but, in addition, to take the necessary measures to implement its decision.⁴⁵ In the context of the present case, this meant that, if Sunflower wished to be represented by counsel at the inception of the hearing and required time to arrange for the appearance of Mr. Lodge or some other lawyer in Mr. Wilt's stead, it had the affirmative duty to request a postponement. Far from doing so, Sunflower led the Licensing Board to believe that it was prepared to go forward without counsel. In the circumstances, it has no ground now for complaint.

2. The second prong of Sunflower's unfairness argument fares no better. At the hearing, the Licensing Board took an active role in the intervenors' cross-examination of the various witnesses. As the Board explained, this "was principally designed to assist intervenors . . . in their

⁴² 5 U.S.C. 555(b) provides in relevant part that "[a] party is entitled to appear in person or by or with counsel or other duly qualified representative in an agency proceeding."

⁴³ 10 C.F.R. 2.713(b) provides in relevant part that "[a] partnership, corporation or unincorporated association may be represented by a duly authorized member or officer, or by an attorney-at-law."

⁴⁴ Sunflower's Brief at 4. Compare *Statement of Policy on Conduct of Licensing Proceedings*, CLI-81-8, 13 NRC 452, 454 (1981).

⁴⁵ See generally *Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1)*, ALAB-772, 19 NRC 1193, 1246-47 (1984), *rev'd in part on other grounds*, CLI-85-2, 21 NRC 282 (1985).

⁴⁶ Memorandum and Order (Aug. 30, 1983), *supra*, at 3.

technical framing of questions and pursuit of lines of cross-examination.”⁴⁶ According to the Board, it was motivated by the need to compensate for Sunflower’s loss of its lead counsel just before the start of the hearing and to assure a complete record.⁴⁷

On appeal, Sunflower complains that it was prejudiced by the “excessive activism” of the Board.⁴⁸ It maintains that the Board’s conduct brought about substantive changes in the content of the record.⁴⁹ It does not explicate, however, the respects in which the record was changed or how its interests are adversely affected by the present state of the record.

Sunflower advanced this same claim, in almost identical terms, before the Licensing Board at the close of the hearing below.⁵⁰ In its August 30 memorandum and order, the Licensing Board examined it in detail (together with Sunflower’s other claims of unfair treatment) and found it unsupported by the cited instances of Board involvement in the hearing.⁵¹

We need not decide whether, as one of the other members of the Licensing Board opined,⁵² the Board Chairman’s participation in Sunflower’s cross-examination of witnesses might have been excessive on occasion. Be that as it may, absent a clear demonstration of prejudice (and none is even attempted by Sunflower), no possible basis exists for upsetting the substantive determinations reached in the partial initial decision on reopening the record.⁵³ Moreover, it must be borne in mind that there is not a bright line separating proper and excessive involvement on the part of the tribunal hearing the evidence — indeed, a trial judge performe must have great latitude in that regard.⁵⁴ This is especially true where, as here, certain of the parties are represented by lay persons and the judge concludes that they are in need of assistance.⁵⁵

3. We turn now to Sunflower’s final claim of Licensing Board unfairness. At the hearing, the staff presented a panel of four witnesses who testified on the construction and quality assurance program activities at the Perry site. These witnesses had participated in the inspection of

⁴⁷ *Ibid.*

⁴⁸ Sunflower’s Brief at 2-4.

⁴⁹ *Id.* at 4.

⁵⁰ Sunflower Alliance’s Proposed Findings at 16-17.

⁵¹ Memorandum and Order (Aug. 30, 1983), *supra*, at 2-14.

⁵² *Id.*, separate views of Judge Kline.

⁵³ In this connection, Judge Kline explicitly stated his view that Sunflower was not harmed by what he regarded to be an unduly active involvement on the Board Chairman’s part. *Id.*, separate views of Judge Kline, at 3.

⁵⁴ Compare *Three Mile Island*, *supra*, 19 NRC at 1247-48.

⁵⁵ It is revealing that, although now complaining of the Board Chairman’s activism, Sunflower did not register an objection during the course of the hearing itself to many of the actions it now cites in support of that complaint.

these activities while employed in the Commission's regional office that has territorial jurisdiction over the Perry facility (Region III).⁵⁶ On the first day of the hearing, in response to the Licensing Board Chairman's inquiry whether there were individuals on the staff who disagreed with the content of the prepared testimony of these witnesses, counsel for the staff submitted to the Board and the parties copies of a May 18, 1983 memorandum from the Region III Administrator to the NRC Executive Legal Director.⁵⁷ Among other things, the memorandum indicated that a staff electrical inspector and a staff investigator, both of whom had conducted an inspection of Comstock's work, did not agree fully with the testimony.⁵⁸

There was a dispute among the parties to the hearing as to whether the memorandum reflected a disagreement on the part of the two staff members with the substance of the testimony or, instead, just with its "tone."⁵⁹ Because the representatives of both OCRE and Sunflower believed that the differences were substantive in nature, they requested the identification of the electrical inspector and his appearance for cross-examination.⁶⁰ The Licensing Board deferred ruling on the request until the conclusion of the staff's testimony.⁶¹ The hearing ended without the inspector's appearance. His views, however, were discussed by the staff witnesses.

Following the close of the hearing, Sunflower again challenged the failure of the Board to order the appearance of the electrical inspector.⁶² Additionally, it disputed on hearsay grounds the Board's admission of the testimony of the staff witnesses describing the inspector's views.

The Licensing Board rejected both of these protests.⁶³ As the Board explained, it had admitted the challenged testimony for the limited purpose of shedding possible light upon whether the inspector might have direct personal knowledge of a material fact not known to the panel of witnesses.⁶⁴ The Board further observed that it was required to make that inquiry by 10 C.F.R. 2.720(h)(2)(i), which in essence precludes an

⁵⁶ Fol. Tr. 1567 (Konklin, *et al.*).

⁵⁷ Tr. 1011-14. Although made available to all of the parties and discussed at length, the memorandum was not formally introduced into evidence. Tr. 1872.

⁵⁸ Tr. 1011-24.

⁵⁹ *Ibid.*

⁶⁰ Tr. 1013-16. Possibly for the reason that the staff investigator was satisfied with certain indicated changes in the testimony, the intervenors did not also request his appearance.

⁶¹ Tr. 1022.

⁶² Sunflower Alliance's Proposed Findings at 9-14.

⁶³ See Memorandum and Order (Aug. 30, 1983), *supra*, at 16-17.

⁶⁴ *Id.* at 16.

adjudicatory board from ordering the appearance as a witness of a specified staff member in the absence of "a showing of exceptional circumstances," such as "direct personal knowledge of a material fact not known to the witnesses made available by the Executive Director for Operations."⁶⁵

In its brief to us, Sunflower does not make even passing reference to section 2.720(h)(2)(i). More important, it does not suggest the existence of either a particular material fact that might have been uniquely in the possession of the inspector or some other exceptional circumstance requiring his appearance as a witness. Thus, under the Commission's Rules of Practice, we have been given no reason to upset the refusal of the Licensing Board to require the inspector to testify.

In our *Three Mile Island Restart* decision relied upon by Sunflower,⁶⁶ we noted that something more than a mere disagreement among staff members was necessary before we would compel testimony by staff witnesses not otherwise scheduled to testify. We perceive no special justification here for compelling the testimony of the inspector. As is clear from both the Regional Administrator's May 18, 1983 memorandum to the Executive Legal Director and the actual changes proposed in the staff's testimony, whatever differences may have existed between the inspector and the NRC witness panel were of little consequence.⁶⁷

B. As previously noted (p. 495, *supra*), prior to the commencement of the hearing on quality assurance issues the Licensing Board indicated that the examination of the applicants' oversight program would be restricted to the work of Comstock, the electrical contractor. If that examination suggested that the oversight program might not have been properly carried out, the hearing would then be broadened in scope to embrace other areas of work.

Sunflower did not complain of that determination at the time it was made. On several occasions during the course of the hearing, however, Sunflower sought to raise through cross-examination matters that the Board ruled were outside the scope of the quality assurance contention because they did not relate to the applicants' oversight of the work of

⁶⁵ *Ibid.*

⁶⁶ *Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1)*, ALAB-715, 17 NRC 102 (1983).

⁶⁷ Nor is there merit to Sunflower's complaint that the Licensing Board should not have allowed the staff witnesses to describe the views of the inspector. As the Board noted, it evaluated this testimony only for the purpose of ascertaining whether it should call the inspector as a witness pursuant to 10 C.F.R. § 2.270(h)(2)(i). Its use for that purpose was plainly permissible. Beyond that, the Commission's Rules of Practice do not prohibit the admission of hearsay evidence. *Duke Power Co. (William B. McGuire Nuclear Station, Units 1 and 2)*, ALAB-669, 15 NRC 453, 477 (1982); *Duke Power Co. (Catawba Nuclear Station, Units 1 and 2)*, ALAB-355, 4 NRC 397, 411-12 (1976).

Comstock. Before us, Sunflower challenges these rulings, insisting that it was entitled to inquire into the work of other contractors.⁶⁸

For two reasons, the challenge is insubstantial. First, not having objected to the Comstock limitation on the scope of its quality assurance contention at the time (prior to the hearing) the Licensing Board imposed that limitation, Sunflower was foreclosed from objecting to the enforcement of the limitation during the hearing. Second, the limitation was warranted. The quality assurance contention had its roots in discovered deficiencies in Comstock's work — rather than in widespread construction deficiencies involving other contractors as well.⁶⁹ This being so, the Board understandably focused its attention on Comstock before deciding whether a need existed to expand the scope of inquiry to the other contractors. And, having found Comstock's work satisfactory, it reasonably concluded that the applicants' oversight program was effective.

C. A Commission regulation requires utility quality assurance programs to contain provisions for *promptly* identifying and correcting conditions "adverse to quality."⁷⁰ At the hearing below, Sunflower insisted that this provision means that adverse conditions must be corrected "as quickly as humanly possible." This, according to Sunflower, is "the only sensible reading [of the regulation] from a dollars-and-cents perspective."⁷¹

In its partial initial decision, the Licensing Board rejected that interpretation of "promptly." As the Board saw it, "a reasonableness test" should be applied to determine what is "prompt":

If a deficiency is serious, particularly if it has immediate implications for ongoing construction, it must be remedied immediately. On the other hand, less serious deficiencies or minor deficiencies in written procedures may be resolved "promptly" in a matter of days or months.⁷²

⁶⁸ Sunflower's Brief at 13.

⁶⁹ LBP-81-35, *supra*, 14 NRC at 686-87.

⁷⁰ 10 C.F.R. Part 50, Appendix B, Criterion XVI. It reads in full:

Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management.

⁷¹ Sunflower Alliance's Proposed Findings, *supra*, at 5.

⁷² LBP-83-77, *supra*, 18 NRC at 1373.

On appeal, Sunflower continues to press its suggested interpretation of “promptly.”⁷³ We find far more persuasive, however, the Licensing Board’s view of the term as used in the regulation in question. One commonly accepted definition of “prompt” is “being ready and quick to act as the occasion demands.”⁷⁴ Employment of that definition here is both practical and sensible. As we have had prior occasion to observe, no project even remotely approaching in magnitude and complexity the erection of a nuclear power plant will enjoy error-free construction.⁷⁵ To the contrary, there undoubtedly will be a substantial number of construction deficiencies. Although, ultimately, all deficiencies of potential safety significance must be corrected, it scarcely follows that there is an imperative necessity to endeavor to rectify all of them at once (even were it possible to do so without an extraordinary expenditure of effort and money). As one of the staff witnesses observed, how rapidly a particular deficiency need be cured will depend upon such factors as its nature and significance, the stage of plant construction, and whether the deficiency might shortly be covered up by further construction work.⁷⁶ We are prepared to assume that the promulgators of the regulation were cognizant of these considerations and, accordingly, did not intend the term “promptly” to have the rigid meaning that Sunflower ascribes to it.

D. Sunflower cites a number of instances in which the applicants and Comstock assertedly made corrections or improvements in their respective quality assurance programs only after NRC investigation of their activities had taken place.⁷⁷ According to Sunflower, these instances establish a need to reopen the record to require the applicants to demonstrate that, over some unspecified period of time, they had exercised “QA supervision which has not been provoked by NRC regulatory activity.”⁷⁸ We think otherwise. The Licensing Board reviewed the history of the applicants’ oversight of Comstock.⁷⁹ It likewise considered the staff’s oversight role.⁸⁰ It did not find that corrections or improvements were made only after NRC staff involvement. The examples cited by Sunflower simply do not come close to providing sufficient support for its claim.

⁷³ Sunflower’s Brief at 10-11.

⁷⁴ Webster’s New Collegiate Dictionary 921 (1977 Ed.).

⁷⁵ *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983).

⁷⁶ Tr. 1596.

⁷⁷ Sunflower’s Brief at 11-12.

⁷⁸ *Id.* at 12.

⁷⁹ LBP-83-77, *supra*, 18 NRC at 1381-94.

⁸⁰ *See, e.g., id.* at 1389-94.

E. Finally, Sunflower insists that there is insufficient evidence to support the Licensing Board's ultimate finding that the applicants provided adequate overview and control of Comstock's activities at Perry.⁸¹ As best as we can understand it, the argument rests on two propositions: (1) the inadequacy of the applicants' oversight of Comstock is demonstrated by the fact that the NRC staff, and not the applicants, discovered the deficiencies during an investigation of the electrical work at Perry;⁸² and (2) the staff's testimony concerning the corrective actions taken by the applicants since the time of the investigation report "is not completely credible."⁸³

We disagree. To be sure, the deficiencies (nine in number) that were discussed in the investigation report had been identified by inspectors in Region III. But nonetheless, the Regional Administrator subsequently decided that both (1) a significant breakdown in Comstock's quality assurance program had *not* occurred; and (2) the applicants were taking corrective steps to upgrade that program.⁸⁴

As we noted at pp. 495-96, *supra*, in its partial initial decision the Licensing Board carefully reviewed the applicants' quality assurance program history at Perry.⁸⁵ Based upon that review, it found that the applicants' "QA program was actively overseeing Comstock's QA program for the period prior to the commencement of the NRC [s]taff's 1981-82 investigation."⁸⁶ It further found that, during that period, the applicants had identified deficiencies and required appropriate corrective action.⁸⁷

As to the more recent state of the applicants' quality assurance program, the Board concluded that the applicants had "conducted an extensive QA overview of Comstock from late 1981 through early 1983, and that applicant adequately controlled Comstock's work."⁸⁸ As observed by the Board:

Applicant conducted a steady stream of reviews, including at least 25 audits; and took significant corrective action steps during this period, including issuing 4 stop work notifications against Comstock. There is evidence demonstrating that Comstock undertook major corrective action in response to applicant's involvement, particularly in the area of QA/QC staffing, and QA/QC and craft training. We note that

⁸¹ Sunflower's Brief at 12-13.

⁸² *Id.* at 12. The investigation was conducted by NRC's Region III between October 1981 and March 1982. A report (No. 50-440/81-19 (EIS)) on the investigation was issued in September 1982.

⁸³ Sunflower's Brief at 13.

⁸⁴ Board Exh. 3 (letter from James G. Keppler to Dalwyn R. Davidson (Sept. 27, 1982)), fol. Tr. 1618, at 2.

⁸⁵ LBP-83-77, *supra*, 18 NRC at 1381-86.

⁸⁶ *Id.* at 1384.

⁸⁷ *Ibid.*

⁸⁸ *Id.* at 1385.

Comstock's QA/QC staff almost doubled in this period, and that the current ratio of craft to QA/QC is approximately 3 to 1, which indicates close Comstock QA/QC coverage of the work in progress.⁸⁹

Contrary to Sunflower's assertion, there is no indication of any significant reliance by the Board on the staff's testimony in reaching these conclusions. Rather, it based its findings almost entirely on the testimony of applicants' witnesses Murray R. Edelman and Gary R. Leidich.⁹⁰ We are satisfied that that testimony provides the requisite support for the ultimate Board determination on the quality assurance issue.⁹¹

Sunflower Alliance's request to reopen the record to receive further evidence on the question of the adequacy of the applicants' quality assurance program at Perry is *denied*, and the Licensing Board's December 2, 1983 partial initial decision is *affirmed*.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

⁸⁹ *Id.* at 1385-86.

⁹⁰ *Id.* at 1381-86. Mr. Edelman is Vice President, Nuclear Group, of The Cleveland Electric Illuminating Company. Mr. Leidich is Senior Engineer, Nuclear Construction Engineering Section, of the company.

⁹¹ In view of the substantial evidence presented by the applicants on this score, we need not address the question of the validity of Sunflower's characterization of the NRC staff testimony.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Ivan W. Smith, Chairman
Dr. Cadet H. Hand, Jr.
Gustave A. Linenberger, Jr.**

In the Matter of

**Docket No. 50-537-CP
(ASLBP No. 75-291-12-CP)**

**UNITED STATES DEPARTMENT
OF ENERGY
PROJECT MANAGEMENT CORPORATION
TENNESSEE VALLEY AUTHORITY
(Clinch River Breeder Reactor
Plant)**

March 11, 1985

The Board, imposing certain conditions on redress of the site, grants the Applicants' motion to authorize revocation of the Limited Work Authorization and to dismiss this construction permit proceeding without prejudice.

REGULATIONS: EXEMPTIONS

Section 50.10(c) of 10 C.F.R. generally prohibits an applicant from starting site or construction work before the applicant obtains a construction permit or a Limited Work Authorization. However, 10 C.F.R. § 50.12 provides for exemptions from § 50.10(c), upon a consideration and balancing of several factors, including "[w]hether redress of any adverse environment impact from conduct of the proposed activities can reasonably be effected should such redress be necessary."

CONSTRUCTION PERMITS: WITHDRAWAL OF APPLICATION

The Board, exercising its responsibility under 10 C.F.R. § 2.107(a) to consider whether terms should be prescribed for the withdrawal of an application, predicates its granting of the Applicants' motion to authorize revocation of their Limited Work Authorization and to dismiss the proceeding without prejudice upon the adequacy of the Applicants' site redress plan, and upon clarification of what the responsibilities of the Applicants and the Staff are in the event an alternate use is found for the site before redress is complete.

CONSTRUCTION SITE: MODIFICATION OF REDRESS

A condition of the Board's granting the Applicants' motion to dismiss this construction permit proceeding is that if an alternate use is found for the construction site before redress of the site is complete, the Applicants, under the Staff's review, will carry out, to the greatest extent possible consistent with the alternate use, the redress plans approved in this Order.

MEMORANDUM AND ORDER GRANTING APPLICANTS' MOTION TO DISMISS PROCEEDING

In November 1983, in the face of action the month before by Congress which made it appear very likely that the funds necessary to complete the construction of the Clinch River Breeder Reactor Plant would not be appropriated, the Applicants — the United States Department of Energy (DOE), the Project Management Corporation (PMC) and the Tennessee Valley Authority (TVA) — agreed to terminate the project. The Applicants now move the Board to authorize revocation of the Applicants' Limited Work Authorization (LWA), and to dismiss the proceeding without prejudice. Since termination of the project, there has been a search for an alternate industrial use for the project site, but no such use has been found. The Applicants therefore propose to redress the site in accord with commitments they made before they began to prepare the site for construction of the plant. Applicants' Motion dated October 19, 1984. The NRC Staff, having obtained the agreement of the Applicants to honor certain conditions regarding redress, supports the motion by a filing dated November 8, 1984. In their Response, dated October 30,

1984, the Natural Resources Defense Council (NRDC) and the Sierra Club, joint intervenors in this proceeding, do not oppose the motion. Exercising our responsibility under 10 C.F.R. § 2.107(a) to consider whether we should prescribe terms for the withdrawal of an application, we grant the Applicants' motion, after clarifying what the responsibilities of the Applicants and the Staff are in the event an alternate industrial use is found for the site before redress is complete.

THE APPLICANTS' COMMITMENTS AND OUR JURISDICTION

Nearly 15 years have passed since Congress first authorized the Clinch River Breeder Reactor Plant as a cooperative project between industry and government for the design, construction, and operation of the Nation's first demonstration-scale fast breeder reactor. A construction permit was applied for in 1974, and the next year NRDC and the Sierra Club petitioned to intervene in the mandatory hearings. In 1977 the Carter Administration decided to cancel the project, and this proceeding and the Staff's review of the application were suspended. Four years later, the Reagan Administration directed that the project be completed, and the next year, on motion from the Applicants, we lifted the suspension of this proceeding. The parties and the Board then undertook preparations for evidentiary hearings on issues which had to be decided before we could authorize the issuance of an LWA, and ultimately, a construction permit.

Section 50.10(c) of 10 C.F.R. prohibits the commencement of certain site or construction work before an applicant obtains a construction permit or an LWA, but 10 C.F.R. § 50.12 provides for exemptions from § 50.10(c), upon a consideration and balancing of several factors, including "[w]hether redress of any adverse environment impact from conduct of the proposed activities can reasonably be effected should such redress be necessary." 10 C.F.R. 50.12(b)(2). On motion from the Applicants, the Commission granted the Applicants an exemption from § 50.10 permitting the conduct of nonsafety-related site preparation activities. CLI-82-23, 16 NRC 412 (1982). The Commission's decision rested in part on record evidence that, although "perfect restoration of the topography could not be achieved," substantial redress could be, and that the Applicants had committed to whatever redress was both achievable and necessary. *Id.* at 427-28.

In 1983 this Board, after evidentiary hearings, authorized the issuance of an LWA. LBP-83-8, 17 NRC 158 (1983). Then, after the completion

of hearings on construction permit issues, while we were writing the initial decision on those issues, the Senate voted to table its Appropriations Committee amendment containing a multi-year appropriation for the project.¹ On motion from the Intervenor, the Appeal Board terminated its own proceedings on LWA issues, and vacated our authorization of the issuance of the LWA. ALAB-755, 18 NRC 1337 (1983). However, the Appeal Board denied the Intervenor's motion to authorize the Director of Nuclear Reactor Regulation to revoke the LWA. The Appeal Board argued that the issue of revocation was better left to this Board, which still retained jurisdiction over the application for a construction permit, to determine whether conditions should be imposed to ameliorate the environmental impacts of site preparation. *Id.* at 1339.

THE REDRESS PLAN

The Applicants have agreed to redress the site in accord with a plan identified in the Final Site Redress Plan (Applicants' Motion, Attachment 1) as Alternative 2. The objective of that Alternative is a self-maintaining, environmentally stable, and aesthetically acceptable site suitable for industrial use, for which the site has long been zoned. Applicants' Motion at 12. To achieve that objective, Alternative 2 requires, among other things, that excavations be filled in at least to elevations high enough to allow the site to gravity-drain to the Clinch River, that areas outside the presently cleared area be left undisturbed, that the surface be stabilized to prevent erosion, and that certain buildings be removed from the site. *Id.* at 12-13. Environmental control of the site since termination of the project has been carried out in accordance with a complex regulatory scheme involving the Applicants and several other State and Federal agencies. *Id.* §§ 3.2-3.3 and Appendix B. The same scheme will be adhered to while the site is being redressed. *Id.*

By letter dated June 6, 1984, the Staff conditioned its acceptance of Alternative 2 on the Applicants' agreeing to certain requirements concerning, principally, reports to the Staff and facilitation of the regrowth of vegetation. Applicants' Motion, Attachment E. The Applicants have agreed to conform to these requirements. Applicants' Motion at 3.

In August 1984, DOE and TVA entered into a Supplemental Agreement in which DOE agrees to redress the site in accordance with Alter-

¹ We nonetheless issued a Memorandum of Findings to memorialize our assessment of the issues as reflected in the extensive record before us, to which impressive amounts of resources had been devoted by all parties over some 8 years. The history of the project is more fully recounted and documented in that Memorandum. See LBP-84-4, 19 NRC 288, 291-98 (1984).

native 2 as described in the Site Redress Planning Task Force Report (Task Force Report), on which the Final Site Redress Plan is based. Applicants' Motion, Attachment F at 2. The Staff's support of the Applicants' motion to dismiss the proceeding is conditioned on the Applicants' agreement to abide by the Final Site Redress Plan wherever it differs from the Task Force Report. Staff Response at 2-3, and Attachments 2 and 3 thereto. The Supplemental Agreement also obligates \$5,000,000 for the redress and sets November 30, 1985, as the date for the completion of the work. Applicants' Motion, Attachment F at 3.

The Intervenors would have preferred that the Applicants restore the site "to as nearly approaching its original condition as possible." Intervenors' Response at 2-3. Barring this virtually complete restoration, the Intervenors would prefer an option identified in the Final Site Redress Plan as Alternative 1. Under Alternative 2, the agreed-upon option, redress will leave some 54 acres parceled out into three distinct but connected areas at elevation 810. Applicants' Motion, Attachment A, Sketch 3. Redress under Alternative 1, however, would leave a roughly rectangular area at the same elevation, an area which, though it is a few acres smaller than the three areas under Alternative 2, would permit greater flexibility in land use by any future industrial user than would the three areas. *Id.*, Sketch 2. The Intervenors also assert that Alternative 1 is environmentally superior to Alternative 2, though they put forward no basis for their claim and we cannot identify any such basis. Tr. 8912.

However, rather than risk further delay in redressing the site, the Intervenors have chosen not to oppose the terms the Applicants and the Staff propose for dismissal of the proceedings and revocation of the LWA. Intervenors' Response at 1; Tr. 8917-18. Instead, the Intervenors invite us to exercise our power under § 2.107(a) to prescribe terms for the withdrawal of the application in the direction of Intervenors' preference. Intervenors' Response.

We decline to require either that redress be carried out according to the terms of Alternative 1, or that the site be restored as nearly as possible to its original condition. We find no deficiency in Alternative 2's treatment of the environment. Moreover, there has been no showing that Alternative 1 is either environmentally superior to Alternative 2, or more geared to industrial development. But, in any event, Alternative 2 will leave the site more suited to industrial development than it was in its original condition. Tr. 8910-11. We have no jurisdiction to ask for a site condition even more suited to such development.

THE RESPONSIBILITIES OF THE APPLICANTS AND THE STAFF IF AN ALTERNATE USE IS FOUND BEFORE REDRESS IS COMPLETE

By the time the Applicants filed the motion before us, they and the Staff apparently had come to an agreement about whether, and how, redress would be modified if an alternate use were found before redress had been completed. However, the terms of that agreement were not clear to us. The language of the Final Site Redress Plan was definite: The redress plan would be modified only if a "committed" alternate use were found prior to the commencement of redress; and in such a case, modification took a definite form: "redress would be implemented by the Project in accordance with this plan on those areas of the site not committed to industrial use." Applicants' Motion, Attachment A at 16-17. The language of later documents, however, was more general and loose: The plan would be modified "as appropriate" if there were an "expression" of "interest" from a "serious prospect" before the *completion* of redress. *Id.*, Attachment E (Staff's June 6, 1984 Letter) at 1; *id.*, Attachment F (Supplemental Agreement) at 3.

More important, it was not clear to us what jurisdiction the parties thought the NRC, and most crucially, this Board, had over any negative environmental effects arising from modification of the redress plan to make the site more attractive to a "serious prospect." On the one hand, under § 2.107 and the Appeal Board's order dismissing its proceeding and vacating our authorization of the LWA, we had the power to prescribe terms for withdrawal of the application in order to ameliorate any environmental effects of site preparation. On the other hand, it was clear that neither the Staff nor the Board had any jurisdiction over any negative environmental effects caused by an alternate use secured *after* redress was complete. What jurisdiction, then, did either the Staff or the Board have over such negative effects in the case where an alternate use was found before redress was complete? And could we delegate any jurisdiction we had in the latter case to the Staff?

To help us clarify what the Applicants', the Staff's, and our responsibilities would be in the event an alternate use were found before completion of redress, we held a conference of the parties on February 28, 1985. Tr. 8885-8924. At the conference, the Intervenors argued that the looser language in which the Staff's June 6, 1984 acceptance letter and the Supplemental Agreement between DOE and TVA described possible modifications to the redress plan left room for the Applicants to treat expressions of slight interest in industrial use of the site as excuses to postpone redress, or its completion, indefinitely. Tr. 8890-91. The Interven-

nors therefore urged that the redress plan be modified only upon the securing of a firm commitment to an alternate use, a commitment as expressed in a letter of intent or some similar document, and that even in the event of such a commitment, redress be continued to the greatest extent possible. Tr. 8915-16.

In reply, the Applicants claimed that, given the lack of success of the extensive efforts to find an alternate use for the site, it was not likely that one would be found before redress was complete, and that therefore, it was not likely that the Applicants would have the opportunity, let alone the inclination, to delay redress. Tr. 8892. They said, though, that given such an opportunity, they would adhere to the more definite language of the Final Site Redress Plan, which explicitly calls for redress according to Alternative 2 of all areas not slated for alternate use. Tr. 8892, 8905. The Applicants also made clear that even in those areas which were slated for alternate use, redress would continue to the greatest extent possible. Tr. 8905, 8922. However, they argued that binding them to require a serious prospective user to execute a letter of intent or similar document before redress would be modified might lead to a situation in which certain valuable uses of the site would be foreclosed. Tr. 8891-92. The Applicants also disavowed any inclination to use expressions of slight interest as an excuse for delay. Tr. 8898.

Thus the problem presented the Board in the conference of the parties was to find that action by the Board which would help assure both that completion of redress would not be delayed but also that resources would not be wasted by letter-perfect adherence to Alternative 2 in the face of an expression of genuine interest in an alternate use of the site. The Intervenor proposed that we keep jurisdiction over redress until its completion. Tr. 8900, 8914, 8918. They also asked that they be fully informed by the Applicants of the existence of an alternate use and of any modifications to Alternative 2. Intervenor's Response at 3. The Applicants on the other hand, argued that the Staff was quite able to oversee redress and any modifications to the plan, and to distinguish sham expressions of interest from genuine ones, and that, in any event, a complex regulatory scheme was in place to protect environmental values both now and during redress. Tr. 8897-98, 8920, 8893f. The Applicants nonetheless expressed their willingness to inform the Intervenor fully of the existence of an alternate use and of any modifications to redress. The Staff for its part expressed its commitment not to permit unjustified delay in the completion of redress. Tr. 8918.

In our view, the best course is to entrust to the Staff the oversight of redress and any modification of Alternative 2. The most important bases

for our decision are the Applicants' explicit commitments and acknowledgment of the Staff's jurisdiction over not only the implementation of the redress plan but also the justification for modifications to that plan. The already unlikely prospect of delay in the completion of redress is made more unlikely by the Applicants' commitment to carry redress to completion in all areas of the site which, before the end of redress, do not become slated for alternate use, and in those latter areas to continue redress to the greatest extent possible. This commitment conforms to at least part of what the Intervenors seek here. But they also want us to oversee the carrying out of that commitment. However, the redress plan has been subject to litigation in this proceeding and has gained the approval of all the parties and of the Board. What remains for this agency to do is to see that the terms of the plan are carried out, and such oversight is classically a function of the Staff. Even if, despite the Applicants' commitment to continue redress to the greatest extent possible, there remains some possibility that redress might be delayed on grounds of a less-than-genuine expression of interest in the site, the Staff may be depended upon to discern whether delay would be justified. The exercise of such routine business judgment is not ordinarily a fit object of litigation. Since the NRC's remaining responsibilities for the site are most properly the Staff's, the Intervenors' remedy, should they conclude that the Staff is not bearing its responsibilities, is a petition under 10 C.F.R. § 2.206. *See also* Tr. 8920-21 (Edgar).

Order

The Applicants' October 19, 1985 motion that the Board authorize revocation of the LWA and dismiss the proceedings without prejudice is hereby *granted* on the following conditions, agreed to by the NRC Staff and Applicants:

- (1) The Applicants will redress the site in accord with Alternative 2 as described in the Final Site Redress Plan, and under the conditions set out in the Staff's June 6, 1984 letter of acceptance of the Final Site Redress Plan.
- (2) The Applicants will modify the redress plan only in the event of a genuine expression of interest in an alternate use of the site from a serious prospect. In the event of such a prospect, the Applicants will carry out the redress plan to the greatest extent possible consistent with the alternate use. The Staff will review such prospects and any modifications.

- (3) The Applicants will inform the Intervenors fully and immediately of the existence of an alternate use of the site, and of any modifications to redress.

The Director of Nuclear Reactor Regulation is hereby authorized to revoke the Limited Work Authorization issued under LBP-83-8, 17 NRC 158 (1983). In accord with 10 C.F.R. § 2.107(c), the Director will cause to be published in the *Federal Register* a notice of withdrawal of the application for a construction permit.

This proceeding is dismissed without prejudice.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Gustave A. Linenberger, Jr.
ADMINISTRATIVE JUDGE

Ivan W. Smith, Chairman
ADMINISTRATIVE LAW JUDGE

Bethesda, Maryland
March 11, 1985

Judge Hand agrees with this action but was unavailable to join in the Memorandum and Order.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Charles Bechhoefer, Chairman
Dr. James C. Lamb
Ernest E. Hill**

In the Matter of

**Docket Nos. STN 50-498-OL
STN 50-499-OL
(ASLBP No. 79-421-07-OL)**

**HOUSTON LIGHTING AND
POWER COMPANY, *et al.*
(South Texas Project,
Units 1 and 2)**

March 15, 1985

Responding to the remand by the Appeal Board in ALAB-799, 21 NRC 360 (1985), the Licensing Board explains why it does not invoke its authority under 10 C.F.R. § 2.760a to consider *sua sponte* certain previously dismissed contentions.

OPERATING LICENSE HEARINGS: *SUA SPONTE* ISSUES

In an operating license proceeding, a licensing board is constrained from reviewing an issue *sua sponte* unless a “serious safety, environmental, or common defense and security matter exists.” 10 C.F.R. § 2.760a (emphasis supplied). The Commission must be advised of a board’s intent to consider an issue *sua sponte*. When so advising the Commission, a board must provide more than a conclusory statement of the issue’s significance.

OPERATING LICENSE HEARINGS: *SUA SPONTE* ISSUES

The circumstance that a particular contention no longer being pursued has already been admitted to a proceeding is not in itself sufficient to satisfy the standard for *sua sponte* review, nor is the incompleteness of Staff review of the issue.

OPERATING LICENSE HEARINGS: *SUA SPONTE* ISSUES

A licensing board may take into account the pendency and likely efficacy of NRC Staff nonadjudicatory review in determining whether or not to invoke its *sua sponte* review authority.

EMERGENCY PLANS: EMERGENCY PLANNING ZONES

Emergency Planning Zones must currently extend "about 10 miles" in radius from a plant. 10 C.F.R. §§ 50.47(b)(10), (c)(2), and 10 C.F.R. Part 50, Appendix E, § I, n.1.

EMERGENCY PLANS: CONTENT (EVACUATION)

The fact that evacuation of particular individuals would require them to begin their journey by heading toward a plant will not necessarily be fatal to the effectiveness of an emergency plan. The effectiveness of any plan will depend upon the particular circumstances in question.

MEMORANDUM

(Explanation for Declining *Sua Sponte* Review of Contentions 5-8)

On February 6, 1985, the Appeal Board, *inter alia*, affirmed our ruling¹ denying the request of Citizens Concerned About Nuclear Power, Inc. (CCANP), an Intervenor, to adopt four contentions (numbers 5-8) initially sponsored by Citizens for Equitable Utilities, Inc. (CEU), a former Intervenor. ALAB-799, 21 NRC 360. However, the Appeal Board remanded the matter to us to consider the appropriateness of our reviewing those issues *sua sponte*, pursuant to our authority under 10 C.F.R. § 2.760a. The remand based its *sua sponte* query on our statement in our Memorandum and Order of August 3, 1979 (unpublished),

¹ LBP-82-91, 16 NRC 1364 (1982).

that certain late-filed contentions raised “significant safety or environmental issues” which should be taken into account in our balancing of the factors applicable to late-filed contentions. For reasons hereafter set forth, we do not at this time find that Contentions 5-8 warrant our *sua sponte* review.

I. BACKGROUND

Prior to discussing Contentions 5-8² individually, some background of our August 3, 1979 ruling and the applicability of the “significant . . . issues” statement to particular contentions is warranted. All of those contentions were originally included among those which CEU submitted in its initial intervention petition. In our April 3, 1979 Prehearing Conference Order, we accepted CEU’s late-filed petition on the basis of a balancing of factors which did not rely, *per se*, on the significance of any of the particular contentions proffered. LBP-79-10, 9 NRC 439, 467-68, *aff’d*, ALAB-549, 9 NRC 644, 650-51 (1979). In that Order, we accepted two of CEU’s contentions (later identified as numbers 4 and 6). LBP-79-10, *supra*, 9 NRC at 463-65. We deferred ruling on CEU’s remaining contentions and called upon CEU to provide further specificity to enable us to ascertain their acceptability as contentions. We also permitted (indeed, encouraged) CEU to particularize further the two contentions we had already accepted. *Id.* at 464, 468-69.

When CEU supplied this further information, it expanded the scope of certain of the original contentions. This was the case with respect to contentions which we later designated as Contentions 1.4, 1.5, 1.6, 1.7(a-e), 4 and 7. For these broadened contentions, we deemed it necessary to balance again the factors applicable to late-filed contentions. 10 C.F.R. § 2.714(a). These were the particular contentions which we referred to in our August 3, 1979 Memorandum and Order as raising “significant safety or environmental issues.” All of these contentions except Contention 7 have either been litigated in Phase I or scheduled for litigation in Phase II. The contentions designated 5, 6 and 8 were not considered as late-filed at the time of our August 3, 1979 issuance and

² The CEU contentions which were accepted as Contentions 5-8 were originally numbered as follows:

Contention as accepted	CEU contention(s) from which derived
5	2-3 (combined)
6	5
7	7
8	8

hence were not among those to which the late-filed factors or our "significant . . . issues" statement was applicable.

II. APPLICABLE LAW

With that background, we turn to the considerations which prompt us not to exercise *sua sponte* review of Contentions 5-8. In general, in considering whether to undertake such review in an operating license proceeding (such as this), we are constrained from reviewing any issue *sua sponte* unless a "serious safety, environmental, or common defense and security matter exists." 10 C.F.R. § 2.760a (emphasis supplied). As we pointed out some time ago, we must also advise the Commission of our intent to consider an issue *sua sponte*. LBP-81-54, 14 NRC 918, 922-23 & n.4 (1981); *see also* ALAB-799, *supra*, 21 NRC at 385 n.111. When so advising the Commission, we must provide more than a conclusory statement of the issue's significance. *Texas Utilities Generating Co.* (Comanche Peak Steam Electric Station, Units 1 and 2), CLI-81-24, 14 NRC 614 (1981).

Furthermore, the circumstance that a particular contention has already been admitted to a proceeding is not in itself sufficient to satisfy the standard for *sua sponte* review. *Comanche Peak, supra*, CLI-81-36, 14 NRC 1111, 1114 (1981). Nor is the incompleteness of Staff review of the issue. *Id.* at 1113; *see also Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), CLI-84-3, 19 NRC 555, 562-63 (1984). However, unlike the situation where a board is considering admission of a late-filed contention proposed by a party (*see* ALAB-799, *supra*, 21 NRC at 384 n.108), a board may take into account the pendency and likely efficacy of NRC Staff nonadjudicatory review in determining whether or not to invoke its *sua sponte* review authority. *Cincinnati Gas and Electric Co.* (Wm. H. Zimmer Nuclear Power Station, Unit No. 1), CLI-82-20, 16 NRC 109 (1982), *reconsideration denied*, CLI-83-4, 17 NRC 75 (1983); *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-83-75, 18 NRC 1254 (1983); *cf. Louisiana Power and Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1111-14 (1983).

III. DISCUSSION OF CONTENTIONS

A. Contention 7: Make-up Water

Turning to the issues remanded for our further consideration, we begin first with Contention 7, one of those which we had deemed to be

“significant” in our August 3, 1979 Memorandum and Order. That contention raises a safety issue with respect to the availability of make-up water for the main cooling reservoir, claiming that soil conditions peculiar to the STP area, inadequate water flow in the Colorado River, and diminishing ground water supply would prevent the cooling pond from being maintained at a sufficient level.

In its answers to Applicants’ interrogatories filed April 23, 1980, at page 21 *et seq.*, CEU explained that its concern was the “numerous sand pockets that are similar to quicksand” which it asserted were present in the STP area. In the current version of the FSAR, the Applicants have addressed the general question of seepage from the cooling reservoir. *See, e.g.*, FSAR, §§ 2.4.8.2.5, 2.4.11, 2.4.13.3.2.3, 2.5.6.2.1, 2.5.6.6; *see also* § 9.2.5.1.4.1. In that connection, the FSAR provides, *inter alia*, as an operating requirement, “that the power plant will be shut down if and when the reservoir water level drops below” a specified elevation. FSAR (Amendment 43), § 2.4.11, at p. 2.4-44.

While we express no opinion as to the adequacy of the FSAR treatment of seepage from the cooling water reservoir, including the referenced technical specification (which, we might note, should possibly include plant shutdown factors other than water level, such as water volume and/or temperature), we are confident that the subject is being given serious consideration by the Applicants. Moreover, standards for adequate cooling water supply are set forth in the Staff’s Standard Review Plan. NUREG-0800 (Rev. 2), § 2.4.11 (Cooling Water Supply). We would expect that the Staff would deal with this subject in its Safety Evaluation Report (or supplements). Absent any indication that the Staff’s review will not be adequate, we find no persuasive reason at this time for our considering this issue *sua sponte*.

B. Contentions 5, 6 and 8

With respect to Contentions 5, 6 and 8, concerning which we have not previously made a significance determination, there is even less warrant for our considering *sua sponte* review.

1. Contention 5: Bioaccumulation of Radionuclides

Contention 5 claims that the Staff’s treatment in the construction permit FES (NUREG-75/019, § 5.4.1.3, “Dose rate estimates”) of bioaccumulation of radionuclides in aquatic organisms was inadequate or in error. It cites several generalized evaluations of that subject, some of which post-dated the construction permit FES.

The Applicants have updated the information on this subject in their operating license Environmental Report (OL ER). See § 5.2.3 of that report. Among other authorities, the Applicants are relying on an early version of Regulatory Guide 1.109. Although the authorities cited by the Applicants in their OL ER do not include any of those specified by CEU in its contention or its responses to interrogatories, we note that at least one of those authorities is referenced in the most recent version of Reg. Guide 1.109 (Rev. 1, October 1977). We would anticipate that the Staff, in preparing its operating license DES and FES, would employ Reg. Guide 1.109 and also would analyze any of the information referenced by CEU which was of significance to the dose-rate estimates to be reached by the Staff. For that reason, we do not regard *sua sponte* review of Contention 5 by this Board to be warranted.

2. Contention 6: Radionuclide Deposition Rates

Contention 6 questions calculations of radionuclide deposition rates by the Staff and Applicants, used to determine compliance with 10 C.F.R. Part 50, Appendix I, as not taking into account the relatively high and continual humidity in the STP area. When we accepted this contention in our April 3, 1979 Prehearing Conference Order, we pointed to Applicants' claims that humidity had in fact been taken into account; but we declined to consider those claims because, in our view, they related to the merits of the contention and not to its acceptability. LBP-79-10, *supra*, 9 NRC at 465; see also Applicants' Response to Petition for Leave to Intervene of Citizens for Equitable Utilities, Inc., dated March 2, 1979, at 11.

In considering whether to litigate this contention *sua sponte*, we have, however, examined the material cited by the Applicants. As they claim, § 2.6 ("Meteorology") of the construction permit environmental report (ER) did in fact take into account relative humidity in the area. See § 2.6.2.2.1.5 (p. 2.6-11) and Tables 2.6-18, 2.6-19, 2.6-20 (pp. 2.6-37, 2.6-38, 2.6-39), the sections of the ER cited by the Applicants. The operating license ER updated the meteorological information, but added only limited information bearing on humidity. See OL ER, § 2.6 (p. 2.6-1) and Table 2.6-25 (p. 2.6-26). We understand CEU's major concern to have been the distance from the STP site of the humidity recordings relied upon in the construction permit ER. See CEU Answers to Applicants' Interrogatories, dated April 23, 1980, at 19. Although we express no opinion as to the adequacy or sufficiency of the data provided by the Applicants, particularly the data in the construction permit ER derived from locations somewhat distant from STP — for example, Corpus

Christi, Texas, a location apparently more than 100 miles from the site, and Galveston and Victoria, Texas, apparently over 50 miles from the site — we assume the Staff will consider humidity effects in its OL review, including the adequacy and sufficiency of data currently relied upon by the Applicants. We also find no basis in the information supplied by CEU to warrant our retaining the issue *sua sponte*.

3. Contention 8: Evacuation Plan

Contention 8 claims that the evacuation plan does not, but should, include an elementary school and a number of residences in Matagorda, Texas, approximately 8 miles from the site and outside the Low Population Zone (LPZ). The contention also questions the feasibility of evacuation from those areas, on the ground that persons would have to begin their evacuation by traveling toward the plant.

At the time this contention was accepted, NRC rules required an emergency plan (including evacuation) only for the LPZ. Other areas could be included on a showing of special circumstances. Contention 8 was an effort to demonstrate that such circumstances were present with respect to Matagorda.

The NRC rules have since been amended. Emergency Planning Zones (EPZs) must now extend “about 10 miles” in radius from a plant (10 C.F.R. §§ 50.47(b)(10), (c)(2) and 10 C.F.R. Part 50, Appendix E, § I, n.1) and thus, for STP, would have to include Matagorda. The proposed emergency plan submitted by the Applicants on December 26, 1984 (ST-HL-AE-1160) in fact includes plans for the Matagorda area, including its elementary school. *See, e.g.*, §§ 2.7.1.3, 2.7.1.6, Attachment 2 (Items 8 and 15), and Attachment 16 (at 16-11, 16-15, 16-23 through 16-25). Insofar as Contention 8 seeks to include Matagorda in the coverage of the STP emergency plan, therefore, the contention appears to be moot.

To the extent that Contention 8 questions the effectiveness of evacuation of Matagorda because of the necessity of traveling toward the plant, the claim appears to have been based on AEC and NRC adjudicatory decisions which raised that same question. *See Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-248, 8 AEC 957, 963 (1974); *Detroit Edison Co.* (Enrico Fermi Atomic Power Plant, Unit 2), LBP-79-1, 9 NRC 73, 81 (1979). More recently, however, the Appeal Board has made it clear that the fact that evacuation of particular individuals would require them to begin their journey by heading toward a plant will not necessarily be fatal to the effectiveness of an emergency plan. The effectiveness of any plan will depend upon

the particular circumstances in question. *Fermi, supra*, ALAB-730, 17 NRC 1057, 1069-72 (1983).

We express no view, of course, on the adequacy of the Applicants' proposed emergency plan. Indeed, defined evacuation routes have not yet been submitted to the Staff for review. See Cover Letter dated December 26, 1984, at 2, and Attachment 17 to Emergency Management Plan. Given the circumstances we have described, however, together with the extensive review of the emergency plan which will be undertaken both by the NRC Staff and by the Federal Emergency Management Agency (FEMA), we find no warrant for considering Contention 8 *sua sponte*.

In summary, we find no persuasive reason for undertaking *sua sponte* review of any of CEU's former Contentions 5-8. We are providing copies of this Memorandum to the Appeal Board.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 15th day of March 1985.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Charles Bechhoefer, Chairman
Dr. James C. Lamb
Ernest E. Hill**

In the Matter of

**Docket Nos. STN 50-498-OL
STN 50-499-OL
(ASLBP No. 79-421-07-OL)**

**HOUSTON LIGHTING & POWER
COMPANY, *et al.*
(South Texas Project,
Units 1 and 2)**

March 29, 1985

The Licensing Board denies an intervenor's late-filed contention on soil stability but, as part of its consideration of the lead Applicant's competence, directs a hearing on certain soils questions.

**RULES OF PRACTICE: NONTIMELY SUBMISSION OF
CONTENTIONS**

Late-filed contentions may be admitted only after balancing all five of the factors set forth in 10 C.F.R. § 2.714(a)(1). Factors (ii) and (iv), concerning representation of a party's interest in a contention by other means or parties, are entitled to relatively less weight than the others.

RULES OF PRACTICE: NONTIMELY SUBMISSION OF CONTENTIONS

Factor (ii), involving other means for a party to protect its interest, is limited to the availability of other fora in which the party itself might protect its interest and is not satisfied through nonadjudicatory resolution of issues by license applicants or the NRC Staff (whose programs do not focus on the interests of particular parties). Nor is factor (iv), involving representation by other parties, satisfied through participation by applicants or the NRC Staff.

RULES OF PRACTICE: NONTIMELY SUBMISSION OF CONTENTIONS

The most significant of the factors to be balanced with respect to late-filed contentions, at least in situations where litigation of the contention will not delay the proceeding, is the extent to which the intervenor may reasonably be expected to assist in developing a sound record.

MEMORANDUM AND ORDER

(Denying Proposed Contention on Soil Stability but Directing Hearing on Certain Soils Questions)

On October 24, 1983, Citizens Concerned About Nuclear Power, Inc. (CCANP), an Intervenor in this operating license proceeding, filed a motion seeking to introduce a new contention questioning the stability of soil under the South Texas Project.¹ By responses dated November 8 and 11, 1983, the Applicants and NRC Staff, respectively, oppose admission of the contention. In our Phase I Partial Initial Decision, LBP-84-13, 19 NRC 659, 668 n.2 (1984), *aff'd in part*, ALAB-799, 21 NRC 360 (1985), we noted that we were deferring ruling on the contention inasmuch as CCANP did not seek to litigate it prior to Phase III. Nonetheless, at the October 16, 1984 prehearing conference, the Applicants expressed the view that, if the contention were to be heard, they would prefer litigating it earlier, if possible during Phase II (Tr. 10,863-64). For reasons set forth herein, we are denying this contention but are

¹ CCANP's proposed contention reads: "The soil beneath the South Texas Nuclear Project is not sufficiently stable to ensure the safe operation of the plant over the projected time span of that operation in accordance with 10 C.F.R. Section 50.57(a)(3)(i)."

including a soils-related question among matters to be litigated in the Phase II hearings on the Applicants' competence.

A. All contentions filed after the date specified for the filing of contentions in an operating license proceeding are considered late-filed and, assuming they meet the general requirements for contentions,² may be admitted only after balancing all five of the factors set forth in 10 C.F.R. § 2.714(a)(1). *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), CLI-83-19, 17 NRC 1041 (1983). Those factors are:

- (i) Good cause, if any, for failure to file on time.
- (ii) The availability of other means whereby the petitioner's interest will be protected.
- (iii) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.
- (iv) The extent to which the petitioner's interest will be represented by existing parties.
- (v) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

1. Turning to the first factor, CCANP bases its proposed contention on a 10 C.F.R. § 50.55(e) report transmitted to NRC by HL&P, with copies to the Board and parties, on August 25, 1983 (following up on an oral notification to the Staff on July 26, 1983). CCANP's proposed contention was filed approximately 2 months after submission of the written report, a "reasonable time" in CCANP's view.

The Applicants and Staff each observe that there was no good cause for CCANP to delay as long as it did in filing its contention. They view the contention as related to soils conditions site-wide and not merely those underlying the Unit 1 containment structure (the subject of the § 50.55(e) report):

As worded, the contention does question soils conditions throughout the site. CCANP admits that it has long been aware of "rumors and stories" about the instability of soils at the STP site (Motion at 1) and, in support of its motion, even forwarded a 1981 Staff inspection report (I&E Rept. 81-24) noting an allegation of the possible uneven settlement or "tilt" of the Unit 2 containment building. (That report concluded, however, that the concern was unwarranted.) Moreover, as the Applicants and Staff point out, the settlement of soils under the Mechanical Electrical Auxiliary Building (MEAB) was a question considered in Phase I of this proceeding. CCANP itself introduced an exhibit —

² See 10 C.F.R. § 2.714(b). No party claims that CCANP's proposed contention fails to satisfy these general requirements.

CCANP Exhibit 30 — on the MEAB settlement, although it failed to file proposed findings on that exhibit. See LBP-84-13, *supra*, Findings 291-292, 19 NRC at 801. Furthermore, as the Applicants observe, the FSAR includes information concerning settlement of various structures, including documentation of the “tilting” of STP structures which had already occurred. For these reasons, we conclude that CCANP did not have a good reason to wait as long as it did to submit a general soils contention *unless* it could establish that the August 25, 1983, § 50.55(e) report added a new and significant dimension to such a contention.

As the Staff points out, CCANP does not in its motion even attempt to explain why the report is substantively different from previously available information bearing on soil stability. The report mentions, *inter alia*, that core support ledge tilt (discovered with respect to the Unit 1 reactor containment building) in excess of allowable manufacturing tolerances may have been caused by differential settlement. But the report concludes that the tilt is not expected to pose a safety or operability concern, since the differential settlement is “well within allowable limits” for such settlement.

A followup and final report, dated February 16, 1984, confirmed that the tilt did not exceed the design basis differential settlement criteria. The report concluded (1) that the tilt did not constitute a safety hazard, within the meaning of 10 C.F.R. § 50.55(e), and (2) that STP Unit 1 may operate “without repair to the condition with no detrimental effects.”³ In the totality of circumstances, we conclude that CCANP has not met its burden of demonstrating good cause for its delay in submitting a general soils issue. See *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-5, 13 NRC 361, 364 (1981); *Puget Sound Power and Light Co.* (Skagit Nuclear Power Project, Units 1 and 2), ALAB-552, 10 NRC 1, 5 (1979), and cases cited.

On the other hand, to the extent that CCANP may seek to raise an issue based solely on the differential settlement of the Unit 1 reactor containment building, it submitted its contention within a reasonable time of the § 50.55(e) report and hence has shown good cause for its late filing.

2. The second and fourth factors (concerning representation of CCANP’s interest by other methods or parties) are somewhat related. The Staff does not discuss them but assumes that they would weigh in CCANP’s favor. The Applicants assert that their own settlement

³ Report ST-HL-AE-1055, at 4. The Board and parties were on the distribution list for this followup report. Another copy was transmitted to the Board by the Applicants on March 5, 1984, with copies of the transmittal letter forwarded to all parties.

monitoring program, together with the Staff's continuing review, constitute other means to protect CCANP's interest. Such means of protection, however, do not focus on CCANP's interest; hence they are not considerations to which we may give weight in balancing these factors. ALAB-799, *supra*, 21 NRC at 384 n.108, citing *Washington Public Power Supply System* (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167 (1983). Nor do they constitute permissible areas of inquiry for factor (ii) — which is limited to the availability of other fora in which CCANP itself might protect its interest. *Houston Lighting and Power Co.* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-671, 15 NRC 508, 513 n.13 (1982). Indeed, if CCANP had raised a legitimate safety concern about soil stability, adjudication in this proceeding would likely be the *only* means of adequately protecting CCANP's interest.

As for the extent to which CCANP's interest will be represented by other parties, the Applicants repeat their legally irrelevant position that the Applicants and Staff will represent CCANP's interest. They go on to assert that there is "no legitimate interest to be represented." That latter response (if intended to be serious) ignores the substance of the factor which we must balance.⁴ We therefore accord it the weight it deserves: it is clear to us that, as CCANP asserts, no other party will represent its interest.

We balance factors (ii) and (iv) in favor of admitting CCANP's proposed contention. These two factors, however, are entitled to relatively less weight than the others. *South Carolina Electric and Gas Co.* (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 895 (1981).

3. As we observed some time ago, the most significant of the factors to be balanced with respect to late-filed contentions, at least in situations where litigation of the contention will not delay the proceeding, is the extent to which the intervenor may reasonably be expected to assist in developing a sound record. Memorandum and Order dated August 3, 1979 (unpublished), at 3. While adjudicatory consideration of an issue will perforce result in a more complete record than nonadjudicatory resolution by the Staff, there is no mandate in an operating license proceeding to create an adjudicatory record on every issue.

Here, the August 25, 1983, § 50.55(e) report called attention to a lack of conformance to a manufacturer's criterion which, although not perceived to be a regulatory deficiency, nonetheless called for further analysis. After being undertaken, the analysis confirmed that the discovered

⁴ In balancing factor (iv), we assume that an intervenor's interest is worth protecting. Whether that be the case may be considered under factors (iii) and (v).

"tilt" has no safety significance, that excessive differential settlement has not occurred, and that no NRC requirement has been breached. We have been furnished no information by CCANP, and are aware of no information, which would suggest otherwise. That being so, further adjudicatory consideration of soil stability based only on that § 50.55(e) report would not be essential for creating a sound record on the issue, beyond the substantial record already existing on soil stability. Furthermore, although not a factor in our determination concerning CCANP's proposed contention, we note that the Staff will undoubtedly review the facility's soil stability during the process of preparing its Safety Evaluation Report (SER).

Even more important, as both the Applicants and Staff point out, CCANP has demonstrated no technical expertise on soil stability and has not indicated that it will offer a witness or witnesses with such expertise. CCANP to date has not presented any witnesses of its own and elected not to file proposed findings and conclusions on the technical issues considered in Phase I (including the stability of soil under the MEAB).

For these reasons, we cannot conclude that admission of the proposed contention is necessary to create a sound record. We balance this important factor against admission of the contention.

4. Finally, CCANP admits that the contention would "open a new area of inquiry" but claims that litigation would not delay the proceeding. The other parties seem to agree. Given the apparent lack of substance to the contention, however, we find little reason to justify the broadening of issues which acceptance of CCANP's contention would entail. We balance factor (v) against admission of the contention.

5. In sum, giving effect to the greater weight which we are according to factor (iii), *vis-a-vis* factors (ii) and (iv), our balancing of the five factors of 10 C.F.R. § 2.714(a) dictates that we reject CCANP's proposed contention. We accordingly are doing so.

B. We have not yet completed our review of the affidavits filed by the Staff and Applicants, and of responsive pleadings filed by CCANP, the Applicants and Staff, concerning the competence of the Applicants' new construction organization. We hereby put the parties on notice, however, that we regard the matter of the Applicants' current organization, procedures and activities in soils areas as likely warranting further exploration in the Phase II hearings. In I&E Rept. 83-26, dated April 20, 1984 (the Staff's SALP report for the period December 1, 1982–November 30, 1983), transmitted in final form to HL&P on June 22, 1984, the Staff points to two violations in the area of "soils and foundation": a

violation of the standard test method of determining the minimum density of backfill, and another violation arising from the quality control inspections of backfill operations. The Staff portrayed the latter violation as "represent[ing] a failure on the part of the licensee to rectify issues raised in the Show Cause Order concerning the adequacy of backfill inspection" (*id.*, Inspection Report at 4).

Although HL&P has submitted a program to improve its performance in the soils and foundation area (*see* Letter to NRC dated June 8, 1984, ST-HL-AE-1105), we cannot evaluate the adequacy of this program on the basis of the material before us (including ¶¶ 14-15 of the Applicants' affidavit submitted to us on February 26, 1985, and the programmatic audit of backfill activities submitted to the Staff on May 25, 1984 (ST-HL-AE-1095)). The Staff, through its letter to HL&P of June 22, 1984, has at most expressed only conditional and tentative approval of this program. Furthermore, the material before us does not reflect monitoring requirements (if any) employed to detect future excessive differential settlement, but it raises certain questions concerning the adequacy of baseline data (*see, e.g.*, programmatic audit, Findings 23 and 24, at 8-9). Since this area overlaps an area of deficiencies underlying the Show Cause Order, and since we devoted some attention to this area in our Phase I Partial Initial Decision, we designate this area as one for further exploration in the Phase II hearings.⁵

At a later date, we will determine whether there are other "competence" matters which we find necessary to consider in Phase II.⁶

For the reasons stated, it is, this 29th day of March 1985,

ORDERED

1. That CCANP's October 24, 1983 motion for a new contention is *denied*;
2. That a Phase II hearing on HL&P's competence on soils questions, as raised in the Staff's 1984 SALP report and as described herein,

⁵ The degree of attention we give to this topic depends, in part, on the soils work (if any) remaining to be undertaken. We will explore this subject with the parties in more detail at the forthcoming April 30, 1985 prehearing conference.

⁶ CCANP's February 25, 1985 comments on the Staff's "competence" affidavit listed matters from the SALP report as generally warranting a further adjudicatory hearing (Comments at 7), but CCANP does not specify such matters with sufficient particularity to create an issue for Phase II hearings. Although our consideration of the soils issues defined herein does not stem from a submission by CCANP, we regard all of the "competence" issues as open matters from Phase I and hence as not subject to rules on raising issues *sua sponte*.

is *directed*, with hearings on other competence questions, if any, to be determined at a later date.

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

**Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE**

Bethesda, Maryland

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION

Harold R. Denton, Director

In the Matter of

Docket Nos. 50-443
50-444
(10 C.F.R. § 2.206)

**PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, *et al.***
(Seabrook Station, Units 1
and 2)

March 18, 1985

The Director of the Office of Nuclear Reactor Regulation denies a Petition of the New England Coalition on Nuclear Pollution requesting that the Nuclear Regulatory Commission take action to remedy alleged violations and deficiencies associated with construction of the Seabrook facility. Specifically, the Petition contends that construction activities are being conducted in violation of the terms of the construction permit and the Commission's quality assurance requirements, specifically 10 C.F.R. Part 50, Appendix B. Based on these alleged violations and deficiencies, the Petitioner seeks immediate suspension of construction.

CONSTRUCTION PERMIT: AUTHORIZED ACTIVITIES

Organizational changes at and financing of the Seabrook facility did not have the effect of removing the entity solely accountable and responsible for design and construction of the facility. Consequently, design and construction activities continue to be conducted in accordance with the terms of the construction permit.

TECHNICAL ISSUE DISCUSSED: QUALITY ASSURANCE

The quality assurance program at the Seabrook facility, including Criterion I calling for the program to have adequate authority and organizational freedom, satisfies the requirements of 10 C.F.R. Part 50, Appendix B. Staffing of the Licensee's quality assurance program with employees of another company would not be inappropriate if it remained clear that those employees were ultimately responsible to the Licensee. Nor does the Licensee necessarily compromise its authority and organizational freedom to supervise quality assurance by becoming heavily indebted to its contractors and other creditors.

DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206

INTRODUCTION

In its "New England Coalition on Nuclear Pollution Petition for Enforcement and Motion for Suspension of Construction at the Seabrook Nuclear Power Plant" dated August 22, 1984 (Petition), the New England Coalition on Nuclear Pollution (Petitioner) requested that the Nuclear Regulatory Commission (NRC) take action to remedy alleged violations and deficiencies associated with construction of the Seabrook facility by a number of electric companies (the Licensees) including Public Service Company of New Hampshire (PSNH). Specifically, the Petition contends that construction activities underway at the Seabrook facility are being conducted in violation of the terms of the construction permit issued to the Licensees authorizing construction of the Seabrook facility. The construction permit identified PSNH as the sole technically qualified entity responsible for construction of the Seabrook facility. The Petition alleges that PSNH is no longer acting in that capacity due to a series of recent management changes. The Petition also alleges violations of the Commission's quality assurance (QA) requirements, specifically, 10 C.F.R. Part 50, Appendix B. Based on these alleged violations and deficiencies, the Petitioner seeks immediate suspension of construction of the plant until a construction permit amendment has been obtained reflecting the management changes which have occurred at Seabrook and conformance with NRC QA requirements are demonstrated.

In a letter dated October 17, 1984, I acknowledged receipt of the Petition but declined to take any immediate actions with respect to the alleged concerns identified in the Petition. I determined that no immediate action was necessary based on the preliminary conclusion of the NRC

Staff that PSNH continued to have the necessary authority over the Seabrook project to assure continued implementation of the QA Program. This conclusion was based in part on continued oversight of construction at the Seabrook facility by NRC inspectors. With respect to any violations of the construction permits or NRC regulations, I concluded that the Petition failed to identify any imminent hazard to the public associated with the alleged violations. Furthermore, the Petition concerns a facility under construction which will not operate for some time and where construction activities have been found generally acceptable and in accordance with the approval QA Program. For these reasons, I declined to take any action.

I further indicated that a final decision with respect to the concerns raised would be forthcoming within a reasonable time. This Decision constitutes my final action with respect to the Petition. In reaching my decision, I have considered the "Permittees' Response to the New England Coalition on Nuclear Pollution Petition for Enforcement and Motion for Suspension of Construction at the Seabrook Nuclear Power Plant" submitted on September 6, 1984, by the Licensees (Licensees' Response).

DECISION

The Petition raises essentially two concerns. First, the Petition alleges a violation of the terms of the construction permit issued to the Licensees based on a series of organizational changes which, the Petitioner argues, has effectively removed PSNH as the entity solely responsible for construction of the Seabrook facility. Second, the Petition alleges violations of the Commission's quality assurance requirements. Each of these issues will be discussed below in turn.

A. Present Construction Activities Are Authorized Under the Construction Permit

The construction permits issued for the Seabrook facility (Construction Permit Nos. CPPR-135 and -136, issued July 7, 1976) presumed that PSNH would act on behalf of all Licensees in accordance with the Joint Ownership Agreement (JOA) that was then in effect. The construction permits were issued to the Licensees based on a finding that PSNH was technically qualified to design and construct the Seabrook facility. As is generally the case in the construction of nuclear facilities, PSNH would contract for and assign certain responsibilities to others. This was recognized by the Atomic Safety and Licensing Board which

considered the issue of technical qualifications in the construction permit proceeding.¹ The Licensing Board based its conclusions regarding the technical qualifications of PSNH in large measure on the fact that the Yankee Atomic Electric Company (YAEC), United Engineers and Constructors, Inc., and Westinghouse Electric Corporation had suitable qualifications and had been assigned major responsibilities for construction of the Seabrook facility.² Indeed the participation by YAEC was deemed essential by the Licensing Board because Seabrook was the first nuclear venture for PSNH.³ In any event, regardless of the degree to which activities were delegated, the Licensing Board recognized that ultimate responsibility lay with PSNH.⁴

Following issuance of the construction permits in 1976, the construction permits were amended from time to time to reflect changing ownership interests in the Seabrook facility. However, at no time did these amendments reduce the responsibilities of PSNH with respect to design and construction of the Seabrook facility. Indeed, as the Petition points out, in approving the construction permit amendments, the NRC recognized the fact that PSNH would continue to retain full responsibility and authority under the JOA for design and construction of the Seabrook facility and would continue to utilize suitably qualified contractors. The Petition contends in essence that, under recently executed amendments to the JOA, and other agreements concerning continued funding of the Seabrook project, PSNH in fact no longer remains solely accountable for design and construction of the Seabrook facility and, consequently, construction of the facility is being performed in violation of the construction permit and the provisions of the Atomic Energy Act of 1954, as amended, and the Commission's regulations limiting the transfer of licenses, specifically § 183 and 10 C.F.R. § 50.54(a). While there has been a number of agreements recently involving organizational changes at and financing of the Seabrook facility, in the NRC Staff's view, for the reasons stated below, none have had the effect of removing PSNH as the entity solely accountable and responsible for design and construction of the Seabrook facility.

Petitioner points to the "Fifteenth Amendment of Agreement for Joint Ownership, Construction and Operation of New Hampshire Nuclear Units" dated April 30, 1984 (Fifteenth Amendment) to support its view that Commission requirements have been violated. Petitioner argues that the Fifteenth Amendment eliminated PSNH's "veto power"

¹ LBP-76-26, 3 NRC 857 (1976).

² *Id.* at 800-07.

³ *Id.* at 917.

⁴ *Id.* at 866.

over the Seabrook project by reducing the vote necessary for effecting decisions from 80% to 51% of the ownership shares. While the Fifteenth Amendment did permit certain actions to be taken based on a vote of 51% of the ownership shares, Petitioner attributes undue significance to the so-called "veto power" of PSNH. What is significant is that the entity found to be technically qualified has the requisite authority to fulfill its responsibilities to construct a facility in accordance with the Commission's regulations. PSNH was given such authority under the original JOA. The Fifteenth Amendment at page 3 explicitly recognizes that PSNH remains the entity ultimately responsible for project construction. To the extent that the Fifteenth Amendment contemplates possible removal of PSNH as Project Manager upon a 51% vote of ownership shares, such removal is conditioned upon obtaining needed regulatory approvals, including that of the NRC, and appointment of a new Project Manager. Until then, PSNH remains ultimately responsible for Seabrook facility design and construction. Nor do the terms of the Fifteenth Amendment regarding the appointment of a dispersing agent upon a 51% vote of the ownership shares change this result. The very term itself, "dispersing agent," makes clear that this is a particular function associated with design and construction of the Seabrook facility which may readily be contracted to or assigned to another entity.⁵ Finally, the requirement in the Fifteenth Amendment that PSNH report to and consult with an Oversight Committee prior to making major decisions in connection with the Seabrook project does not detract from its role as the entity solely accountable for design and construction of the Seabrook facility. To the contrary, the provision itself recognizes that PSNH is the entity responsible for making decisions associated with design and construction of the project (Fifteenth Amendment at 2-3). Also, the Fifteenth Amendment makes clear that PSNH can disregard the recommendations of the Oversight Committee when it believes that such recommendations are not in accordance with NRC regulations. (Fifteenth Amendment at 3). Nor does the "Sixteenth Amendment of Agreement for Joint Ownership, Construction and Operation of New Hampshire Nuclear Units" dated June 15, 1984 (Sixteenth Amendment) affect the role of PSNH as the entity solely accountable for the design and construction of the Seabrook facility. It appears from the document that the role of the Executive Committee created under it is to closely monitor the expenses of

⁵ The appropriate disbursing agent for the Seabrook facility is also the subject of the "Interim Agreement to Preserve and Protect the Assets of an Investment in the New Hampshire Nuclear Units" dated April 27, 1984, and the "Agreement for Seabrook Disbursing Agent" dated May 23, 1984. Both documents concern disbursement of payments due from certain participants in the Seabrook project in light of the financial difficulties associated with the project. The documents place no limitations on the authority of PSNH in managing design and construction of the Seabrook project and Petitioner points to none.

the project to assure that they do not exceed approved levels. It is a vehicle apparently designed to monitor the financial course of the project. While it could be argued that such monitoring could in some fashion affect PSNH's commitment to quality, which inherently involves expenses, it does nothing to undermine PSNH's sole accountability under the construction permit. Every nuclear construction project has an inherent tension between keeping costs reasonable and ensuring that the quality demanded in construction of the project meets NRC regulations. Every project has associated with it budget control and the monitoring of construction expenses. A central concern with regard to every nuclear construction project, including Seabrook, is that the entity in charge has the authority to carry out its responsibilities to ensure construction in accordance with the Commission's requirements. The Sixteenth Amendment expressly rebuts the Petitioner's claims that PSNH is no longer in charge. It specifically states that its terms do not affect the duties and responsibilities for construction, operation and maintenance of the units by PSNH. (Sixteenth Amendment at 8-9.)

The June 23, 1984 "Resolution for Transfer of Managing Agent Responsibility" (Resolution) also does not support the Petitioner's view. The Resolution contemplates an orderly process for transferring responsibility for design, construction and operation of the Seabrook facility from PSNH to a new entity, New Hampshire Yankee Electric Company. The first stage of this process calls for the creation of the New Hampshire Yankee Division within PSNH. The Division has been formed.⁶ With the exception of the President and Chief Executive Officer of the Division, who is an employee of YAEC, all other employees of the Division are employees of PSNH.⁷ The Division reports to the Chief Executive Officer of PSNH. PSNH thus remains the entity accountable for, and with the authority to carry out, design and construction of the Seabrook facility. The New Hampshire Yankee Division is envisioned under the Resolution to ultimately dissolve with separate corporate entities assuming responsibility for completion of construction and operation of the Seabrook facility. Staffing of the Division by employees of YAEC, an entity experienced in nuclear construction and operation and recognized by the Licensing Board as essential for construction of the Seabrook facility, is not inappropriate. In any event, the current organizational structure has the New Hampshire Yankee Division and its employees subordinate to PSNH with PSNH remaining accountable for the design and construction of the Seabrook facility. Incorporation of the

⁶ Licensees' Response at 4.

⁷ Licensees' Response at 5, 9.

Division under the Resolution as the New Hampshire Yankee Electric Corporation responsible for completing construction of Seabrook Unit 1 would become effective upon receipt of any necessary regulatory approvals. (Resolution at 2.)

In summary, none of the changes raised in the Petition have had the effect of undermining the authority of PSNH to continue managing the construction of the Seabrook facility. PSNH remains in charge. While future changes may be contemplated, present responsibility and authority for construction continue to rest with PSNH. While actions and proposals by PSNH for continued construction of Seabrook are reviewed by newly created committees, and while such committees may voice concerns with proposed expenditures, ultimate decisionmaking authority remains with PSNH. Nor does the NRC oversight of construction activities suggest differently. The NRC monitors and inspects construction at the Seabrook site through Regional and Resident Inspectors. The design process is also the subject of inspections not only at the site but at the corporate headquarters and at contractors and vendors. The results of these inspection activities confirm that PSNH continues in its role as managing agent solely accountable and responsible for design and construction at Seabrook. Consequently, no actions on my part with respect to this matter are appropriate.

B. Construction of the Seabrook Facility Is Being Undertaken in General Conformance with the NRC's Quality Assurance Requirements

The Petition also alleges violations of the Commission's Quality Assurance (QA) requirements, specifically 10 C.F.R. Part 50, Appendix B. The Petition alleges that the recent organizational changes discussed above with respect to construction of the Seabrook facility make it unclear who has authority over the construction quality assurance in violation of Criterion I of Appendix B. The Petition claims that PSNH no longer has clearly established and delineated authority with respect to QA and construction. Further, to the extent that PSNH does retain any control over the construction program for Seabrook, the Petition alleges that PSNH has compromised its authority and organizational freedom to effectively supervise QA by becoming heavily indebted to its contractors and creditors, again in violation of Criterion I of Appendix B.

The current management and organization associated with the implementation of the QA Program at the Seabrook facility have been the subject of a recent NRC Staff review and were found to continue to satisfy the requirements of 10 C.F.R. Part 50, Appendix B. The description of

this management and organizational arrangement is provided in PSNH's letter of October 31, 1984, from W.P. Johnson to G.W. Knighton which has been reviewed by the NRC Staff.⁸ As a result of this review, the Staff found that PSNH has established a new integrated project organization, the New Hampshire Yankee Division, with delegated responsibility for the design, construction and operation of the Seabrook facility. Under this new organizational arrangement, PSNH continues to delegate to the Yankee Atomic Electric Company (YAEC), through the Division, responsibility for establishing and implementing the Quality Assurance Program. Also, PSNH continues to retain ultimate responsibility for this program. This arrangement has been acceptable in the past and complies with Criterion I which permits PSNH to delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the Quality Assurance Program or any part thereof, providing PSNH retains responsibility therefor.

The Petition alleges that responsibilities and authorities over quality assurance are not clearly defined at Seabrook, and specifically, that individuals immediately responsible for QA may be accountable to four different organizations. The Staff has found that lines of responsibilities and authorities over quality assurance are adequately described in the Final Safety Analysis Report (FSAR) § 1.4 "Identification of Agents and Contractors," § 13.1.1.5 "Construction and Construction/Operation Interface," and § 17.1 "Quality Assurance During Design and Construction," which includes a § 17.1.1.1(a) on "Authority, Responsibilities, and Duties." (See Appendix A attached hereto (not published)). From these descriptions, it is clear that QA personnel within YAEC who are responsible for establishing and implementing the Seabrook QA Program report to the YAEC Construction QA Manager. The YAEC Construction QA Manager is assigned exclusively to the Seabrook project and is responsible for interfacing with the New Hampshire Yankee Division Vice President in charge of Administrative Services. United Engineers and Constructors and Westinghouse Electric Corporation QA Programs are extensions of the YAEC QA Program and have been reviewed and accepted by YAEC. YAEC maintains control of these and other contractors by means of audits, surveillance, surveys, investigations and reviews. In turn, YAEC is accountable to the New Hampshire Yankee Division of PSNH which is responsible for the construction of Seabrook Station. The overall responsibility for all activities associated with Seabrook Station resides with the PSNH President and Chief Executive Officer.

⁸ Letter of January 31, 1985 to R.J. Harrison from D.G. Eisenhut transmitting the NRC Staff review, attached hereto as Appendix A (not published).

The New Hampshire Yankee Division consists of an integrated project organization to ensure effective project management control. This integrated organization is comprised of the Director of Construction, the Director of Engineering and Licensing, the Vice President of Nuclear Production, and the Vice President in charge of Administrative Services who is responsible for interfacing with YAEC Quality Assurance Department. Responsibility for quality assurance has been delegated to the YAEC for the development, execution, and administration of the QA Program.

The YAEC Director of Quality Assurance who reports to the YAEC President is responsible for establishing policies under which the Yankee quality assurance organization works, and with which contractors comply. He approves the Seabrook Station Quality Assurance Manual which governs all YAEC program activities and receives copies of correspondence and reports generated by the Quality Assurance Department. He evaluates and reports to the President on the effectiveness of the Quality Assurance Program. He reports on a quarterly basis to the New Hampshire Yankee Division management to keep them advised of the program status. He coordinates the activities and program direction of quality assurance during design, construction and certain phases of operation to maintain a consistency of the program and a continuity of the effort. The YAEC Construction Quality Assurance Manager, who reports to the Director of Quality Assurance, is responsible for the direction and supervision of work performed by the Construction Quality Assurance Group staff, at both the corporate office and at the plant site, and by consultants hired to supplement this staff. Offsite personnel (Home Office QA Engineers) perform staff functions, i.e., develop QA programs and procedures, review technical and QA documentation submittals, provide training and indoctrination and perform audit and/or surveillance functions internally as well as over contractors, constructors, subcontractors and suppliers. Onsite personnel perform QA line functions, i.e., plan and develop verification procedures and controls, perform surveillance activities over constructors and subcontractors and review contractor and subcontractor implementing procedures.

YAEC has delegated to the engineer-constructor, United Engineers and Constructors Inc. (UE&C), and to the nuclear steam system supplier, Westinghouse Electric Corporation-Water Reactor Divisions (WRD), administration and execution of large portions of the Quality Assurance Program associated with the design, procurement and installation of safety-related structures and equipment. UE&C and WRD and their vendors and subcontractors who are responsible for safety-related

components and structures, are required to have quality assurance programs consistent with the requirements of 10 C.F.R. Part 50, Appendix B. The UE&C QA Program is described in Topical Report No. UEC-TR-001. The WRD QA Program is described in the Westinghouse WRD Quality Assurance Plan (WCAP-8370).

The YAEC Construction Quality Assurance Manager has direct communication with Westinghouse and UE&C regarding quality-related activities. YAEC reviews and concurs with all quality-related procedures, programs, plans, that are generated by UE&C. YAEC reviews and concurs with the Westinghouse QA Topical Report and reviews department procedures in the process of auditing Westinghouse performance.

The contractors are responsible for the review and approval of their supplier and subcontractor quality-related documents. The adequacy of the contractors' reviews are verified by YAEC audit and/or surveillance.

The New Hampshire Yankee Division Vice President of Administration and his staff maintain cognizance of and evaluate the QA Program activities in the following manner:

1. Reviews and approves of the YAEC Quality Assurance Program.
2. Participates in major QA decisions and program changes.
3. Receives copies of all YAEC audit reports (internal and external) pertaining to the Seabrook project. Monthly he receives the status of outstanding items indicating the status of audit findings
4. Participates on a quarterly basis in selected external audits by YAEC to assess YAEC performance in contractor activities.
5. Participates on a quarterly basis in selected internal audits of YAEC to assess YAEC performance in QA activities.
6. Performs management audits of YAEC construction quality assurance performance. The management audits are conducted annually using approved checklists and follow a preestablished schedule assuring compliance with the program.
7. Reviews quarterly evaluations of QA Program activities.
8. Receives copies of all YAEC correspondence with contractor relating to QA Program activities.

Organizational changes that culminated in creation of the New Hampshire Yankee Division reinforce the position that PSNH is responsible for the establishment and execution of the Seabrook Quality Assurance Program.

As the above description of the current Quality Assurance Program for the Seabrook facility demonstrates, the lines of organizational authority are clear and well defined and dispel the allegation of the Petition

that individuals immediately responsible for quality assurance may be accountable to four different organizations. As the Staff concluded in Appendix A, establishment of the New Hampshire Yankee Division and the delegated responsibilities to this Division from PSNH have not diluted or weakened the previously approved QA Program for design and construction. Therefore, the organization and the QA Program for design and construction are acceptable for the remaining construction activities at the Seabrook Station.

The Petition alleges that the chief officials of PSNH's New Hampshire Yankee Division are actually employees of, and therefore answerable to, a different corporation, YAEC, suggesting that the Division is subordinate to PSNH in name only.

As was discussed earlier in this Decision, staffing of the Division by employees of YAEC would not be inappropriate if it remained clear that those employees were ultimately responsible to PSNH, as is in fact the case. Indeed, given the explicit recognition by the Licensing Board of the need for YAEC, an entity experienced in nuclear construction and operation, to be involved in the Seabrook project, such staffing is of great importance.

The Petition also alleges that PSNH has compromised its authority and organizational freedom to supervise QA by becoming heavily indebted to its contractors and other creditors. Because of this heavy indebtedness, the Petition alleges that PSNH is in no position to make objective and independent decisions where safety and financial considerations are in opposition. The Petition's allegation lacks specificity in that there is no instance given where such a compromise has actually occurred. Although one could argue that PSNH's position may be weakened by its financial problem, PSNH is well aware of the need for it to demonstrate that it does properly balance safety and financial considerations in the execution of its Quality Assurance Program. It should be emphasized that the Petition fails to point to any instance where a compromise of safety has occurred. This can also be said of the allegation raised in the Petition that, in making difficult QA decisions, PSNH may be influenced by the authority of the other owners to dismiss it immediately as manager of the Seabrook project. No specific instance of undue influence is presented in either instance.

With respect to both of these concerns, the issues raised by the Petition are not unique to the Seabrook project. There may be differences in degree but the problem of an inherent tension caused by the need to keep costs under control while at the same time ensuring that quality meets NRC regulations is an industry-wide one. Financial considerations may make the potential more intense at Seabrook. But Petitioner points

to no specifics indicating a problem in fact. The recent NRC Staff review of organizational changes indicates continued compliance with Commission regulations. Furthermore, NRC oversight of construction activities including extensive field and corporate inspections has failed to identify any compromise by PSNH in the implementation of its Quality Assurance Program. The Construction Quality Assurance Manager and personnel reporting to him have the authority to stop any operation found being performed contrary to approved procedures, specifications, instructions or drawings. It is expected that all provisions of the Licensees' QA Program will be adhered to, including the exercise of stop work authority when appropriate. Failure to adhere to the QA Program can result in NRC enforcement action, including civil penalties and orders. Failure to adhere to the QA Program would be a relevant consideration in the issuance of an operating license for Seabrook. These controls along with the inspection and surveillance activities of the resident inspector and NRC Regional office provide the necessary deterrents to discourage abuse of the QA decision process.

Recent Systematic Assessments of Licensee Performance by the NRC have recognized that management support of quality assurance remains a strong point in the construction of Seabrook Station. In recent NRC meetings with senior New Hampshire Yankee Division management personnel, PSNH has committed that such support of QA will continue. Finally, it should be noted that, during the suspension of construction and in accordance with the "Interim Agreement to Preserve and Protect the Assets of the Investment in the New Hampshire Nuclear Units," dated April 27, 1984, the Joint Owners included QA and QC activities as one of the high priorities for the limited expenditures.

CONCLUSION

The Licensees' activities in the construction of the Seabrook facility are authorized under the construction permit issued for the facility. More specifically, PSNH continues in its role as managing agent solely accountable and responsible for design and construction at Seabrook. Furthermore, the QA Program at Seabrook which has been the subject of a recent Staff review, and ongoing inspection oversight continues to meet the requirements of 10 C.F.R. Part 50, Appendix B. The Petition has failed to raise issues which would warrant the relief requested, namely suspension of construction.

Accordingly, the Petitioner's request for action pursuant to 10 C.F.R. § 2.206 has been denied as described in this Decision. As provided by 10

C.F.R. § 2.206(c), a copy of this Decision will be filed with the Secretary for the Commission's review.

Harold R. Denton, Director
Office of Nuclear Reactor
Regulation

Dated at Bethesda, Maryland,
this 18th day of March 1985.

[Appendix A has been omitted from this publication but may be found in the NRC Public Document Room, 1717 H Street, NW, Washington, DC 20555.]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION

Harold R. Denton, Director

In the Matter of

Docket No. 50-341
(10 C.F.R. § 2.206)

THE DETROIT EDISON COMPANY,
et al.
(Enrico Fermi Atomic Power
Plant, Unit 2)

March 20, 1985

The Director of Nuclear Reactor Regulation denies a request filed by the Safe Energy Coalition of Michigan which requested initiation of an investigation and formal proceeding to ensure adequate resolution of certain safety issues prior to issuance of an operating license for Fermi-2.

TECHNICAL ISSUES DISCUSSED

Emergency response information system, discrepancies between drawings and as-built systems, radwaste systems, fire protection, Mark I containment design.

DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206

By petition dated January 28, 1985, Jennifer E. Puntteney, on behalf of the Safe Energy Coalition (hereinafter referred to as the Petitioner or SECO) requested pursuant to 10 C.F.R. § 2.206 that the Director of the Office of Nuclear Reactor Regulation take specific action to investigate several areas of concern with regard to the Fermi-2 facility, prior to is-

suance of a license for the operation of that facility. The actions requested are summarized as follows:

- Investigate information system problems, including the consistency of computer data systems, systems coding/coding maintenance, and related data retrieval;
- Investigate the lack of records for the as-built design of the facility electrical and instrumentation systems;
- Require the Detroit Edison Company (DECo) to perform additional tests to verify the adequacy of radwaste systems in view of modifications made to those systems, and provide proprietary information for the NUS Corporation portable radwaste system for the interim processing of liquid and solid radwastes.
- Require DECo to install an alternate safe shutdown system prior to licensing to ensure compliance with NRC fire protection guidelines; and
- Confirm the adequacy of the General Electric Mark I containment design.

By letter dated March 11, 1985, the Director acknowledged receipt of the petition and informed the Petitioner that her request was being addressed by the NRC Staff. DECo provided its comments on the petition in its letter dated February 22, 1985. A notice that the petition was being reviewed was published in the *Federal Register* (50 Fed. Reg. 10,561 (Mar. 15, 1985)). The NRC has since completed its review of the areas of concern identified by the Petitioner, and for the reasons stated in this Decision, the petition is denied.

BACKGROUND

The Detroit Edison Company holds Construction Permit No. CPPR-87, issued by the Atomic Energy Commission (predecessor to the Nuclear Regulatory Commission) on September 26, 1972, authorizing construction of the Fermi-2 facility, located on the western shore of Lake Erie, in Frenchtown Township, Monroe County, Michigan. In October 1974, DECo submitted an application for an operating license for Fermi-2. The application was docketed on April 4, 1975, and the operational safety and environmental review initiated by the NRC Staff at that time. Hearings on the operating license application were held before an Atomic Safety and Licensing Board, at the conclusion of which the Board authorized issuance of an operating license. See LBP-82-96, 16 NRC 1408 (1982), *aff'd*, ALAB-730, 17 NRC 1057 (1983).

In addressing each area of concern presented in the petition which follows, portions of the petition are excerpted followed by the NRC findings and determinations on each concern.

(1) Computer Systems

Statement of Concern

Information systems at Fermi-2 are "awful" according to sources we have been in contact with. Consistency in the different data systems and their coding has not been maintained. Further, input into the data base has not been consistent with the codes used for indexing documents. There is difficulty retrieving data and there has not been time to fix these problems. To compound the situation Detroit Edison has reduced personnel that take care of all documentation and vaults. Further allegations by our sources reveal that despite the Construction Team Assessment (CAT) conducted in the Summer of 1984 by Duke Power, the problem of how long it takes to retrieve the documentation has not been addressed at Fermi-2. Retrieval of information for many critical parts of the plant is not readily available, some not available at all and could take days to retrieve.

In addition to the above information the following documentation is available on this matter: In an October 6, 1984 letter (EF-72264) from Wayne Jens, Detroit Edison's Vice President, Nuclear Operations, to B.J. Youngblood, Chief of Licensing at the NRC, Branch 1, the schedule and problems of the Emergency Response Information System (ERIS) and the Safety Parameter Display System (SPDS) are described.

ERIS, the automated data acquisition system provides data for the SPDS and for the dose assessment function. The SPDS is a primary function for the control room operations personnel. These systems electronically interface with many plant systems. The schedule for acceptance of critical plant systems has been delayed according to this letter. June 1985 was the anticipated implementation date. But in a December 12, 1984 letter (EF-72264) from Wayne Jens to T.M. Novak, NRC Assistant Director for Licensing, in Attachment C, it is indicated the ERIS/SPDS completion date has been changed to December 1985.

The computer systems in our view must be operational and functional in a highly automated nuclear plant. NUREG-0737, Supplement I supports the need for this matter to be thoroughly investigated and resolved before fuel loading.

NRC Response

The Emergency Response Information System (ERIS) is a computer-based data acquisition and display system. ERIS provides two major functions: (1) display of plant parameters to allow rapid and reliable assessment of the safety status of the plant (SPDS), and (2) display of meteorological and radiological information to allow appropriate implementation of onsite and offsite emergency actions. ERIS provides no automatic plant protection function and no automatic process control function. ERIS is designed to provide plant personnel with concise displays of emergency information, and does not provide or initiate any process or system control function.

The Emergency Response Information System and the Safety Parameter Display System are not required to be operational at the time a nuclear plant is issued an operating license. Supplement 1 of NUREG-0737 (which proposed the requirement) provides that the schedule for the systems will be established on a plant-by-plant basis.

The ERIS/SPDS is not necessary for the safe operation of the plant, but would be used to display plant data and prepare radiation dose assessments in the event of an accident at the plant. These functions will be accomplished by other computer-based systems and manual calculations until the ERIS/SPDS is operational. These interim measures are similar to those in use at many operating nuclear power stations. The adequacy of Detroit Edison's interim measures was demonstrated in two full-scale emergency exercises, the most recent of which was held June 26-27, 1984. DECo's completion date of December 31, 1985, is within the envelope of the completion dates found acceptable by the NRC for operating nuclear power plants and plants under construction.

The Staff's review of the Emergency Response Information System's SPDS function is ongoing. The Staff has reviewed Detroit Edison's Safety Analysis regarding the Fermi-2 SPDS and concluded that it is acceptable for the utility to continue implementing its SPDS Program. If, during its review of the Fermi-2 SPDS, the Staff identifies a significant deficiency in the expected performance of the system, the NRC will direct DECo to make appropriate modifications to the Fermi-2 SPDS.

The other ERIS functions (dose assessment and meteorological monitoring) will be revised as necessary after the ERIS is fully implemented. That evaluation will be done under the Emergency Response Facilities Appraisal Program conducted by the NRC Office of Inspection and Enforcement.

The Petitioner also raised a concern relative to the reliability of data retrieval. This matter is addressed in the Staff's response to Concern (2) which immediately follows.

(2) As-Built Designs

Statement of Concern

In the SALP #5 Report (Systematic Assessment of Licensee Performance) issued recently, the problems of lack of records for the as-built designs for the electrical and instrumentation systems are raised. Delays in fuel loading at Fermi-2 as of this date are contingent on the correction of this problem.

According to the Michigan Public Service Commission's (PSC) "Staff Investigation into the Enrico Fermi-2 Nuclear Project" February 1984, Detroit Edison's internal audits showed that there have been serious problems with document control, inadequate paperwork associated with construction and no adequate control on the design process. Throughout the project several thousand design changes have been made according to PSC.

These criticisms from the Michigan PSC staff have raised our concerns that other areas in addition to the electrical and instrumentation systems identified by the SALP Report could be problematic. Sources at the plant have told us that documentation is not there for many systems that underwent design changes over the last 15 years. These sources indicate documentation was not recorded or it was lost.

Further investigation into other areas besides electrical and instrumentation for confirmation that all records and documentation of design changes has been completed properly and fully. Because of the alleged problems mentioned earlier in Matter No. 1, that is with the coding, indexing and retrieval of information from the plant's data base systems, the Safe Energy Coalition would like your office to investigate how safety issues in Nos. 1 and 2 interface. The total picture must be looked at.

NRC Response

The petition's statement relating to the recently issued SALP 5 Report (Systematic Assessment of Licensee Performance) identifying problems with the as-built plant versus the design in the electrical and instrumentation systems is correct. That SALP assessment was based on NRC inspections which identified violations of NRC regulations and other Detroit Edison Company (DECo) commitments to the NRC; subsequent NRC inspections found additional problems in these areas.¹ The Duke Construction Appraisal Team (CAT) evaluation performed by the

¹ See NRC Inspection Reports 50-341/84-14, -17, -45, -49, -50, -57, -62, -68, and 85-04, -09.

Duke Power Company acting as an independent reviewer, also identified findings in these areas.² On February 16, 1985, DECo identified the as-built versus design matter as construction deficiencies to the NRC in accordance with 10 C.F.R. § 50.55(e). These deficiencies were only related to instrumentation and control and electrical areas of the plant, and they encompassed the problems identified by the NRC. The DECo report provided a description of the deficiencies, an analysis of safety implications, and a corrective action program.

DECo's corrective actions concerning this matter were assessed during NRC inspections, and were reviewed and discussed at two public meetings held at the Fermi-2 site on February 13 and 20, 1985. As a result of these efforts, the NRC Staff concludes that the corrective action program set forth in DECo's § 50.55(e) report, as revised in subsequent correspondence between DECo and the NRC, is adequate to resolve this issue.³ The NRC conducted further inspection efforts at Fermi-2 and concluded that the corrective actions necessary to support issuance of a license permitting fuel load and low-power testing were adequately implemented. The remaining issues will be completed as required by conditions to the operating license.

The Petitioner asserts that further investigation was needed into other areas besides electrical and instrumentation to confirm that all records and documentation of design changes have been completed properly and fully. As-built problems of the magnitude of those found in the electrical and instrumentation areas have not been identified during NRC inspections of other plant areas. In those instances where the NRC found problems in the mechanical, piping, piping support, and structural areas, those problems were analyzed and satisfactorily resolved without requiring hardware modifications. The problems in those areas were judged to be isolated cases and not indicative of the problems uncovered in the electrical and instrumentation areas. The NRC Staff, therefore, did not require the scope of DECo's corrective action program to be extended beyond the electrical and instrumentation areas.

Design changes are not unusual at a nuclear plant, and in fact, provisions must be in place for an orderly implementation of proposed changes. Changes occur as a result of many reasons including construction problems, and thus field changes are made. These changes are subsequently reviewed to ensure that the final as-built configuration satisfies

² See Duke Power Report, Fermi-2 Final Assessment of Construction, dated July 1984.

³ See NRC Region III Letters to DECo dated March 8 and 13, 1985, and DECo Letter to the NRC Region III dated March 9, 1985.

design criteria. For Fermi-2, the NRC does not have a concern related to this area.

The Petitioner questioned how its Concern Nos. 1 and 2 interface. The issue associated with the as-built plant versus the design in the electrical and instrumentation systems is not related to the problems alleged in the area of computer systems (Concern No. 1). The computer systems can be divided into two separate areas as follows:

1. The computer and associated ERIS-SPDS system and,
2. The Automated Records Management Systems (ARMS).

The ERIS-SPDS is a nonsafety-related system used as an augmented aid during operations and reactor transients. The ARMS system is an integral part of DECo's records management system. The NRC identified deficiencies in this system as early as 1979. Subsequent inspections to assess the performance of this system continued as part of the normal inspection program. The primary deficiency identified by the NRC was DECo's failure to properly post design changes against drawings. DECo has taken corrective action in the intervening period which the NRC Staff found acceptable. The deficiencies identified in the computer system cited above are not related to the deficiencies identified in safety-related electrical and instrumentation drawings and their representation of the as-built plant.

(3) Radwaste Processing System

Statement of Concern

The Radwaste Processing System will not be tested and functional at the time of fuel load according to two letters from Wayne Jens to B.J. Youngblood, Chief of the NRC Licensing Branch No. 1, dated October 11, 1984 (EF-71992) and December 18, 1984 (EF-72035). Detroit Edison plans to use the NUS Corporation's portable radwaste system for liquid and solid radioactive waste. Portions of the permanent facility as indicated in a December 12, 1984 letter (Wayne Jens to T.M. Novak) (EF2-72028-Attachment C) necessary to support the vendor radwaste system are to be completed before initial criticality and the complete system by "warranty run." In addition, Edison has no program for disposal of potentially radioactive oil.

In 1979, Detroit Edison engineers found serious design flaws with almost every subsystem of the Radwaste Processing Facility at Fermi-2. In an April 1980 study by the NUS Corporation, "Report of Evaluations: Enrico Fermi-2, Solid and Liquid Radwaste Systems," confirmed that "the system as designed and installed was inoperable, inefficient, unsafe, and uneconomic." Edison engineers were further criticized by

the Michigan Public Service Commission Staff investigation in February 1984 for ignoring “numerous elementary design consideration and basic laws of physics.” Some of these included: extremely poor piping arrangements, locations of valves and motors, disregard for radiation exposure levels, unnecessary and excessive person power, etc. The report further states that “modifications to the Radwaste facility have been extensive including the rip out of large components, piping, and relocation of equipment, etc. Inherent features of the original design will continue to inhibit efficient operation of the radwaste system.”

The Safe Energy Coalition believes it is the responsibility under the Atomic Energy Act and Code of Federal Regulations to ensure the safe operation of this facility. This, in our opinion is not the case at this time. We request further investigation into this matter and insist on making public the NUS Corporation’s proprietary portable radwaste system. The public has the right to know what systems are being used to protect their environment, health and safety.

NRC Response

With respect to the SECO concern about the radioactive waste processing systems not being fully tested and functional at the time of fuel load, the NRC is aware of this situation and considers it acceptable for licensing.⁴ DECo previously informed the NRC that the permanent systems might not be available, prior to the start of fuel loading, and has submitted descriptions of the temporary systems for review and approval. The NRC has reviewed the temporary system for processing liquid radwaste and has found it to be acceptable for plant operation up to 5% of full power. DECo will be required to have the approved permanent liquid radwaste system operational before plant operation is permitted to exceed 5% of rated thermal power.

The temporary solidification system is currently being reviewed by the NRC, and is not required to be completed for licensing. DECo will not be permitted to solidify radwaste until the system has been approved by the NRC. The temporary solidification system design proposed by DECo is a proven technology so that the NRC review will consider detailed plant-specific requirements. This review may require minor design modifications. The solidification system’s general design acceptability is, therefore, not in question.

⁴ See §§ 11.2.1 and 11.2.3 of Supplement No. 5 to the Fermi-2 SER, March 1985.

SECO has also requested the NRC make available to the public, the NUS Corporation (NUS) proprietary report, describing the portable radwaste system to be used at Fermi-2, in order to be convinced of the safety of that system. The system in question is described in a nonproprietary report which has been filed in the Public Document Room and docketed since May 1983. The NRC finds that this nonproprietary report contains sufficient information on the portable system design to assess its safety and reliability implications. Nonetheless, the NRC has offered to make arrangements with SECO through Ms. Puntenney which will permit SECO to review the requested proprietary information under an appropriate protective agreement.

With respect to SECO's concern relative to contaminated oil, DECo has not proposed a specific program for the disposal of possibly contaminated oil at the Fermi-2 facility. A similar situation exists at other operating nuclear power plants. This is not unusual because contaminated oil may be safely stored on site for extended periods of time prior to disposal. Prior to any removal, the method for disposal must be approved by the NRC. For example, if the oil is to be solidified and shipped for disposal, the solidification must be performed in accordance with NRC-approved processes, and the product must meet the applicable Commission regulations. As such, the absence of a DECo commitment at this time does not constitute or indicate either a lack or disregard for public safety or a failure to meet NRC requirements.

Lastly, the design deficiencies alluded to by SECO were identified in a DECo internal review. Subsequently, DECo has modified the system. The modified system was reviewed by the NRC and found to meet all applicable regulatory requirements.⁵ Nonetheless, as requested by SECO, the NRC conducted a further review of the radwaste systems and has reaffirmed its prior findings on the radwaste system design; i.e., when fully constructed and made operational these systems will meet all regulatory requirements and protect the health and safety of the public.

(4) Fire Protection

Statement of Concern

The Safe Energy Coalition is still not satisfied with the NRC's discretionary decision to allow Detroit Edison to load fuel and operate Fermi-2 without an alternate shutdown system in place. . . .

⁵ See §§ 11, "Radioactive Waste Management," of Supplement No. 3 to the Fermi-2 SER.

To allow Detroit Edison the option to delay installing an alternate shutdown system until the first fuel outage (1986) is inexcusable with the length of time Edison has had to reroute cables and design and implement an alternate shutdown capability elsewhere in the plant.

The Safe Energy Coalition vehemently opposes the continued relaxing of NRC strict standards for fire protection knowing the realized hazards that fires pose at nuclear plants, especially with the Fermi-2 plant design without the alternate shutdown system in place.

In the M.D. Lynch summary document of July 11, 1984, Detroit Edison supplied the NRC with a brief fire protection history for Fermi-2. In this summary, Edison's knowledge of the Browns Ferry Fire of March 22, 1975, was well documented by themselves with review groups and task forces formed to deal with the issue of fire protection. During this time Detroit Edison had Fermi-2 shut down from 1974-77 for financial reasons and to catch up on their engineering design backlog. Regulatory Guides were issued in 1976 and 1977, ANSI Standards were released in 1979, followed by NRC regulations, Appendix R in 1980. DECo has had ample time to implement the needed defense-in-depth fire protection that includes the most critical component, an alternate shutdown capability.

We request that full implementation, prior to fuel load and low-power operation, of the shutdown system be required. Further investigation, explanation, and justification for NRC approval of Edison's fire protection systems is in order. We regard this as a very serious matter and would like public hearings called under § 2.202 (Show Cause).

NRC Response

The alternate shutdown system proposed by DECo and approved by the NRC,⁶ will allow the reactor to be maintained in a safe shutdown condition from outside the control room in the event electrical circuits are damaged in the control room due to a fire. The alternate shutdown system is required to be fully installed and operational no later than December 31, 1986; it may be fully operational as early as October 1985.⁷ However, redundant shutdown systems are already in place and with the separation provided in the Fermi-2 control room, and the required interim procedures, there is reasonable assurance that at least one division of shutdown systems will be available in the event of a control room fire.

⁶ See § 9.5.1 of Supplement No. 5 to the Fermi-2 SER.

⁷ See License No. NPF-33, Condition 2.C(10)(d).

The delay in implementing the alternate shutdown system occurred in mid-1984 when it was determined that the electrical panels and ventilation system for the control room were not installed in accordance with the design approved in the Supplement No. 2 to Fermi-2 SER and because the as-installed fire protection features in the relay room were considered marginal.⁸ DECo proposed to provide an alternate shutdown capability independent of the control room and the relay room which would physically and electrically isolate these areas.⁹ The NRC concluded that this new design is more desirable than the original design, and granted a delay in implementation while imposing interim compensatory measures.¹⁰

The NRC has accepted DECo's proposed schedule for operability of the independent alternate shutdown system, with the provision that compensatory measures be taken in the interim. These compensatory measures include the development of procedures to maintain the plant in a safe shutdown condition in the event of limited fire damage in the control room. These procedures must be fully tested and the plant operating personnel trained in the use of the procedures prior to initial criticality. Compensatory measures have also been taken to limit the fire damage in the control room to one electrical division. These measures include a fire watch in the control room and modifications to the control room panels to limit fire damage to one panel. The compensatory procedures and equipment have been reviewed and accepted by the NRC.¹¹ The alternate shutdown system and the interim compensatory measures are discussed in detail in § 9.5.1 and Appendix E of Supplement 5 to the Fermi-2 SER.

Based on DECo's schedule for operability of the alternate shutdown system, and on the adequacy of the interim compensatory measures to be implemented, DECo meets the requirements for fire protection as required by General Design Criterion 3 of Appendix A to 10 C.F.R. Part 50.

⁸ See § I.A of Appendix E to Supplement No. 5 of the Fermi-2 SER.

⁹ *Ibid.*

¹⁰ See §§ VII.C and VII.D of Appendix E to Supplement No. 5 of the Fermi-2 SER.

¹¹ See § VII.D of Appendix E to Supplement No. 5 of the Fermi-2 SER.

(5) General Electric Mark I Boiling Water Reactor and Containment

Statement of Concern

Serious problems have become apparent with this older, obsolete reactor design, particularly in regards to the constructability and accessibility and the ability of the containment to hold in a serious accident. Design modifications had to be made at Fermi-2 to the torus and the drywell steel. The small containment, defects in the pressure-suppression system (torus) and the volumes of possible failures for this type of reactor cannot be, in our view, ignored in licensing this plant. It should not be put in the "generic, unresolved" category of the NRC to be solved sometime in the future.

In the book, the *Occult of the Atom*¹² by Daniel Ford, as early as 1971, the Atomic Energy Commission (AEC) through its safety analysts proposed to senior AEC officials the banning of "the pressure-suppression containment scheme" of which Fermi-2 is included. Technical analysis was never challenged and no objections were raised on scientific grounds. The reply by Joseph Hendrie, Senior AEC official, was the following:

the acceptance of pressure-suppression containment concepts by all elements of the nuclear field, including Regulatory and the A.C.R.S., is firmly embedded in the conventional wisdom. Reversal of this hallowed policy, particularly at this time, could well be the end of nuclear power. It would throw into question the continued operation of licensed plants, would make unlicensable the G.E. and Westinghouse ice-condenser plants now in review and would generally create more turmoil than I can stand thinking about.

This matter has been ignored for too long. The Safe Energy Coalition requests resolution of this generic issue and guarantees from the NRC that Fermi-2's reactor design and operation will not either endanger public health and safety, increase worker exposure, or contaminate the surrounding environment. More thorough investigations and hearings are, we feel, warranted. Fuel loading should not be expedited because of lack of solutions.

NRC Response

The Mark I containment design, which is used in the Fermi-2 facility, represents a containment concept which has evolved into a proven de-

¹² Correct title is *Cult of the Atom*.

sign. This evolution has spanned a 20-year period of operating experience and testing. With the completion of each test program, whenever the results showed them to be necessary and whenever indicated by operating experience, additional design specifications have been added to the Mark I design. DECo has incorporated all of these changes into the containment design for the Fermi-2 facility. At the present time, there are no ongoing generic test programs for the Mark I design.

All of the test programs have been completed with the exception of plant-specific confirmatory testing of the safety relief valve quencher device.¹³ DECo is required to complete this test program prior to start of the second cycle of operation, as stated in Supplement No. 5 to the Fermi-2 SER.¹⁴ The results of the generic test programs have been reviewed by the NRC and acceptance criteria published in several NUREG reports as identified below. Therefore, the NRC has concluded that there are no outstanding generic safety issues associated with the Mark I containment design as used in the Fermi-2 facility.

It is true, as the Petitioner indicates, that a number of safety issues had been raised since the Mark I concept was first developed for the Humboldt Bay Nuclear Power Plant in the period 1958-1962. However, at no time was it shown that the containment would fail as a result of the various concerns; modifications have been recommended and implemented at the Fermi-2 facility and other plants to maintain acceptable design margins. These concerns were documented in a memorandum written by Dr. S.H. Hanauer in 1972. Dr. Hanauer at that time was technical advisor to the AEC's Director of Regulation. It is believed that the references in the SECO petition, to concerns stated by senior AEC officials, were identified in the above-mentioned memorandum. These concerns were also the subject of considerable interest by several members of the U.S. Congress and the public during 1978. To address the issues cited above and to summarize the technology of water suppression containments, including the Mark I design, the NRC issued NUREG-0474 in July 1978. In the judgment of the NRC, NUREG-0474 demonstrated that: (1) the safety issues had been satisfactorily identified; (2) the licensed BWR facilities could withstand the containment loads associated with these concerns; and (3) a comprehensive program of tests was under way to investigate the details of the pressure suppression phenomena.

Since the issuance of NUREG-0474, the ongoing testing programs have been completed. The NRC reported in NUREG-0661, "SER on

¹³ See § 3.8.1 of Supplement No. 5 to the Fermi-2 SER, and License No. NPF-33, Condition 2.C(4).

¹⁴ *Ibid.*

Mark I Containment Long-term Program,” dated July 1980, an evaluation of the test program results. Included within the report were acceptance criteria that, if followed, would result in an acceptable containment design. DECo demonstrated compliance with these criteria in its plant-specific analysis report. The NRC found the Fermi-2 report acceptable.¹⁵ With this satisfactory finding, the NRC concludes that the containment design for Fermi-2 is acceptable, subject to satisfactory completion of the confirmatory items related to in-plant testing of the safety relief valves, with no outstanding unresolved safety issues.

CONCLUSION

For the reasons stated in the NRC responses above, the Petitioner’s request has been denied.

A copy of this Decision is being filed with the Office of the Secretary of the Commission, for the Commission’s review in accordance with 10 C.F.R. § 2.206(c) of the Commission’s regulations. This Decision will become the final action of the Commission 25 days after the date of issuance unless the Commission, on its own motion, institutes a review of the decision within that time.

Harold R. Denton, Director
Office of Nuclear Reactor
Regulation

Dated at Bethesda, Maryland,
this 20th day of March 1985.

¹⁵ See § 3.8.1 in both Supplement Nos. 3 and 5 to the Fermi-2 SER.



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

In the Matter of

Docket Nos. 50-289
50-320
50-219
(Petition for Relief
Under 10 C.F.R. § 2.206)

GENERAL PUBLIC UTILITIES
NUCLEAR CORPORATION
(Three Mile Island Nuclear
Station, Units 1 and 2)
(Oyster Creek Nuclear Generating
Station)

April 4, 1985

The Commission clarifies the basis for the denial by the Director, Office of Nuclear Reactor Regulation, of a petition requesting that the licenses held by the General Public Utilities Nuclear Corporation to operate the Three Mile Island and Oyster Creek nuclear facilities be revoked on the ground that it lacks the necessary character to operate them safely. As a separate matter, the Commission denies the Petitioners' request for a hearing under the Atomic Energy Act on the Licensee's character.

RULES OF PRACTICE: SHOW-CAUSE PROCEEDING

The principle is now firmly established that parties must be prevented from using 10 C.F.R. § 2.206 as a vehicle for reconsideration of issues previously decided, or for avoiding an existing forum in which they more logically should be presented. *Consolidated Edison Co. of New York* (Indian Point, Units 1, 2 and 3), CLI-75-8, 2 NRC 173, 177 (1975). See also, e.g., *Rockford League of Women Voters v. NRC*, 679 F.2d 1218 (7th Cir. 1982); *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-6, 13 NRC 443, 444 (1981).

RULES OF PRACTICE: SHOW-CAUSE PROCEEDING

Because there must be finality to administrative decisionmaking, those who are not parties to a proceeding must be prevented from using 10 C.F.R. § 2.206 as a means to reopen issues previously adjudicated. See, e.g., *Northern Indiana Public Service Co.* (Bailly Generating Station, Nuclear-1), CLI-78-7, 7 NRC 429 (1979), *aff'd*, *Porter County Chapter of the Izaak Walton League, Inc. v. NRC*, 606 F.2d 1363 (D.C. Cir. 1979).

ATOMIC ENERGY ACT: RIGHT TO HEARING

There is no right to a hearing under the Atomic Energy Act simply because questions are raised about a licensee's character.

MEMORANDUM AND ORDER

On August 13, 1984, several individuals and groups jointly filed a petition requesting that the Commission revoke the licenses granted General Public Utilities Nuclear Corporation (GPUN or Licensee) to operate the Three Mile Island (TMI) and Oyster Creek nuclear facilities.¹ One of those petitioners, Three Mile Island Alert (TMIA), is also a party to the TMI-1 restart proceeding. The others are not.² The petitioners alleged

¹ Additional sections supplementing the petition were filed on October 1, 1984. Licensee filed a response to the petition on October 12, 1984.

² The other petitioners are Pennsylvania State Senator John J. Shumaker, Pennsylvania State Representative Peter C. Wambach, Jr., Dauphin County Commissioner Larry J. Hochendoner, Harrisburg City Councilmember A. Jane Perkins, The Monmouth County Safe Energy Alternatives Alliance, Essex County Women's International League for Peace and Freedom, the Essex SEA Alliance, and New Jersey SANE.

that Licensee's past record demonstrates deficiencies in "foresight, judgment, perception, resolve, integrity and values." Petitioners claim that these alleged deficiencies show that Licensee does not have the necessary character to operate a nuclear facility safely. The Petitioners apparently filed this petition because of their belief that the NRC has no available forum to consider Licensee's overall character. The Petitioners assert in this connection that Licensee's overall character will not be considered in the TMI-1 restart proceeding.

The Director, Office of Nuclear Reactor Regulation, denied the request on January 15, 1985 (DD-85-1, 21 NRC 263). The Director discussed the substance of Petitioners' allegations as they related to each facility in question, and found in each case that the allegations did not provide an adequate basis for instituting enforcement proceedings.³ The Director also noted that it would be inappropriate to institute enforcement proceedings regarding TMI-1 because the Commission then had pending before it the question of whether further hearings were required in the TMI-1 restart proceeding on many of the issues raised in the 2.206 petition.

The Commission agrees with the Director's Decision insofar as it declines to institute separate proceedings. However, the Commission has decided because of the importance of the principle involved to clarify the basis for that holding.

The principle is now firmly established that "parties must be prevented from using 10 C.F.R. 2.206 procedures as a vehicle for reconsideration of issues previously decided, or for avoiding an existing forum in which they more logically should be presented." *Consolidated Edison Co. of New York* (Indian Point, Units 1, 2 and 3), CLI-75-8, 2 NRC 173, 177 (1975). See also, e.g., *Rockford League of Women Voters v. NRC*, 679 F.2d 1218 (7th Cir. 1982); *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-6, 13 NRC 443, 444 (1981). The court explained in *Rockford League*:

Government agencies have limited resources to perform their appointed tasks. The courts cannot tell them how to allocate those resources so as to get the most value out of them. That calls for a managerial judgment. The Byron Station is not the only nuclear power plant under construction or in operation that the Nuclear Regulatory Commission has to worry about. The Commission is in the midst of one proceeding dealing with the Byron plant, the licensing proceeding, in which the safety issues that trouble the League will be considered and in which hearings are

³ The Petitioners requested the Commission to issue an order revoking GPUN's license. The Commission cannot revoke a license without instituting an enforcement proceeding. Hence the Director properly framed the issue as whether enforcement proceedings were warranted.

about to start in which the League, as a result of its recent reinstatement, can still participate if it wants. We cannot say that the Commission must launch another proceeding on the same issues at the same time — which is what the League wants us to say — rather than use the adjudicatory resources that would be consumed in such a proceeding somewhere else in its regulatory domain.

679 F.2d at 1222.

Because there must be finality to administrative decisionmaking, this principle also applies where those not parties to a proceeding seek to use 10 C.F.R. § 2.206 as a means to reopen issues previously adjudicated. *See, e.g., Northern Indiana Public Service Co.* (Bailly Generating Station, Nuclear-1), CLI-78-7, 7 NRC 429 (1979), *aff'd*, *Porter County Chapter of the Izaak Walton League, Inc. v. NRC*, 606 F.2d 1363 (D.C. Cir. 1979).

Petitioners, who never specifically addressed this principle, did contend that Licensee's overall character is not being considered in the restart proceeding. If there were significant issues bearing on Licensee's character falling outside the scope of the restart proceeding, then there might be a reason to consider Petitioners' request.

However, Licensee's overall character is being considered in the restart proceeding. *See, e.g., Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), CLI-85-2, 21 NRC 282 (1985); NUREG-0680, Supp. No. 5, "TMI-1 Restart: An Evaluation of Licensee's Management Integrity as It Affects Restart of Three Mile Island Nuclear Station, Unit 1," July 1984. Consideration of Licensee's overall character does not mean, as Petitioners apparently believe, that every past issue bearing on Licensee's character must be litigated in adjudicatory hearings. Rather, the Commission in the restart proceeding has considered whether new issues bearing on Licensee's character are significant enough to warrant reopening of the record. With regard to the argument that the issues must be considered in the aggregate, the Commission in CLI-85-2 stated: "Whether there was one or many past improper acts, the issue today is whether adequate remedial steps have been taken to provide reasonable assurance that the plant can be operated safely. Any improper acts would need to be considered in the aggregate only if they still posed a current significant safety concern." 21 NRC at 286 n.5.

The petition does state a few issues not specifically raised within the restart proceeding. The Commission finds that these few issues do not warrant institution of enforcement proceedings. The Director adequately discusses why the allegations concerning Oyster Creek do not raise any current significant safety concern. With regard to the TMI-2 cleanup issues not considered in the TMI-1 restart proceeding, the Director adequately explained why Licensee's performance in the cleanup is ade-

quate. However, the Director also noted that two compliance matters regarding the cleanup remain pending before the agency. The Commission will take whatever action is appropriate when the agency's review of those two items is completed.

In accord with the above discussion, the petition is being denied because it is an attempt to relitigate issues properly considered in the restart proceeding. To the extent the petition may raise issues outside the scope of the restart proceeding, the Director has adequately addressed the current significance of those issues. In the absence of any current safety concern regarding those issues, there is no need to consider any aggregate impact.⁴ The petition is therefore denied.

Commissioner Asselstine disapproved this Order.

It is so ORDERED.

For the Commission

JOHN C. HOYLE
Acting Secretary of the
Commission

Dated at Washington, D.C.,
this 4th day of April 1985.

⁴ As a separate matter, Petitioners on February 4, 1985, submitted a pleading entitled "Formal Request for an Adjudicatory Hearing on Character Pursuant to Section 189 of the Atomic Energy Act." Petitioners in that pleading asserted that § 189a of the Atomic Energy Act requires that there be a hearing on licensee's character where sufficient facts are presented to bring a licensee's character into doubt. There is no statutory right to a hearing simply because questions are raised about a licensee's character, and Petitioners' request is accordingly denied.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

In the Matter of

Docket No. 50-289-SP
(Restart)

METROPOLITAN EDISON COMPANY,
et al.
(Three Mile Island Nuclear
Station, Unit 1)

April 5, 1985

The Commission affirms a Licensing Board member's decision denying intervenors' motion seeking his disqualification from further participation in the Three Mile Island, Unit 1 restart proceeding.

DISQUALIFICATION: STANDARDS

The parties in an adjudicatory proceeding have a right to an impartial adjudicator, both in reality and in appearance to a reasonable observer. However, they do not have a right to the judge of their choice.

DISQUALIFICATION: STANDARDS

The right to an impartial adjudicator does not mean that favorable rulings must be divided equally between the parties, or that a judge may not occasionally use strong language toward a party or in expressing his views on matters before him.

DISQUALIFICATION: STANDARDS

The fact that a judge's actions may be controversial or may provoke strong reactions by the parties does not provide grounds for disqualification.

DISQUALIFICATION: STANDARDS

In considering whether information in an extrajudicial communication demonstrates bias, it is the *source* of the information, not the *forum* in which it is communicated, that controls.

DISQUALIFICATION: STANDARDS

Even if Canons 2 or 3 of the Code of Judicial Conduct are violated in a particular case, disqualification will not follow *per se*.

DISQUALIFICATION: STANDARDS

The purpose of Canon 2B of the Code of Judicial Conduct which states that a judge "should not lend the prestige of his office to advance the private interests of others" and further that the judge "should not testify voluntarily as a character witness" is to prevent a judge's testimony from having an undue influence in a trial.

DISQUALIFICATION: STANDARDS

Canon 3A(6) of the Code of Judicial Conduct which states that a "judge should abstain from public comment about a pending or impending proceeding in any court" is meant to apply to general public comment, not to imparting specific information to a court.

MEMORANDUM AND ORDER

The Commission has before it the issue of whether Judge Ivan Smith should be disqualified from further participation in the Three Mile Island, Unit 1 (TMI-1) restart proceeding. As explained below, the Commission has decided that Judge Smith correctly denied the motions seeking his disqualification.

The Commonwealth of Pennsylvania, Three Mile Island Alert (TMIA), and the Union of Concerned Scientists (UCS) moved to disqualify Judge Smith, and have appealed Judge Smith's decision denying their motions. Collectively they cite three acts by Judge Smith as the basis for disqualification: (1) his December 27, 1984 letter to United States District Court Judge Sylvia H. Rambo urging the court to be lenient in sentencing James R. Floyd, former TMI-2 Supervisor of Operations; (2) his comments during the proceeding regarding the treatment given three individuals pursuant to a stipulation between Licensee and the Commonwealth (Licensee agreed, among other things, that they would not operate TMI-1); and (3) his treatment of TMIA's counsel and witnesses. The parties on appeal argue that Judge Smith incorrectly applied the standards for disqualification, that the Commission should in any event revise its standards for disqualification, and that the Commission should disqualify Judge Smith as a discretionary matter.

The parties' arguments on appeal are much the same as those presented to Judge Smith, plus an additional request that he be removed as a matter of Commission discretion. The Commission finds that Judge Smith's decision adequately addresses essentially all of the arguments and that Judge Smith need not be disqualified from the TMI-1 restart proceeding.

Whether the Commission enjoys authority to honor the additional request and remove a sitting judge from this adjudicatory proceeding, purely as a matter of discretion, has not been fully briefed. Since we have decided not to remove Judge Smith, however, we need not decide whether the Commission has authority to remove a Licensing Board member solely as a discretionary matter. Judge Smith, the only remaining member of the original TMI-1 restart Licensing Board, has presided over this proceeding for nearly 6 years, and it now appears there are only two issues left in litigation. As the Commission stated in the *South Texas* decision, in denying a request to disqualify a Board member as a discretionary matter, "[t]he proceeding is now well along and the judge has acquired a valuable background of experience." *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), CLI-82-9, 15 NRC 1363, 1367 (1982). The Commission is convinced that Judge Smith is impartial and believes that the loss of his experience in the proceeding militates against any disqualification as a discretionary matter.

Before turning to those few matters warranting some further discussion, the Commission wishes to make the following general observations. The parties in an adjudicatory proceeding have a right to an impartial adjudicator, both in reality and in appearance to a reasonable observer. However, they do not have a right to the judge of their choice. More-

over, the right to an impartial adjudicator does not mean that favorable rulings must be divided equally between the parties, or that a judge may not occasionally use strong language toward a party or in expressing his views on matters before him. Nor does the fact that a judge's actions may be controversial or may provoke strong reactions by the parties provide grounds for disqualification.

In the present case, Judge Smith was the presiding officer at the hearing which first developed the information which led to Mr. Floyd's conviction. In fact, the Licensing Board recommended that the Commission investigate the certification of Mr. Floyd, and it was the report of this investigation that was referred to the Department of Justice. Judge Smith, finding himself in what he considered a unique position, felt obliged to submit his views to Judge Rambo, so that Mr. Floyd's sentence would not be based on incomplete information. Related to the Floyd matter, Judge Smith explains the importance he places on the rule of law and fair treatment of individuals in his discussion regarding his comments on the treatment given individual operators. Judge Smith's convictions on the importance of the rule of law and the Floyd matter and on the importance of the manner in which individuals are treated generally, both in NRC proceedings and in criminal trials, do not deserve any Commission criticism.

As we stated above, only a few matters require additional Commission comment.¹ With regard to the actions by Judge Smith which form the bases for the motions to disqualify, the Commission finds that only the letter to Judge Rambo warrants further discussion.²

The Commission agrees with Judge Smith's analysis that it is the *source* of the information, not the *forum* in which it is communicated, that controls.³ Intervenors also argue that certain phrases in the letter such as "Mr. Floyd's deception was an impulsive act and was . . . not

¹ The Commission rejects the argument that it should revise its standards for disqualification to apply the same test to both judicial and extra-judicial conduct. The Commission rejected this argument in *South Texas, supra*. No new argument has been presented which would cause the Commission to reconsider its *South Texas* decision.

² With regard to the other two actions, the Commission finds that Judge Smith's decision is sufficient. The Commission adds in this regard only that TMIA's complaints regarding Judge Smith's treatment of TMIA present a classic case of a litigant unhappy with adverse rulings. TMIA in its brief to the Commission raises numerous such examples not presented to Judge Smith. Even if those examples were properly before it, which they are not, the Commission would find that no further discussion of those allegations was warranted.

With regard to Judge Smith's comments about the stipulation between the Licensee and the Commonwealth, the Commission notes that in CLI-85-2, 21 NRC 282 (1985), it discussed the rights of individuals, and offered Mr. Husted the right to request a hearing on the Appeal Board's condition which affected his employment.

³ The Commission finds no sound basis for the Commonwealth's argument that the purpose of the letter — to influence an important decision — distinguishes this case from those cited by Judge Smith which specifically hold that the *source of the information is controlling*.

motivated by personal ambition,” “[o]ne senses he neglected his examination responsibilities out of a misguided but altruistic effort to attend to matters of perceived greater urgency,” and “severe punishment is not necessary as a deterrent,” are speculations not supported by the record. It is not necessary to avoid disqualification that each statement by Judge Smith be supported by the weight of the evidence in the record. It is enough that the statements will be understood to reflect Judge Smith’s opinion based on the record and his conduct of the proceeding, rather than on some sources outside the proceeding.

Intervenors and the Commonwealth also argue that Judge Smith’s letter violated certain of the Canons of the Code of Judicial Conduct. The Commission believes that several aspects of this challenge to the propriety of Judge Smith’s conduct warrant further discussion.⁴

Canon 2B states a judge “should not lend the prestige of his office to advance the private interests of others; . . . He should not testify voluntarily as a character witness.” Based on the literal language and purpose of Canon 2B, the Commission concludes Judge Smith has not violated the Canon. We believe the purpose of Canon 2 is to prevent a judge’s testimony from having an undue influence in a trial, which consideration is not applicable here. This interpretation is supported by the literal language of Canon 2, which uses the terms “testify” and “character witness.” Judge Smith did not testify, nor did he appear as a character witness.⁵ In addition, the Commentary to Canon 2 explains why a judge should not testify as a character witness: “The testimony of a judge as a character witness injects the prestige of his office into the proceeding in which he testifies and may be misunderstood to be an official testimonial.” These considerations do not apply here. A judge would not likely be influenced by the prestige of another judge’s office, nor would a judge view such a communication as an official testimonial.

Nor did Judge Smith violate the prohibition in Canon 2B against lending “the prestige of his office to advance the private interests of others.” Judge Smith explained in his decision that the letter was sent for public purposes, not to advance Mr. Floyd’s private interests. Moreover, Judge Smith in his letter made it clear that he was speaking as a private citizen. Any influence which the letter could have on the matter pending before Judge Rambo would be based on the merits of the information supplied, not on the prestige of Judge Smith’s office.

⁴ Even if Canons 2 or 3 were violated in a particular case, disqualification would not follow *per se*.

⁵ We also conclude that Judge Smith did not violate Canon 2A, which states “[a] judge should respect and comply with the law and should conduct himself at all times in a manner that promotes public confidence in the integrity and impartiality of the judiciary.” Judge Smith acted to ensure that Mr. Floyd’s sentencing was based on complete information. This purpose is not inconsistent with Canon 2A.

It is also argued that Judge Smith violated Canon 3A(6), which states that “[a] judge should abstain from public comment about a pending or impending proceeding in any court. . . .” This Canon was not meant to cover the present situation, where a judge is imparting specific information to another court. Rather, it was meant to apply to general public comment.

In sum, the Commission concludes that Judge Smith’s disqualification is not warranted.⁶

The separate views of Commissioner Asselstine are attached. The additional views of Commissioner Bernthal are also attached.

It is so ORDERED.

For the Commission

JOHN C. HOYLE
Acting Secretary of the
Commission

Dated at Washington, D.C.,
this 5th day of April 1985.

SEPARATE VIEWS OF COMMISSIONER ASSELSTINE

I concur in the result of the Commission’s order. I would not disqualify Judge Ivan Smith from participating further in TMI-1 Restart proceedings. I do not, however, subscribe to all of the reasoning in the Commission’s order so I have not joined in approving that order.

In my dissent on the *South Texas* disqualification decision, I articulated a higher standard for appraising the conduct of the agency’s administrative law judges than did the Commission majority. *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), CLI-82-9, 15 NRC

⁶ Intervenors also argue on appeal that there are inaccuracies in Judge Smith’s decision. For instance, they criticize some of Judge Smith’s discussion of the prior history of this matter, including his statement that the moving parties do not sufficiently understand the demands placed on the TMI-1 operators, and TMIA challenges Judge Smith’s statements regarding the strength of the actions he has taken against the Licensee. They also note that Judge Smith is incorrect when he states that the stipulation between the Commonwealth and the Licensee was not approved by a Board. None of these arguments relate to the substance of Judge Smith’s decision that the legal standards for disqualification have not been met, and accordingly they do not require further discussion.

1363 (1982). I feel very strongly that our licensing proceedings must not only be fair to all parties, but that they must be perceived to be fair. That is one reason I apply a high standard to disqualification motions. However, I recognize that emotions run high during what are, after all, adversary contests, and that is why my standard is based on what a reasonable and objective observer might perceive about the conduct of the judge.

I have carefully considered the claims of all of the parties on this motion. I have reviewed relevant portions of the record, and I have reviewed the relevant legal authority. I am unable to conclude that an objective, reasonable person aware of all of the circumstances of this case would reach the conclusion that Judge Smith's impartiality — that is, his ability to pass judgment on the merits of the remaining issues in the TMI-1 Restart case in a fair and impartial manner — might reasonably be questioned.

Despite this conclusion, I am concerned with the propriety of Judge Smith sending a letter to Judge Rambo commenting on what Judge Smith perceived to be Mr. Floyd's motivations in cheating on an exam. I believe that Judge Smith should not have sent the letter and that he violated the spirit, if not the letter, of Canon 2 of the Code of Judicial Ethics in doing so. It is clear to me that Judge Smith, at the urging of Mr. Floyd's counsel, lent the prestige of his office as an administrative law judge with the NRC to assist Mr. Floyd by urging Judge Rambo to be lenient when sentencing Floyd. I see no public purpose served by Judge Smith's actions, and in my opinion, Judge Smith exhibited poor judgment in sending the letter to Judge Rambo. Despite my personal disagreement with Judge Smith's actions, I am unable to conclude that the letter demonstrates that Judge Smith will not fairly and impartially decide the remaining issues in the TMI-1 Restart proceeding.¹ Judge Smith's letter does not evidence prejudgment on any issue now before the Board. The Floyd issue is no longer before the Licensing Board for decision, and Judge Smith's statements in the last paragraph of his letter seem merely to be an expression of his faith in the administrative process rather than any prejudgment or bias on issues before the Board.

I also do not believe that the other grounds for disqualification cited by the parties require that we disqualify Judge Smith. TMIA claims that certain rulings adverse to TMIA show that Judge Smith is biased against TMIA. I have reviewed those portions of the transcript cited by TMIA, and I cannot agree. The mere fact that a judge makes rulings adverse to

¹ It is also not clear that the Commission has specifically applied the Code of Judicial Ethics to our administrative law judges. I think the Commission should consider doing so.

a party does not require disqualification. I could discern no evidence of prejudice in the cited rulings and comments of Judge Smith.

Judge Smith also expressed disagreement with the manner in which certain individuals had been treated as a result of the reopened management hearings. I have also reviewed these portions of the transcript, and it appears that Judge Smith's disagreement arises at least in part from his concern for protecting the due process rights of individuals. I cannot fault Judge Smith for being protective of due process rights. While Judge Smith should not have expressed his disagreement with the settlement agreement between the Commonwealth and the Licensee in the manner in which he did, his comments on this score do not indicate that he would decide the issues before him in other than a fair and impartial manner or that he would hesitate to make whatever findings he felt necessary to protect the public health and safety.

In sum, even applying the higher standard I articulated in *South Texas* I do not believe that petitioners have established a reasonable factual basis upon which I can conclude that Judge Smith ought to be disqualified.

ADDITIONAL VIEWS OF COMMISSIONER BERNTHAL

It should go without saying that removal of administrative law judges as magistrates in the Commission's proceedings is not a matter left purely to the discretion of the Commission. Such removal must be for cause, as set forth in the case law. Otherwise, the tenure of an administrative law judge on a given case could eventually become dependent solely on whether the Commission agreed with the decisions reached by that judge during the course of the proceeding. With the few exceptions spelled out clearly in case law on disqualification, the Commission's judges must therefore be free to conduct proceedings as they see fit, and their personal business as their conscience dictates.

Thus, the question for the Commission to decide here is not simply whether Judge Smith exercised good or bad judgment in sending the letter to Judge Rambo. While Judge Smith's letter may not explicitly state the public purpose behind his action, his subsequent explanation denying the motion for his disqualification does: "It [the letter] was intended only to assure that Mr. Floyd's sentence would not be unjust." That is sufficient public purpose. Nor is the question whether or not we think that Mr. Ivan Smith erred in an assessment of the decent thing to do, given the circumstances. Mr. Smith presumably believed that this was a matter of conscience on which he was bound, out of concern for

the decent treatment of an individual, to express a view. We may respect him for that. But the Commission must here determine *only* whether Judge Smith's comments in the letter and the actions complained of in the proceeding demonstrate his inability to judge fairly and impartially the facts in this proceeding.

I find little information to suggest that the standards for disqualification are met in this case. Had Judge Smith departed from the record in his letter to Judge Rambo recommending leniency, he might indeed have found his impartiality in question. He did *not* so depart, however; Judge Smith's comments to Judge Rambo have their origin solely in information obtained from the TMI restart proceeding. Suggestions that Judge Smith's comments stem from an extrajudicial source are without foundation, and therefore this element of intervenors' argument fails.

Further, there is no reasonable argument for the proposition that the Floyd letter constitutes a prejudgment of the facts involved in the TMI proceeding. The letter clearly represents a post-judgment on a matter which had been closed for some time. Indeed, in view of the fact that it was Judge Smith who apparently was instrumental in developing the facts surrounding the Floyd cheating incident in the first place, it is ironic that the centerpiece of intervenors' arguments for removing him should now be his comments concerning the sentencing of the man whose troubles Judge Smith himself compounded by his persistent efforts to uncover the facts, sometimes independent of the urging of any party to the proceeding.

In the absence of "extrajudicial" bias, the movants must demonstrate "pervasive" bias against them by Judge Smith. Here again, the law is clear that neither sharp words to counsel or witnesses, nor intemperate remarks, nor rulings predominantly against the movants constitute, by themselves, a demonstration of pervasive bias. Nor is the test whether public officials, or newspapers, or organizations with political constituencies hold the opinion that a judge is biased. The test is whether a reasonable person, having knowledge of all the facts and circumstances, would reach the conclusion that Judge Smith is biased and will be unable henceforth to reach an objective judgment on the facts in this proceeding.

The TMI restart proceeding is a controversial case where emotions run high on all sides. But I believe that any reasonable person who steps back from the emotion and controversy, and objectively considers all of the facts and circumstances present here, will conclude that no basis exists upon which to remove Judge Smith from his position as presiding officer in this case.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

**Christine N. Kohl, Chairman
Dr. W. Reed Johnson
Howard A. Wilber**

In the Matter of

Docket No. 50-382-OL

**LOUISIANA POWER & LIGHT
COMPANY
(Waterford Steam Electric Station,
Unit 3)**

April 4, 1985

The Appeal Board finds no cause to recant its earlier findings that there are no significant safety concerns associated with cracking in the concrete basemat at Waterford, and denies intervenors' second motion to reopen the record for a hearing on this issue.

RULES OF PRACTICE: REOPENING OF RECORD

An essentially bare allegation of falsified documents is not enough to support a motion for reopening a closed record.

RULES OF PRACTICE: REOPENING OF RECORD

A motion to reopen a closed record must be timely, address a significant safety or environmental issue, and show that a different result might have been reached had the newly proffered material been considered initially. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-598, 11 NRC 876, 879 (1980). *See also id.*,

ALAB-775, 19 NRC 1361, 1365-67 & n.18, *aff'd*, *San Luis Obispo Mothers for Peace v. NRC*, 751 F.2d 1287 (D.C. Cir. 1984).

RULES OF PRACTICE: RESPONSIBILITIES OF STAFF

The staff should not be reluctant to acknowledge and discuss disagreements among its personnel on issues involved in a hearing. Airing legitimate differences of opinion and the steps taken to resolve them often contributes to a more effective treatment of the issues, regardless of which view ultimately prevails.

RULES OF PRACTICE: RESPONSIBILITIES OF STAFF

Dissenting staff members should be afforded the opportunity to express their views and to participate in the staff review process. Further, the substance of their views must be given full consideration by the staff. *See San Luis Obispo Mothers for Peace, supra*, 751 F.2d at 1322.

APPEAL BOARD: SCOPE OF REVIEW (CONFLICT OF INTEREST)

Where a question of possible violation by a "special government employee" of the Commission's conflict of interest rules has been handled in accordance with the agency's internal procedures, it is not the Appeal Board's function to review independently either the General Counsel's determination, or the judgment as to the need for punitive measures.

RULES OF PRACTICE: ADMISSIBILITY OF EVIDENCE

Only relevant, material, and reliable evidence which is not unduly repetitious will be admitted in NRC adjudicatory proceedings. 10 C.F.R. § 2.743(c). A witness's violation of the Commission's ethics regulations could, in certain circumstances, undercut the reliability of that witness's testimony.

TECHNICAL ISSUES DISCUSSED:

Cracking in Reinforced Concrete Basemat.

APPEARANCES

Carole H. Burstein, New Orleans, Louisiana, for joint intervenors Oystershell Alliance and Save Our Wetlands, Inc.

Bruce W. Churchill, Washington, D.C., for applicant Louisiana Power & Light Company.

Sherwin E. Turk for the Nuclear Regulatory Commission staff.

DECISION

Among the matters still pending before us in this operating license proceeding is Joint Intervenors' motion to reopen the record for a hearing on the concrete basemat underlying the Waterford facility.¹ As recounted in ALAB-786, 20 NRC 1087, 1089 (1984), it is actually Joint Intervenors' second motion to reopen on the basemat that is still before us. They first moved to reopen in July 1983, arguing that hairline cracks in the concrete basemat — discovered two months earlier — raised questions about the integrity of the plant's design and safe operation of the facility. Relying on several studies submitted by applicant Louisiana Power & Light Company (LP&L) and the NRC staff, we found no significant safety concerns associated with the cracking and denied the motion. ALAB-753, *supra* note 1, 18 NRC at 1324-29. Joint Intervenors' second, or supplemental, request to reopen (filed in December 1983) alleged, on the basis of a *Gambit* newspaper article, that those LP&L and staff studies on basemat cracking relied on falsified documents. Thus, the focus of our consideration of the second basemat motion is principally on the credibility and reliability of the information previously supplied by LP&L and the staff, and relied on by us in finding no safety significance to the concrete cracking.

We explained in ALAB-786 how Joint Intervenors' second basemat motion itself failed to meet the standards for reopening a closed record. The essentially bare allegation of falsified documents is not enough. 20

¹ We previously disposed of all matters raised by Joint Intervenors on appeal from the Licensing Board's partial initial decisions in this proceeding, completed sua sponte review of those decisions, and ruled on two of their earlier motions to reopen (one of which concerned the basemat). See ALAB-732, 17 NRC 1076 (1983); ALAB-753, 18 NRC 1321 (1983). Another motion to reopen, which raises primarily quality assurance and management competence issues, is under active consideration. See ALAB-801, 21 NRC 479 (1985).

NRC at 1089-91.² But we also noted that this case presented “the unusual (if not unique) situation where the material filed in opposition to a motion to reopen raises more questions than it answers.” *Id.* at 1091. In this connection, we identified some seven areas where clarifying or supplementary information from the staff was necessary before we could rule finally on Joint Intervenors’ basemat motion. *Id.* at 1092-95. The staff has now supplied extensive affidavits and reports in response to our questions. Accepting our invitation to comment on the staff’s filings, LP&L likewise has submitted more detailed information on the basemat. Although afforded a like opportunity to comment, Joint Intervenors have filed nothing on this matter since their brief December 1983 motion.

We are fully satisfied with the staff’s most recent submissions on the concrete basemat. The asserted deficiencies in documentation for the basemat have been cured. But more important, the myriad and voluminous analyses of all aspects of the basemat, undertaken by both the staff and LP&L, convince us that the hairline cracking presents no serious safety challenge to the structural soundness of the basemat. We have been given no cause to recant our earlier findings in ALAB-753 concerning the adequacy of the basemat. Joint Intervenors’ second motion to reopen on the basemat is therefore denied.

A.

We need not rehearse at length the substantial basemat-related material submitted by the staff and LP&L. These thorough affidavits and technical reports speak for themselves and stand as evidence of the massive effort devoted by the staff and applicant alike to assuring the integrity of the basemat. Moreover, though given the opportunity, Joint Intervenors have voiced no objection to any part of this information. We therefore discuss only briefly the answers provided to the several inquiries we posed to the staff in ALAB-786.

1. ALAB-786 noted an inconsistency between two staff documents on the safety significance of certain irregularities in concrete inspector certification records. A June 13, 1984, letter from the staff to LP&L (the “Eisenhut Letter”) stated that these irregularities made the quality

² Specifically, the motion must be timely, address a significant safety or environmental issue, and show that a different result might have been reached had the newly proffered material been considered initially. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-598, 11 NRC 876, 879 (1980). See also *id.*, ALAB-775, 19 NRC 1361, 1365-67 & n.18, *aff’d*, *San Luis Obispo Mothers for Peace v. NRC*, 751 F.2d 1287 (D.C. Cir. 1984).

of the inspected construction activity indeterminate. The staff's August 7, 1984, filing with us, however, reflected no such concern about the quality of the basemat construction. 20 NRC at 1092-93.

The staff first explains that, by August 7, it actually had more information than was apparent from its filing on that date, and that the information tended to establish the lack of safety significance to the involved inspector certification problems. Subsequent to August 7, the staff obtained and verified information from LP&L that shows all inspections performed by "unqualified" concrete inspectors had, in fact, been duplicated by qualified inspectors from Ebasco Services Incorporated, LP&L's architect-engineer. Thus, the staff considers this matter to be fully resolved. Supplemental Affidavit of Robert E. Shewmaker (Dec. 17, 1984) at 2-6.

2. Another inconsistency existed as to the safety significance, especially in terms of the plant's seismic response capability, of certain missing soil backfill test documents. See ALAB-786, *supra*, 20 NRC at 1093. The staff again disclaims any inconsistency in its stated views on the ground that its August 7 position was based on additional (albeit unidentified at the time) information. Further, the soil test records once thought to be missing have been located and the staff considers them authentic.³ These records show a close adherence to quality procedures for the pertinent soils work done at Waterford. The staff has also reviewed numerous additional soil test and inspection records and studies; on this basis, it concludes that soils issues are fully resolved. Shewmaker Affidavit, *supra*, at 6-12.

3. In ALAB-786, *supra*, 20 NRC at 1093-94, we noted the conclusion of the Brookhaven National Laboratory (BNL) — which serves as a staff consultant — that the cracks in the concrete basemat were caused primarily by the imposition of dead loads, after construction of the superstructure but *before* placement of the backfill. Assuming (correctly, it now appears) that the backfill was in place for several years, we suggested that under BNL's analysis the cracks should have been wider and thus more evident before the backfill was placed. We therefore asked why the cracks were not discovered before May 1983.

The staff first tells us that BNL has revised its conclusion so as to eliminate the confusing reference to the placement of the backfill. BNL's more accurate view now is that the cracks developed on the mat surface during construction and were probably caused by "differential

³ This moots our concern in ALAB-786, *supra*, 20 NRC at 1093 n.10, as to whether certain refined analyses recommended by Brookhaven National Laboratory could be performed without these missing records and the data in them.

settlement induced by the dead loads acting alone or by dead loads acting on the mat already cracked by normal thermal and/or shrinkage effects." Supplemental Affidavit of James P. Knight (Dec. 17, 1984) at 5-6; Affidavit of Morris Reich, et al. (Dec. 17, 1984), Attachment 1 (hereafter "BNL Addendum 2") at 3. Second, the staff indicates that it is unable to answer our query (about the timing of discovery of the cracks) directly, except to state that NRC inspectors did not see the involved cracking outside the reactor containment building (RCB) ring wall before 1983. Knight Affidavit, *supra*, at 6-7. LP&L sheds more light on the matter, however, explaining that the area in question was covered with water, dirt, and debris from construction, obscuring the hairline cracks until cleanup got under way in late 1982 and early 1983. Affidavit of Kenneth W. Cook (Jan. 3, 1985) at 3.

4. We expressed concern in ALAB-786, *supra*, 20 NRC at 1094, that the staff may not have interviewed the two individuals identified as primary sources of information for the *Gambit* newspaper article on which Joint Intervenors base their motion. The staff has replied that, beginning in January 1984, it held one or more meetings with these and other persons who have made allegations about the Waterford facility.⁴ The staff adds further that in many instances these meetings and staff follow-up work have led to agreement with the allegers that matters have been satisfactorily resolved. Affidavit of Dennis M. Crutchfield (Dec. 17, 1984) at 2-6.

5. We also inquired in ALAB-786, *supra*, 20 NRC at 1094-95, about the current views of Drs. John S. Ma and Raman Pichumani. The staff had previously submitted the affidavits of these NRC employees in connection with Joint Intervenors' first motion to reopen on basemat cracking. But the staff provided the views of neither one after the second basemat motion was filed.

In response to ALAB-786, the staff has now supplied the affidavits of Drs. Ma and Pichumani, as well as a statement from Dr. John T. Chen. Dr. Chen apparently assumed Dr. Pichumani's duties with respect to the Waterford basemat after the latter was reassigned to a different section of the NRC in March 1984. Consequently, Dr. Pichumani has no further comments on this matter. Affidavit of Raman Pichumani (Dec. 17, 1984). It is evident from the Ma and Chen statements that they have

⁴ The staff states that it did not previously disclose that it had interviewed these two individuals so as to protect its investigative techniques and to keep the allegers' names confidential. But the *Gambit* article attached to Joint Intervenors' December 1983 motion referred freely to both individuals (Messrs. Hill and Davis) by name — hence, our inquiry about whether the staff specifically talked to either one.

views that differ somewhat from the official staff position.⁵ But it is equally apparent that their differing views have been given ample consideration, even well before our inquiry in ALAB-786. Knight Affidavit, *supra*, at 28-31, 34-35. See also note 8, *infra*.⁶

There is no need to address these differing views in detail, especially in view of Joint Intervenors' failure to mount any challenge to the staff's official position.⁷ Suffice it to say that the staff has identified three principal areas of disagreement with Dr. Ma: (1) the initial causes of the basemat cracking; (2) the acceptability of the cracking vis-a-vis the dynamic response of the mat during an earthquake; and (3) the effect of the cracking on corrosion and durability. Knight Affidavit, *supra*, at 31. Dr. Ma finds inadequate BNL's conclusion that differential settlement induced by dead loads during construction of the mat is the primary cause of the cracking. Affidavit of John S. Ma (Dec. 12, 1984), Attachment (hereafter "Ma Report") at 1. He offers no alternative theory, but suggests that analysis of the temperature generated by cement hydration would be useful. *Id.* at 25. See note 13, *infra*. Dr. Ma also recommends repair of the cracks with grout or epoxy injection to prevent corrosion of the reinforced steel bars within the concrete. Ma Report, *supra*, at 31.

Dr. Chen's concerns center on the uniformity of the soil beneath the basemat. He believes a more refined analysis based on the actual soil conditions during construction should be performed to verify more precisely the cause of the cracking. Knight Affidavit, *supra*, Attachment 1 (hereafter "Chen Statement").

The staff, through its consultant, BNL, has put forth a convincing point-by-point rebuttal to both Drs. Ma and Chen. See BNL Addendum 2, Appendices F and G. LP&L as well has supplied similarly persuasive affidavits from an Ebasco civil engineer and a consulting structural engineer. Affidavit of Joseph L. Ehasz (Jan. 7, 1985); Affidavit of Myle J. Holley, Jr. (Jan. 4, 1985).⁸ We are fully satisfied with BNL's explanation

⁵ Neither has filed a formal "Differing Professional Opinion," however. See NRC Manual, Chapter 4125 (Sept. 19, 1980).

⁶ Had the staff informed us of this in its August 7, 1984, filing, our inquiry on this point might have been obviated. The staff should not be so reluctant in the future to acknowledge and discuss similar disagreements among its personnel. We do not expect complete consensus on all issues: we recognize the inevitability — and desirability — of healthy dissent within any organization. Airing legitimate differences of opinion and the steps taken to resolve them often contributes to a more effective treatment of the issues — regardless of which view ultimately prevails.

⁷ Moreover, this is not an initial decision following a hearing on contested issues, where more detailed "findings of fact" are required.

⁸ Subsequent to the filing of LP&L's response to the staff's comments on the basemat, staff counsel solicited the further views of Drs. Ma and Chen. Their comments were supplied to us and the parties in Board Notification No. 85-019 (Feb. 25, 1985). The staff response to these latest views of Drs. Ma and
(Continued)

of the cause of the basemat cracking and, perhaps more important, with its analyses of the effect that cracking might have on the ability of the mat to serve its intended function. BNL has likewise sufficiently addressed Dr. Chen's concerns about the soil beneath the mat. See pp. 584-86, *infra*. Finally, not only has the staff afforded both Dr. Ma and Dr. Chen the opportunity to express their views and to participate in the staff review process, it has also given full consideration to the substance of those views. See *San Luis Obispo Mothers for Peace, supra* note 2, 751 F.2d at 1322. Our inquiry in ALAB-786, *supra*, 20 NRC at 1094-95, has been more than answered.⁹

6. As requested in ALAB-786, the staff has obtained the additional views of Robert E. Philleo, a consulting engineer with expertise in concrete construction. See *id.* at 1095. We were interested, in particular, as to whether Mr. Philleo's earlier evaluation of the adequacy of the basemat would be altered in any way in light of the results of subsequent nondestructive testing by Muenow and Associates, Inc. Mr. Philleo has reviewed the Muenow report and, although he is critical of some aspects of it, "there is nothing to cause concern about the structural performance of the basemat." Knight Affidavit, *supra*, Attachment 2 (hereafter "Philleo Comments") at 2.¹⁰ His earlier conclusion that the basemat is structurally sound thus remains unchanged.

7. The last inquiry to the staff in ALAB-786 concerned a discrepancy in a report by applicant's consultant, Harstead Engineering Associates, Inc. We asked the staff to determine if this was simply an inadvertent error or an indication of "broader problems with the reliability of the data supplied to Harstead by LP&L's contractors." 20 NRC at 1095. The staff has reviewed the particular error we identified and examined, with LP&L, other reports and data for similar discrepancies. While a few more such errors were found, they are clerical in nature, do not detract

Chen was provided as Enclosure 2 to Board Notification No. 85-025 (Mar. 8, 1985). The arguments voiced in each document reflect essentially the same positions advocated in the earlier round of comments. *But see* note 19, *infra*.

⁹ Some of the differences in opinion between Dr. Ma and BNL are attributable to a misunderstanding or an inconsistent use of certain engineering terminology. See, e.g., BNL Addendum 2, *supra*, Appendix F at F-18, F-19, F-22 to F-23. Further, as BNL and Messrs. Ehasz and Holley have pointed out, some of Dr. Ma's cited references are incorrect or incomplete, and his reliance on studies of such different structures as bridges and monolithic concrete dams is misplaced in considering the 12 feet thick *reinforced* concrete slab involved here. *Id.* at F-10; Ehasz Affidavit, *supra*, at 4-7; Holley Affidavit, *supra*, at 11-13.

¹⁰ Mr. Philleo's criticism of the Muenow report is due largely to the fact that the report does not fully explain the ultrasonic techniques used. Such information is proprietary. See Knight Affidavit, *supra*, at 13-14. Mr. Philleo acknowledges, however, that Mr. Muenow's results have been verified by other means in the past, giving his techniques credibility. Philleo Comments, *supra*, at 1. Further, Mr. Muenow did elaborate somewhat on his testing procedures at meetings with the staff and BNL, satisfying both as to the overall reliability of his results for the purposes here. Knight Affidavit, *supra*, at 12-16.

from the reliability of the data supplied to Harstead, and do not affect any earlier conclusions. Shewmaker Affidavit, *supra*, at 12-14. *See also* Affidavit of Raymond F. Burski, Jr. (Jan. 3, 1985).

B.

A matter peripheral to Joint Intervenors' motion to reopen on the basemat concerns Gunnar Harstead. Mr. Harstead and his engineering firm (Harstead Engineering Associates, Inc.) served as a consultant to LP&L on the basemat soon after the discovery of the cracks in 1983. He prepared several reports in this connection, concluding that the cracks and associated moisture do not impair the structural adequacy of the mat. In our earlier decision denying Joint Intervenors' first basemat motion, we relied on this information and the staff's analysis of it. ALAB-753, *supra*, 18 NRC at 1326-28. In a letter dated August 2, 1984, however, staff counsel informed us that he had just learned that Mr. Harstead had served in 1981 as a consultant to the staff on several matters involving Waterford, including the concrete basemat. Although the staff stated its belief that this fact does not affect either the staff's or our review of the Waterford basemat, we felt obliged to refer the matter to the NRC's General Counsel, who has responsibility for interpreting the Commission's conflict of interest rules. *See* 10 C.F.R. § 0.735-27.

This matter has been handled in accordance with the agency's internal procedures. *See* NRC Manual, Chapter 4124 (Apr. 6, 1982). The General Counsel's conclusion is that, by serving as a consultant on Waterford, first for the NRC (as a "special government employee"), and then several years later for LP&L (while continuing as an NRC special employee on other projects), Mr. Harstead committed a technical violation of 18 U.S.C. § 205(2) and 10 C.F.R. § 0.735-23(a)(2). Memorandum to Appeal Board from J. A. Fitzgerald (Nov. 23, 1984). The Department of Justice (to which the General Counsel referred this matter) has decided not to prosecute, however, and the NRC has determined that administrative action in this matter is not warranted. Memorandum to Appeal Board from J. A. Fitzgerald (Oct. 19, 1984); Memorandum to Appeal Board from W. J. Dircks (Jan. 16, 1985), Enclosure (hereafter "Dircks Memorandum"). The NRC staff stresses that Mr. Harstead had served as a staff consultant on Waterford more than two years before his association with LP&L and that he was probably unaware that his action was a violation of the law. The staff also states that it will take steps to assure no such violations will occur in the future. Dircks Memorandum, *supra*.

It is not our function to review independently either the General Counsel's determination that there has been a violation, or the judgment

that no punitive measures are necessary. We accept those conclusions and only note our view that the matter has been fully and carefully investigated. Rather, our concern here is whether those determinations detract in any way from the weight we previously gave to the Harstead Reports. In other words, is the reliability of the technical analysis in Mr. Harstead's work somehow undercut by his minor (and likely inadvertent) violation of the agency's regulations?¹¹ We think not. Although we cannot conclude generally that an ethics violation by a party or witness could never diminish the reliability of that person's work, we see no such taint here.¹² Moreover, Mr. Harstead's engineering expertise has been convincingly demonstrated, and there is no reasonable basis for not according his work the full credit it is due on the merits.

C.

As is plainly evident from the wealth of information ultimately provided by the staff, there is no ground for reopening the record for hearing on the basemat issue. Indeed, the analyses supplied by the staff stand in stark contrast to the flimsy support for Joint Intervenors' motion. See ALAB-786, *supra*, 20 NRC at 1090-91. We have also been given no reason to reconsider our earlier conclusion, with respect to Joint Intervenors' first basemat motion, that there is no safety significance to the cracks and associated moisture in the mat. See ALAB-753, *supra*, 18 NRC at 1328. The charge in Joint Intervenors' second basemat motion that that conclusion was based upon falsified information has been shown to be without merit. Further, the additional material supplied by the staff and LP&L demonstrates not only the overall reliability of the original basemat evaluations, but also the structural soundness of the mat.

¹¹ "Only relevant, material, and *reliable* evidence which is not unduly repetitious will be admitted." 10 C.F.R. § 2.743(c) (emphasis added).

¹² We invited the parties' views on this matter. Appeal Board Order of October 3, 1984 (unpublished). Joint Intervenors argue that, because of Mr. Harstead's "conflict of interest," his work cannot be considered "truly independent." In their view, his basemat evaluation for LP&L could have been influenced by his earlier work for the staff. See Joint Intervenors' Comments on Harstead Conflict of Interest (Nov. 14, 1984). Although we could readily understand the gist of this argument if Mr. Harstead had worked first for LP&L and then for the NRC staff, we do not understand Joint Intervenors' point here in this opposite context, and they fail to elaborate. Joint Intervenors also note that earlier BNL analyses relied to some extent on the Harstead reports. But as is evident from the staff's recent basemat filings, substantial testing and evaluation of the mat has been done without regard to the Harstead work, with the same ultimate conclusion — the mat is structurally sound. See pp. 584-86, *infra*.

To be sure, some differences of opinion exist among the experts consulted as to the exact cause of the cracking.¹³ Nevertheless, we are convinced that, regardless of the causative mechanism, the cracking is not safety significant. The many tests and evaluations of the concrete mat and the soil around and beneath it strongly support this conclusion.

Although some cracks are up to 10 feet deep, they are only about 0.007 inch wide. BNL Addendum 2, *supra*, at 4, 8.¹⁴ They are tightly closed and are likely to stay that way because of the compressive force of lateral soil pressure. Knight Affidavit, *supra*, at 22.¹⁵ The cracks are vertical, indicating that they are not attributable to diagonal tension failure. *Id.* at 30. The concrete is reinforced with steel rebars that are designed to carry tensile forces. Holley Affidavit, *supra*, at 13, 15.¹⁶ Calculations based on very conservative assumptions (i.e., no credit taken for existing compressive forces) show that the shear capacity of the mat is almost twice the shear demand. BNL Addendum 2, *supra*, at 12-13. Tests based on conditions more severe than found at Waterford show that shear slip along the cracks during an earthquake would be less than 0.01 inch. *Id.* at 13.¹⁷ Further, dynamic analyses performed by BNL show that the cracking has little effect on the plant's response to both horizontal and vertical earthquake movements. *Id.*, Appendix D (as modified, Letter to Appeal Board from S. E. Turk (Mar. 11, 1985)). Other experiments by BNL indicate that the cracking in the Waterford basemat has a negligible (if any) effect on the strength and stiffness of the mat. *Id.*, Appendix E. Data and tests show that the soil and clamshell blanket beneath the concrete are relatively uniform and well compacted. *Id.*, Appendix G; Board

¹³ The principal area of dispute concerns whether the thermal effect of cement hydration, or differential settlement induced by dead loads, is the *primary* cause of the cracking. BNL points out, however, that the pattern of the cracking is more indicative of the latter cause, whereas cracking from normal concrete drying and shrinkage is more random. BNL Addendum 2, *supra*, Appendix F at F-6.

¹⁴ Actual measurements showed the width of the cracks at the top surface of the mat to be between 0.003 and 0.005 inch (about the thickness of the paper on which this decision is printed). Mr. Muenow, who conducted nondestructive testing of the mat (see p. 582, *supra*), concluded that the cracks at depth and outside the shield wall are 0.007 inch, with an accuracy of ± 20 percent. The results of nondestructive testing of the mat under the reactor containment building (RCB) are considered less accurate than the results of testing on the area outside the RCB; thus, Mr. Muenow has reportedly concluded that cracks underneath the RCB could not exceed 0.015 inch. This is, however, a very conservative upper limit on crack width. None of the measurements has shown any crack actually to be of this width, and there is no reason to expect the cracks under the RCB to be wider than those elsewhere in the mat (i.e., 0.003 to 0.007 inch). See Holley Affidavit, *supra*, at 6.

¹⁵ This is also "indicative of a stable situation with no further [crack] growth." Board Notification No. 85-025, *supra*, Enclosure 2, Staff Comments with Regard to Dr. Chen at Item 5.

¹⁶ Dr. Ma's concern that the cracks in the concrete might diminish the basemat's ability to carry tensile forces is therefore misplaced. See Ma Report, *supra*, at 16.

¹⁷ Relying on the even more conservative assumptions and data suggested by Dr. Ma, the maximum shear slip during an earthquake would be only 0.014 inch. Board Notification No. 85-025, *supra*, Enclosure 2, Staff Comments with Regard to Dr. Ma at Item 2.

Notification No. 85-025, *supra* note 8, Enclosure 2, Staff Comments with Regard to Dr. Chen at Item 3.

Moreover, LP&L has promised to submit to the staff, before exceeding five percent power, a surveillance program that will address (1) settlement of the basemat, (2) changes in ground water chemistry that could corrode the reinforcing steel in the mat, (3) seasonal variations in ground water levels, and (4) mapping of cracking in the basemat and adjacent vertical walls. See ALAB-753, *supra* note 1, 18 NRC at 1326-28.¹⁸ Also before exceeding five percent power, LP&L must commit itself to performing certain confirmatory analyses recommended by BNL. See ALAB-786, *supra*, 20 NRC at 1093 n.10. See also note 3, *supra*.¹⁹ The analyses must be completed and submitted to the NRC for review before restart after the first refueling outage. In addition, the staff has requested LP&L to evaluate the actual stresses caused by the differential settlements of the mat during construction. Knight Affidavit, *supra*, at 36-37; Board Notification No. 85-025, *supra*, Enclosure 1.²⁰

In these circumstances, we conclude that no significant safety issue exists as to the basemat. Joint Intervenor's second motion to reopen on this matter is therefore *denied*.²¹

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

¹⁸ On the strength of the staff's recommendation, the Commission authorized the issuance of a full-power license to LP&L on March 15, 1985. CLI-85-3, 21 NRC 471, *pending on petition for review sub nom. Oystershell Alliance v. NRC*, No. 85-1182 (D.C. Cir. filed Mar. 25, 1985). We thus assume that LP&L has already fulfilled these commitments.

¹⁹ Dr. Ma initially questioned the value of these analyses. He now seems to regard the dynamic analyses as "essential." Compare Ma Report, *supra*, at 24-25, with Board Notification No. 85-019, *supra*, Ma Comments at 5.

²⁰ These various staff-imposed requirements include many of the actions suggested by Dr. Chen. See Chen Statement, *supra*, at 10.

²¹ Joint Intervenor's remaining motion to reopen on quality assurance (QA) and management competence (see note 1, *supra*) raises basemat issues that overlap to a large degree with the matters we raised a month earlier in ALAB-786. See, e.g., Joint Intervenor's Motion to Reopen the Record (Nov. 8, 1984) at 39-44. The motion also alleges a systemic breakdown in construction QA, which in terms would include the basemat. To the extent that such arguments concern the integrity of the mat itself and the adequacy of the QA program for the mat, Joint Intervenor's claims are without merit for the reasons stated in this decision. Irrespective of our ultimate judgment on the charge of a systemic QA breakdown, any QA problems associated with the basemat have been satisfactorily resolved.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Christine N. Kohl, Chairman
Gary J. Edles
Dr. Reginald L. Gotchy

In the Matter of

Docket Nos. 50-352-OL
50-353-OL

PHILADELPHIA ELECTRIC COMPANY
(Limerick Generating Station,
Units 1 and 2)

April 10, 1985

The Appeal Board affirms the Licensing Board's decision dismissing intervenor's revised contentions on two issues concerning the environmental impacts of the Limerick supplementary cooling water system.

ADJUDICATORY BOARDS: JURISDICTION

An operating license proceeding is not intended to provide a forum for the reconsideration of matters originally within the scope of the construction permit proceeding. *See Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-785, 20 NRC 848, 870-71 (1984).*

RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)

All contentions must satisfy the long standing requirement of the Commission's Rules of Practice that both the contention and its bases be set forth with reasonable specificity. *See 10 C.F.R. § 2.714(b); BPI v. AEC, 502 F.2d 424 (D.C. Cir. 1974).*

RULES OF PRACTICE: RESPONSIBILITIES OF PARTIES

The NRC's adjudicatory boards should not have to conduct or complete a party's research for it.

APPEARANCES

Robert J. Sugarman, Philadelphia, Pennsylvania, for intervenor Del-Aware Unlimited, Inc.

Troy B. Conner, Jr., Mark J. Wetterhahn, and Robert M. Rader, Washington, D.C., for applicant Philadelphia Electric Company.

Ann P. Hodgdon for the Nuclear Regulatory Commission staff.

DECISION

In ALAB-785, 20 NRC 848 (1984), we affirmed most of the Licensing Board's various decisions concerning the supplementary cooling water system (SCWS) for the Limerick nuclear facility. With respect to two matters, however, we remanded and directed the Board to give intervenor Del-Aware Unlimited, Inc., an opportunity to submit new versions of its contentions V-16 and V-14, relating to the salinity of the Delaware River and the impact of the SCWS on a designated historic district. *Id.* at 869-70, 876.¹ Del-Aware submitted new contentions dealing with these subjects, and the Licensing Board has once again rejected them. ASLB Memorandum and Order of November 8, 1984 (unpublished).² Del-Aware appeals from this decision, and applicant Philadelphia Electric Company (PECo) and the NRC staff oppose the appeal. We affirm the Licensing Board.

¹ In an attempt to broaden the scope of our remand, Del-Aware sought reconsideration of ALAB-785. We denied this request in our Order of October 10, 1984 (unpublished).

Both Del-Aware and applicant Philadelphia Electric Company petitioned the Commission for review of ALAB-785. See 10 C.F.R. § 2.786(b)(1). The Commission declined review on February 22, 1985.

² These were Del-Aware's last two contentions in this operating license proceeding. With their rejection, Del-Aware is no longer a participant in this case. Other portions of the proceeding, however, remain pending before both the Licensing Board (i.e., offsite emergency planning) and us (i.e., three appeals by other intervenors from the Licensing Board's authorization of a low-power license for the facility).

A.

The extensive history of the litigation of the SCWS for Limerick is set forth in several earlier decisions that span more than a decade. *See, e.g.*, ALAB-785, *supra*; ALAB-262, 1 NRC 163 (1975); LBP-74-44, 7 AEC 1098 (1974). Briefly, PECO plans to supplement the cooling water for its Limerick plant (located on the Schuylkill River) with water from the Delaware River. The water is to be transported to the plant via several transmission mains and pumping stations. This is part of a larger project known as the Point Pleasant Diversion, named for the location of the intake pipe on the Delaware River (Point Pleasant, Pennsylvania).

In the operating license phase of the proceeding, Del-Aware sought to litigate a number of environmental issues. Several such contentions were admitted and addressed at lengthy hearings. Among the contentions that were not admitted was one that alleged that operation of the SCWS would adversely affect the water quality (specifically, the salinity) of the Delaware River and its estuary (contention V-16). The Licensing Board excluded this contention because it found that changes in water salinity are a function of water allocation, which in turn is determined by the Delaware River Basin Commission (DRBC). Litigation of a salinity contention, in the Board's view, would substantially conflict with the DRBC's water allocation authority, contrary to the Delaware River Basin Compact. We disagreed with the Board's interpretation of the Compact and found that it presented no impediment to the admission and litigation of an otherwise acceptable contention concerning the impact of the SCWS on the salinity of the Delaware River. We therefore held that Del-Aware was entitled to an opportunity to litigate contention V-16. But because the NRC staff had issued its final environmental statement (FES) for Limerick in the interim and it addresses salinity, we required Del-Aware to reformulate its contention in light of the FES. ALAB-785, *supra*, 20 NRC at 866-70.

Another Del-Aware contention previously excluded by the Licensing Board concerned the aesthetic impacts of the Point Pleasant pumping station on the Point Pleasant Historic District, recently declared eligible for listing on the National Register of Historic Places (contention V-14). We determined that Section 106 of the National Historic Preservation Act, 16 U.S.C. § 470f, requires consideration of such a contention. Consequently, we directed the Licensing Board to permit Del-Aware to resubmit its contention V-14. As in the case of Del-Aware's salinity con-

tion, however, we noted that the FES addresses the impact on the Historic District; thus, Del-Aware was obliged to frame its revised contention V-14 in terms of the FES treatment of this issue. ALAB-785, *supra*, 20 NRC at 874-76.

On remand, Del-Aware submitted two revised contentions V-14 and V-16 purportedly in accordance with our decision. The Licensing Board rejected both, concluding that they exceeded the scope permitted by ALAB-785 and lacked adequate bases and specificity as required by 10 C.F.R. § 2.714(b). ASLB Memorandum and Order of November 8, *supra*, at 2.³

B.

Del-Aware objects on appeal to the Licensing Board's treatment of each of its revised contentions. It argues generally that the decision simply reflects the Board's previous disinclination to admit either contention. It also complains that the Board effectively required it to "litigate" its contentions as a precondition to their admission. Del-Aware elaborates on these general arguments in the context of each contention.

1. Del-Aware's revised contention V-16 alleges essentially two things. First, contrary to the DRBC findings relied on by the staff, the Point Pleasant Diversion will adversely affect the salinity of the Delaware River. Second, the staff's FES reflects no independent judgment, but rather improper deference to the DRBC, on this matter. The proffered bases for this contention are Section 9 and Appendix O of the FES and several studies, reports, letters, etc.⁴ The Licensing Board rejected the contention because, *inter alia*, it did not mention any changes or new information that has come to light in this regard since the construction permit was issued. It also found the bases of the contention were not specific enough. In this connection, the Board noted that many of the documents to which Del-Aware referred were not identified with enough specificity to locate them, and that Del-Aware had failed to provide copies of them to the Board and other parties. *Id.* at 3-4.

On appeal, Del-Aware first takes issue with the Licensing Board's requirement of a nexus between the revised salinity contention and a change or new information since the issuance of the construction permit. According to Del-Aware, the Board inaccurately paraphrased and interpreted ALAB-785 in imposing this requirement. We disagree. Del-Aware has apparently overlooked our statement that "[t]he admission and litigation of any reformulated salinity contention must, of course, be

³ 10 C.F.R. § 2.714(b) requires a party to set forth "the bases for each contention . . . with reasonable specificity."

⁴ Revised contention V-16 and its bases are set out in their entirety in Appendix A.

tied to changes or new information that has come to light since the issuance of the construction permit for Limerick.” ALAB-785, *supra*, 20 NRC at 870 n.73. As discussed elsewhere in that decision, an operating license proceeding is not intended to provide a forum for the reconsideration of matters originally within the scope of the construction permit proceeding. *See id.* at 870-71. Thus, it was incumbent on Del-Aware to identify, for example, new information concerning the effect of the Point Pleasant Diversion on the salinity of the Delaware River.

Del-Aware’s next point is less clear. It appears to argue that the bases for its contention V-16 are, in fact, reasonably specific.⁵ It focuses on the part of its contention that questions the staff’s reliance on the DRBC findings. Del-Aware asserts that the staff’s improper deference to the DRBC is evident from the minimal attention directed to the salinity issue in the FES itself. Again, we do not agree.

We specifically found in ALAB-785 that the staff could, but need not, rely on the scientific data and inferences drawn by the DRBC and other agencies. Essentially the choice is the staff’s — so long as it exercises independent judgment in making its ultimate conclusions about the environmental impact of the Limerick facility. *Id.* at 868 n.65. The FES does indeed show that the staff relied to a great extent on the DRBC’s findings, particularly on the salinity issue. *See* FES (NUREG-0974) at 9-21, 9-27 to 9-28, O-26 to O-34. This is understandable, however, given that the critical comments of the Department of Interior (DOI) and the Environmental Protection Agency (EPA) on this issue — filed in response to the draft environmental statement — were directed to analysis done by the DRBC. *See id.* at A-98, A-107. Although the staff’s treatment of this issue in the FES could have been more substantial, Del-Aware’s brief references to the FES fail to provide an adequate basis from which to cast serious doubt on the independence of the staff’s ultimate judgment.

It is noteworthy in this regard that Del-Aware has failed to point with any degree of specificity to any study that refutes the DRBC salinity findings explicitly adopted by the staff. We are thus uncertain about just what it is that Del-Aware wants to litigate in contention V-16 — what impact the Point Pleasant Diversion will have on the quality of the Delaware River, or how much work the NRC staff independently did on this issue. *See generally Philadelphia Electric Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20-21 (1974).

⁵ Del-Aware does not challenge the “bases and specificity” requirement itself. All contentions must satisfy this long standing requirement of the Commission’s Rules of Practice. *See* 10 C.F.R. § 2.714(b); *BPI v. AEC*, 502 F.2d 424 (D.C. Cir. 1974). We reminded the parties of this requirement in ALAB-785, *supra*, 20 NRC at 855.

The Licensing Board properly criticized Del-Aware for failing either to cite specifically, or to provide to the Board and parties, the documents on which it bases its contention. Contrary to Del-Aware's apparent misunderstanding, the Board did not expect Del-Aware to point to "evidence," already formally in the record, as support for its newly revised contention. Nor did the Board expect Del-Aware to "prove" its contention before it was even admitted. All the Board meant was that, if Del-Aware intended to rely on certain documents as the bases for its contention V-16, it was obliged to provide them to the Board and the parties, or, at a minimum, to describe them with reasonable specificity so as to facilitate locating them. Without the documents, the Board could hardly make a judgment as to whether they provide a basis for Del-Aware's contention. The reasonableness of such an expectation is patent. Likewise clear is Del-Aware's failure here to meet this minimal obligation. See Appendix A.⁶

2. Del-Aware's revised contention V-14 alleged that, contrary to the FES, the cleared areas, parking lots, transformer pads, and possible walls of the Point Pleasant Diversion will permanently destroy the ambience and integrity of the Historic District and its natural hillside frame. It also referred to a major impact on the Delaware Canal (a National Historic Landmark), assertedly not considered by the Army Corps of Engineers (which issued the permit authorizing construction of the intake at Point Pleasant) or the Advisory Council on Historic Preservation. The bases for the contention consist of references to several studies and documents.⁷ The Licensing Board rejected the contention for the same reasons it rejected contention V-16. It found that the bases for the contention were "extremely vague," and that Del-Aware again failed to provide the documents on which it relied or to cite to them with reasonable specificity. ASLB Memorandum and Order of November 8, *supra*, at 5.

Del-Aware's complaints on appeal from the Board's ruling on contention V-14 thus parallel those heard in connection with the salinity contention. Del-Aware claims its references are reasonably specific. It also

⁶ Del-Aware's cryptic, nonspecific references to various "studies" are of no value. Other than the references to the FES for Limerick, we simply do not know where to look for the asserted support for Del-Aware's contention. Even the reference to "DOI letter, July 1983" is confusing, because DOI's comments on the draft environmental statement were filed in August 1983. See FES, *supra*, at A-95 to A-102. The NRC's adjudicatory boards should not have to conduct or complete a party's research for it. Further, considering the length of time during which Del-Aware has been actively involved in litigation concerning the Point Pleasant Diversion, both at the NRC and in other forums, and the fact that it is represented by an attorney, it is not unreasonable to demand a clear identification of the materials on which it relies.

⁷ Revised contention V-14 and its bases are set out in their entirety in Appendix B.

contends that the staff's FES gives only perfunctory treatment to the project's impact on the Point Pleasant Historic District, relying to an impermissible extent on a Memorandum of Agreement among the Army Corps of Engineers, the Pennsylvania State Historical Preservation Officer, and the federal Advisory Council on Historic Preservation. According to Del-Aware, such reliance is particularly unwarranted because the Memorandum of Agreement considers only certain aspects of the Historic District and ignores the elements enumerated in contention V-14 (i.e., the natural hillside frame and intrusions caused by parking lots, transformer pads, and possible walls).

Although the staff's discussion in the FES of the impact of the project on the Point Pleasant Historic District is not particularly impressive (*see* FES, *supra*, at 4-55, 5-36),⁸ neither is the basis supplied by Del-Aware for its contention. Del-Aware once again refers, in only the most general terms, to "[s]tudies," a "[c]ourt statement," and "other PECO documents," but fails to provide or to identify them with adequate specificity. *See* Appendix B. The single specific reference — to the "Memorandum of Understanding" (sic) — does not support the point for which it is urged, that the hillside surrounding the Historic District was not considered. In fact, the Memorandum of Agreement provides for a "landscaping plan to minimize the visual impact of the pumping station and boundary fence on the visual setting of the District, that is consistent with the existing natural setting of the area." NRC Staff Testimony of Brian J. Richter, fol. Tr. 1118, Exhibit 4 at 4-5.⁹ The Memorandum of Agreement also provides for restoration of areas disturbed by construction of the project.¹⁰

As in the case of contention V-16, Del-Aware was obliged to do more than simply state that the FES did not adequately consider the impact on the Point Pleasant Historic District. It did not have to prove its thesis, but was expected to supply some cognizable basis as support for the

⁸ In its brief on appeal, the staff refers us to additional discussion of the Point Pleasant Historic District in the FES at G-39 to G-40 and G-89 to G-90. This reference is actually to the Licensing Board's discussion of Del-Aware's contention V-16a concerning primarily noise pollution, found in the partial initial decision already reviewed in ALAB-785. It is therefore not directly relevant to the point at issue here — the visual impact of the project on the Historic District (contention V-14).

⁹ The Richter testimony is found immediately after the NRC Staff Testimony of Anthony Policastro, fol. Tr. 1118. (Because the FES (at 5-36) specifically refers to the Memorandum, it would have been preferable for the latter to be incorporated as an Appendix to the FES.) Though not reflected on the face of the document, the Memorandum of Agreement was executed by all three parties. *See* Tr. 1117; Richter Testimony, fol. Tr. 1118, *supra*, at 5 n.4.

¹⁰ In ALAB-785, *supra*, 20 NRC at 876-78, we explained why Del-Aware's arguments with respect to possible walls in the area of the Delaware Canal were untimely. They are even more untimely now and thus were properly rejected by the Licensing Board. We note, however, that the Memorandum of Agreement specifically provides for restoration of the Canal area. *See* Richter Testimony, fol. Tr. 1118, Exhibit 4, *supra*, at 2-5.

charge. Having failed to do so, Del-Aware cannot now complain about the Board's rejection of its contention.

We observed in ALAB-785, *supra*, 20 NRC at 885, that

the environmental impacts of the Limerick supplementary cooling water system have been the subject of considerable attention both at this agency and in numerous other forums. Del-Aware's general assertion that there has been an effort to avoid review of these impacts or to conceal them in some manner is without merit.

As to two of its specific claims (salinity and historic impacts), however, we concluded that Del-Aware was entitled to another chance to raise these matters, subject to the usual requirements for the admission of any contention. Del-Aware has failed in its attempt to put forth a reasonably specific basis for either contention. We therefore *affirm* the Licensing Board's Memorandum and Order of November 8.

It is so ORDERED.

FOR THE APPEAL BOARD

Barbara A. Tompkins
Secretary to the
Appeal Board

APPENDIX A

Del-Aware's revised contention V-16 (Oct. 19, 1984) reads:

The diversion will, contrary to the DRBC's contention adopted by the staff in the FES (Section 9 and Appendix O), adversely and unacceptably affect salinity levels and water quality (dissolved oxygen levels) in the Delaware River, and receiving waters, causing problems with fish, drinking water and other uses, and requiring major construction, and could be reduced or eliminated to avoid that impact. The FES inappropriately gave DRBC, not DOI or NRC, the "last word", and failed to reflect NRC's independent judgment.

Basis: FES Section 9; DOI letter, July 1983; Interstate Water Management Agreement of 1983 and DRBC staff review of its Recommendations, including the review and staff comment of the Basinwide Drought Management Plans, (April 1984), the New Jersey studies pursuant to the Agreement, (Draft, Summer 1984) and the plans to reactivate

Tocks Island show that there is a significant present and projected salinity intrusion caused by low flow and diversions of which Limerick is a significant part. Oyster bed problems documented by DOI, use of DRBC contentions over DOI studies and conclusions not justified or qualified. Blue Marsh flows planned to prevent salinity (FES, D-3) will be less effective than Delaware River flows would be. (See Merrill Creek EIS). Tocks Island and Merrill Creek studies show the extent of construction needed. (See FES [A]ppendix O, showing DRBC reliance on future construction. Gky studies for Bucks County (April, June, 1984) show this can be avoided by eliminating or reducing Limerick, or taking water from the Schuylkill (with lesser impacts). Cancellation of Unit II is in the public interest, contrary to FES, in that only \$700 million spent, and no need for energy; cancellation will also reduce risks of accident. Re: receiving waters, see EHB Decision pp[.] 26-27, 100-02, (6/18/84) regarding impact on receiving waters.

APPENDIX B

Del-Aware's revised contention V-14 (Oct. 19, 1984) reads:

Contrary to the FES, [t]he project will permanently destroy the ambiance and integrity of a[n] eligible National Historic District (Point Pleasant), by causing a permanent loss of the natural hillside frame, by intrusions of cleared areas, parking lots, transformer pads and possible walls not disclosed to, or considered by, the Advisory Council and not considered by the Corps, including a major impact on the National Historic Landmark (Delaware Canal) included in the District. Locational and functional alternatives to avoid the harm exist.

Basis: Studies of the Bucks County Conservancy; Court statement of U.S. Attorney in *Del-AWARE v. Baldwin* (neither the Corps nor the other parties to the Memorandum of Understanding considered or passed upon the hillside); actual scenery (which can be substantially restored if the project is dropped). Regarding alternatives; see V-16 and see PECo 1979 Assessment and other PECo documents.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Dr. W. Reed Johnson
Gary J. Edles

In the Matter of

Docket Nos. 50-440-OL
50-441-OL

CLEVELAND ELECTRIC ILLUMINATING
COMPANY, *et al.*
(Perry Nuclear Power Plant,
Units 1 & 2)

April 10, 1985

Finding that the standard for interlocutory review of a Licensing Board ruling has not been met, the Appeal Board denies intervenor's motion for directed certification of the Licensing Board's rejection of its request that a specified individual be called as a Board witness in this operating license proceeding.

**RULES OF PRACTICE: INTERLOCUTORY APPEALS
(DIRECTED CERTIFICATION)**

Review of an interlocutory licensing board ruling via directed certification is discretionary and granted infrequently. A party invoking review by this means must demonstrate that the board's action "either (a) threatens the party adversely affected with immediate and serious irreparable harm which could not be remedied by a later appeal, or (b) affects the basic structure of the proceeding in a pervasive or unusual manner." *Public Service Electric and Gas Co.* (Salem Nuclear Generating Station,

Unit 1), ALAB-588, 11 NRC 533, 536 (1980), and cases cited; *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 & 2), ALAB-675, 15 NRC 1105, 1110 (1982). See also *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-405, 5 NRC 1190, 1192 (1977).

RULES OF PRACTICE: INTERLOCUTORY APPEALS

In the absence of a potential of truly exceptional delay or expense, the risk that a licensing board's interlocutory ruling may eventually be found to have been erroneous, and that because of the error further proceedings may have to be held, is one which must be assumed by that board and the parties to the proceeding. *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-768, 19 NRC 988, 992 (1984), quoting from *Commonwealth Edison Co.* (Zion Station, Units 1 and 2), ALAB-116, 6 AEC 258, 259 (1973).

APPEARANCES

Susan L. Hiatt, Mentor, Ohio, for the intervenor Ohio Citizens for Responsible Energy.

Jay E. Silberg and **Rose Ann Sullivan**, Washington, D.C., for the applicants, The Cleveland Electric Illuminating Co., *et al.*

George E. Johnson for the Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

Before us is the motion of intervenor Ohio Citizens for Responsible Energy (OCRE) for directed certification¹ of the Licensing Board's rejection of its request that a specified individual be called as a Board witness in this operating license proceeding.² Agreeing with the applicants and

¹ See 10 C.F.R. 2.718(i); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-271, 1 NRC 478, 482-83 (1975).

² The Board's ruling was announced in a telephone conference on March 13, 1985 and was memorialized in a brief unpublished order entered on the same date. On March 26, the Board issued a further order (also unpublished) in which it explained the basis for the ruling. OCRE filed its motion for directed certification on March 15 and did not request leave to supplement it to take into account the March 26 order.

the NRC staff that the standard for interlocutory review of a licensing board ruling has not been met here, we deny the motion.

A.

1. OCRE's issue 16 is addressed to the reliability of the Transamerica Delaval (TDI) diesel generators, which are to supply onsite alternating current power to the Perry facility in the event of an emergency. On February 11, 1985, OCRE moved the Licensing Board to "appoint" George Dennis Eley as "its own consultant and witness" on that issue.³ According to OCRE, Mr. Eley and his employer (Ocean Fleets Services) were retained by an intervenor in the *Shoreham* operating license proceeding to provide consultant services and to testify with regard to a TDI diesel generator reliability issue now pending in that proceeding.⁴ Unlike the *Shoreham* intervenor, however, OCRE assertedly is not in a position to pay Ocean Fleets Services' consultant and hearing fees, which OCRE believes would exceed \$15,000 in this instance — hence, the request that the Board call Mr. Eley as its own witness.

In this connection, OCRE stressed the disparity between its extremely limited financial resources and those available to the applicants and the staff. Because both of the latter parties and their witnesses could be expected to support the reliability of the diesel generators, the absence of Mr. Eley's testimony assertedly would result in a one-sided record which, in turn, would require the resolution of issue 16 in the applicants' favor. In OCRE's view, not only would that reduce the proceeding to a "meaningless charade with a foregone conclusion," but also it would occasion a denial of due process.

2. In its March 26 order explaining its refusal to call Mr. Eley as a Board witness,⁵ the Licensing Board pointed to a provision in the most recent NRC appropriations act to the effect that

[n]one of the funds in this Act shall be used to pay the expenses of, or otherwise compensate, parties intervening in regulatory or adjudicatory proceedings funded in this Act.⁶

³ Motion for the Appointment of Board Witness (Feb. 11, 1985).

⁴ See *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), ALAB-800, 21 NRC 386, 389 n.3 (1985).

⁵ See note 2, *supra*.

⁶ Energy and Water Development Appropriation Act, Pub. L. No. 98-360, § 502, 98 Stat. 403, 420 (1985). An identical provision has appeared in several prior appropriation acts.

As the Board saw it, the grant of OCRE's request would violate this statutory proscription.⁷ Although acknowledging its authority to summon a witness on its own behalf, the Board observed that this authority "must be exercised with discretion and must be based on genuine need for [the witness's] testimony" — a need the Board reasoned was not ascertainable prior to the commencement of the evidentiary hearing.⁸ Still further, the Board noted that OCRE was not required to present an affirmative case on issue 16 but could attempt to defeat the applicants' affirmative case by cross-examination of their witnesses and those of the staff.⁹ Finally, the Board opined that its technical members "have the competence to review and analyze technical matters such as the reliability of diesel generators."¹⁰

In light of these factors, the Licensing Board concluded that a decision on the necessity for calling a Board witness "must await future developments." It therefore ruled that "at this time" the OCRE request "must be denied."¹¹

B.

As we emphasized in this very proceeding three years ago in connection with the denial of the applicants' motion for directed certification of a Licensing Board ruling adverse to them:

[r]eview of an interlocutory licensing board ruling via directed certification is discretionary and granted infrequently. A party invoking review by this means must demonstrate that the board's action "either (a) threatens the party adversely affected with immediate and serious irreparable harm which could not be remedied by a later appeal, or (b) affects the basic structure of the proceeding in a pervasive or unusual manner." *Public Service Electric and Gas Co.* (Salem Nuclear Generating Station, Unit 1), ALAB-588, 11 NRC 533, 536 (1980), and cases cited.¹²

Contrary to OCRE's insistence, neither of these criteria is satisfied here.

1. It is manifest that the Licensing Board ruling under attack does not threaten OCRE with immediate and serious *irreparable* injury. For

⁷ March 26 order at 2.

⁸ *Id.* at 3, citing *South Carolina Electric and Gas Co.* (Virgil C. Summer Nuclear Station, Unit 1), ALAB-663, 14 NRC 1140, 1151 (1981), and ALAB-710, 17 NRC 25, 27-28 (1983).

⁹ March 26 order at 3.

¹⁰ *Id.* at 3-4.

¹¹ *Id.* at 4.

¹² ALAB-675, 15 NRC 1105, 1110 (1982). This two-prong test was first enunciated in *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-405, 5 NRC 1190, 1192 (1977).

one thing, as the Licensing Board made clear in its March 26 order,¹³ no final decision has been reached regarding the calling of Mr. Eley as a Board witness. To the contrary, as earlier noted, the Board left open the possibility that, at a later date, it will find it necessary to invoke its authority to summon a witness of its own in the interest of assuring an adequate record for decisional purposes. And, although the Board did not say so explicitly, in such circumstances the summoned witness might well turn out to be Mr. Eley.¹⁴ Thus, at best, OCRE's complaint of injury is premature.

That consideration to one side, any injury that OCRE might suffer from the failure to call Mr. Eley as a Board witness would be far from irreparable. Should the applicants ultimately prevail on issue 16, OCRE will be entitled to press on an appeal from the initial decision its due process claim (as well as any other arguments available to it).¹⁵ If we were to agree with OCRE, the record undoubtedly would then have to be reopened to receive Mr. Eley's testimony as a Board witness. But this possibility provides insufficient reason for our intercession now. A year ago, in another operating license proceeding, we dismissed as improvident a Licensing Board referral under 10 C.F.R. 2.730(f) of an interlocutory ruling concerned with the litigation of similar TDI diesel generator reliability issues. Responding to the reason assigned by the Board for that referral, we stressed anew that:

in the absence (as here) of a potential of truly exceptional delay or expense, the risk that a licensing board's interlocutory ruling may eventually be found to have been erroneous, and that because of the error further proceedings may have to be held, is one which must be assumed by that board and the parties to the proceeding.¹⁶

2. OCRE's assertion that the Licensing Board ruling affects the basic structure of the proceeding in a pervasive or unusual manner rests upon no better footing. Once again, the Board has determined nothing more than that the necessity for calling a Board witness is not ascertainable at this juncture — a conclusion deriving direct support from our *Summer*

¹³ We recognize, of course, that OCRE did not have that order available to it at the time the motion for directed certification was filed. See note 2, *supra*.

¹⁴ We should not be understood as implying that Mr. Eley's appearance would be the inevitable result of a Board determination that a witness of its own is required to insure a fully developed record on issue 16. Rather, the Board would be free to seek the testimony of any expert it thought to be particularly well-equipped to fill crucial gaps in the existing record.

¹⁵ See *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), ALAB-791, 20 NRC 1579, 1583 (1984).

¹⁶ *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-768, 19 NRC 988, 992 (1984), quoting from *Commonwealth Edison Co.* (Zion Station, Units 1 and 2), ALAB-116, 6 AEC 258, 259 (1973).

decisions.¹⁷ Moreover, OCRE has called our attention to no prior occasion (and we can recall none) on which an intervenor in an NRC licensing proceeding succeeded in having the public treasury pay for the appearance and testimony of a desired witness on the ground that it could not afford to assume the expense itself.¹⁸ This being so, OCRE can scarcely claim that the Licensing Board's action here represented a sharp departure from settled practice and, as such, did essential violence to the manner in which NRC adjudicatory proceedings are conducted.¹⁹

For the foregoing reasons, OCRE's motion for directed certification is *denied*.²⁰

It is so ORDERED.

FOR THE APPEAL BOARD

Barbara A. Tompkins
Secretary to the
Appeal Board

¹⁷ See note 8, *supra*.

¹⁸ Of course, given the continuing statutory proscription against intervenor funding, it is not surprising that no such instances have been recorded in recent years.

¹⁹ See ALAB-675, *supra*, 15 NRC at 1113.

²⁰ In addition to review of the Licensing Board's ruling, the motion sought (at 2) an order directing the Licensing Board to provide a written explanation of the ruling; and a continuance of the portion of the proceeding pertaining to issue 16 pending our disposition of the motion. The Licensing Board's March 26 order rendered moot the first of these requests for relief and the second was denied summarily in our unpublished April 2 order.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of

Docket No. 50-289-SP
(Restart)

METROPOLITAN EDISON COMPANY,
et al.
(Three Mile Island Nuclear
Station, Unit 1)

April 11, 1985

In response to the Commission's directions as set forth in CLI-85-2 of February 25, 1985, 21 NRC 282, the Licensing Board reports its conclusions that the Licensee has made an appropriate response in its training program to the cheating episodes, and that it has carried its ultimate burden of proof in the remanded proceeding, but that the Board is considering finding deficiencies in the training program that may require correction.

LICENSING BOARD RESPONSE TO CLI-85-2

INTRODUCTION

In CLI-85-2, 21 NRC 282 (1985), the Commission directed the Licensing Board to give priority attention to the remanded training issue. The Board was requested to provide to the Commission its ultimate conclusion on the training issue and the essence of the supporting rationale if that could be done, say, a week or more before the completed partial initial decision on the issue. *Id.* at 289.

The Board has reviewed the transcript and exhibits of the remanded hearing, studied the proposed findings and has drafted most of its partial initial decision. While there are some evidentiary and legal issues yet to

be decided in response to ALAB-772 (19 NRC 1193 (1984)), the Board can now report that General Public Utilities Nuclear has made an appropriate response in its training program to the cheating episodes. The Board has concluded that Licensee has carried its ultimate burden of proof in the remanded proceeding. The Board cautions, however, that it has under active consideration the possibility of finding deficiencies in the training program that may require correction, as we explain below.

THE REMAND ORDER

The broad issue on remand was the adequacy of the training program to prepare the TMI-1 licensed operators to operate the plant safely. See Board Memorandum and Order Following Prehearing Conference, July 9, 1984 (unpublished), at 2-3.

The Appeal Board summarized its remand order as follows:

The most significant issue requiring further hearing is training. Because the safe operation of the plant is so heavily dependent upon the operators' skill, the importance of training cannot be overstated. The cheating and related incidents called into question the adequacy and integrity of licensee's entire training and testing program. Although we have found that the reopened record on the cheating itself was as fully developed as possible, the impact of those findings on the Licensing Board's earlier conclusions on licensee's training program was not given the full consideration it warrants. *In particular, the Board should have sought further testimony, in light of the cheating incidents, from the OARP Review Committee, whose views the Board previously found so persuasive.*

ALAB-772, *supra*, 19 NRC at 1279 (footnote omitted) (emphasis added).

The Licensing Board has interpreted ALAB-772 as imposing varied and detailed requirements for the remanded hearing. First, we have an independent responsibility to evaluate the adequacy of the training program in light of the cheating incidents. However, the Appeal Board listed specific evidentiary issues that it sees as bearing on the resolution of the broad issue. We have counted thirteen such evidentiary issues.¹

We do not read ALAB-772 as stating that, to carry its ultimate burden, the Licensee must prevail on each of the subsidiary evidentiary issues, but we do read the remand order as requiring us to receive evidence and make findings on each of the subsidiary evidentiary issues. We are now at a stage where we can conclude that Licensee has prevailed

¹ See Appendix (not published).

on the ultimate issue but we have not determined yet whether Licensee has carried its burden on each subsidiary evidentiary issue and on some legal issues. In addition, there remains a large amount of editing work to be done. Therefore it is possible today to report to the Commission the Board's ultimate conclusion on the training issue about 2 weeks before the partial initial decision will probably issue.

DISCUSSION

While Licensee addressed the broad issue and each subsidiary evidentiary issue remanded in ALAB-772, it approached the remand much more extensively than literally required by the remand order. Licensee's affirmative-case response to the remand order was to disclose its general management response to the cheating episode.

The response consisted of four major, essential efforts:

1. Management officials who were responsible for the cheating, i.e., those who failed to prevent it, have stepped forward to acknowledge their failures. This aspect of the hearing was not disputed in an important way.
2. Management has established effective channels of communication with its employees designed to restore the integrity of the training program. The details of these channels are not in dispute but Intervenors challenge their effectiveness.
3. Stringent security measures for preserving the integrity of the examinations have been established. Although the administrative details of the security measures are not in controversy, Intervenors challenge the reliability of any security measure unless the underlying or "root" causes of cheating are identified — a matter in dispute.
4. Licensee has improved its licensed operator training program, in response to cheating, the accident, and in response to an industry-wide upgrading program.

The first three efforts involved rather straightforward considerations and will occupy a relatively small part of the forthcoming partial initial decision. Suffice it to say that we have found that the Licensee's first three efforts were appropriate and adequate. The adequacy of the fourth effort — upgrading the training program — was intensely litigated, particularly by the Union of Concerned Scientists.

Licensee attempts to establish the adequacy of its training program on three independently sufficient grounds: (1) the substantive adequacy of the licensed operator training program litigated on its merits by a

direct evidentiary presentation; (2) the accreditation of the program by the Institute of Nuclear Power Operations (INPO) coupled with the Commission's Policy Statement on Training and Qualification of Nuclear Power Plant Personnel, March 14, 1985 (the Policy Statement approves INPO accreditation as an acceptable means of industry self-improvement in training); and (3) approval of the TMI training program by a reconstituted Operator Accelerated Retraining Program (OARP) Review Committee. As noted above, the Appeal Board required the additional views of the OARP Review Committee in ALAB-772.

Today's report favorable to Licensee on the training program depends upon the first ground — the substantive adequacy of the licensed operator training program considered on its merits. The Board is still evaluating the legal effect on this proceeding of the INPO accreditation and the Commission's Policy Statement. We have not yet determined whether the OARP Review Committee has adequately responded to the respective subsidiary evidentiary issues set out in ALAB-772 or whether the Review Committee's testimony provides sufficient independent grounds for approving the training program. However, we do report today that the Review Committee has approved the program.

Turning to the licensed operator training program, as directly considered by us on its merits, the Licensing Board has completed its evaluation of the following aspects:

- The organization, key management, and staff of the TMI training department.
- TMI training facilities.
- Training program development and methodology, evaluated especially against the five elements of the INPO accreditation program endorsed in the Policy Statement.
- Instructor training.
- The substance and execution of the licensed-operator replacement and requalification training programs and special training programs.
- Administering written, oral and simulator examinations.
- Some case histories of trainee evaluation.
- Operator attitudes toward the program.

The Board has arrived at conclusions favorable to the Licensee with respect to each of the foregoing aspects of the training program. There is, however, another aspect of the program that is still under consideration and which has been the object of the most intense dispute in the remand on training — the issue of program evaluation and feedback from operational experience.

The Board has found that the five INPO elements of accreditation — which elements the Commission has found in the Policy Statement to be essential to acceptable training programs — are logical criteria for the GPU Nuclear licensed operator training program. The fifth INPO element requires evaluation and revision of training based on the performance of personnel in the job setting. Policy Statement at 4. The Licensee does not use periodic formal evaluations of actual job performance for the purpose of revising its training program — or for any purpose. All other parties, including the NRC Staff, argue that job performance evaluations should be required. Licensee has responded that it does in fact assess training against analyzed operational performance requirements of individuals and crews by other means, such as simulator exercises, emergency drills, skills training, on-the-job checkouts, job/task analyses, and more.

The Board has yet to analyze the record and briefings on the subject to a degree sufficient to determine whether Licensee's job requirement analyses and training methods are the functional equivalent to formal on-the-job performance analyses; whether the fifth INPO element is satisfied by any such functional equivalent; and, indeed, whether the fifth INPO element must, in fact, be complied with. We report now, however, that there is a very substantial possibility that we may find the TMI-1 training program inadequate because of the lack of formal job performance evaluations.

The question, then, is how can the Board conclude that Licensee has prevailed on the training issue when such an important matter remains unresolved. The answer is that, if any such deficiency is found, it will be satisfied by an appropriate license condition. Licensee has implied that it could accept such a condition. The real question is whether the need for any condition would be a long-term or short-term consideration.

The notice of hearing in this proceeding requires the Licensing Board to determine which necessary safety actions must be taken before restart and which may be taken after restart. CLI-79-8, 10 NRC 143, 148 (1979). Formal evaluation of operator performance in the job setting is almost by its very nature a function best performed after restart, although operators have important responsibilities during shutdown. Licensee already has in place a mechanism to examine Licensee Event Reports (LERs) and other industry and in-house data for modification of its operating procedures and training programs. Preparing a formal operator performance evaluation plan would probably be a very short-term endeavor. Licensee is appropriately staffed and organized to accomplish it.

The Licensing Board does not believe that the possible need for such a condition or other unresolved matters provide any basis to delay arriving at the ultimate conclusion on the training issue as the Commission requested in CLI-85-2. Also, the Board does not foreclose the possibility that other conditions might be required. Our conclusion reported today is simply that Licensee has made an appropriate management response to the cheating incidents and that it has a fundamentally sound licensed operator training program possessing no defects that cannot be timely remedied by an appropriate license condition.

Respectfully submitted,
THE ATOMIC SAFETY AND
LICENSING BOARD

Sheldon J. Wolfe
ADMINISTRATIVE JUDGE

Gustave A. Linenberger, Jr.
ADMINISTRATIVE JUDGE

Ivan W. Smith, Chairman
ADMINISTRATIVE LAW JUDGE

Bethesda, Maryland
April 11, 1985

[The Appendix has been omitted from this publication, but may be found in the NRC Public Document Room, 1717 H Street, NW, Washington, DC 20555.]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Lawrence Brenner, Chairman
Dr. A. Dixon Callihan
Dr. Richard F. Cole**

In the Matter of

**Docket Nos. 50-456
50-457**

**COMMONWEALTH EDISON COMPANY
(Braidwood Nuclear Power Station,
Units 1 and 2)**

April 17, 1985

In this Order the Board rules on three contentions and sets out the prehearing schedule. The first two contentions were timely filed earlier in the proceeding. One concerns the possible impact of a railroad accident near the Braidwood facility involving trains transporting explosive material to the Joliet Arsenal. The contention is admitted despite previous consideration of the issue at the uncontested construction permit hearing. The Board denies the second contention, which asserted that the population center calculation must include aggregated areas of recreational facilities. The Board also denies the admission of a late filed quality assurance contention, but because of the significance of the issue directs Intervenors to submit an amended petition specifying in greater detail the contention and the underlying factual support for their allegations.

RULES OF PRACTICE: INTERVENTION

Intervenors may initially submit a reasoned explanation for raising a contention, thereafter buttressing the contention with increased factual

data. See *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-24, 14 NRC 175, 182 (1981).

RULES OF PRACTICE: CONTENTIONS; COLLATERAL ESTOPPEL

When an issue presented in a contention was addressed at the construction permit stage, the Licensing Board must consider whether collateral estoppel applies.

COLLATERAL ESTOPPEL

When collateral estoppel is applied to bar litigation of the same issue in a subsequent proceeding, newly discovered facts or changed circumstances or a special public interest may cause the issue in question to be relitigated. See *Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), CLI-74-12, 7 AEC 203 (1974).

COLLATERAL ESTOPPEL

Collateral estoppel applies to administrative proceedings, *United States v. Utah Construction & Mining Co.*, 384 U.S. 394, 421-22 (1966); *Toledo Edison Co.* (Davis-Besse Nuclear Power Station, Units 1, 2, and 3), ALAB-378, 5 NRC 557 (1977), and to NRC proceedings. *Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), ALAB-182, 7 AEC 210, 211-16 (1974), *rev'd on other grounds*, CLI-74-12, 7 AEC 203 (1974).

COLLATERAL ESTOPPEL

Collateral estoppel requires proper jurisdiction, a prior valid final judgment on the merits, actual litigation of the issue, and the party against whom the doctrine is asserted must have been a party or in privity with a party to earlier litigation.

LIMITED WORK AUTHORIZATION: SITE SUITABILITY; COLLATERAL ESTOPPEL

Under an "LWA-1" request (10 C.F.R. § 50.10(e)(1) and (2)), a site suitability evaluation determines whether the site is suitable for reactors of the general type and size proposed. Analysis of an issue for general site suitability purposes may be so disparate from that undertaken in an

operating license proceeding that collateral estoppel may be inapplicable where the issue at hand in the later operating license proceeding involves the specific design of the nuclear plant.

COLLATERAL ESTOPPEL

When an earlier construction permit proceeding is uncontested, the requirement of identity of parties cannot be met by the party asserting collateral estoppel, because where there had been no adverse party in the prior proceeding, there can be no identity of parties.

COLLATERAL ESTOPPEL

Foreclosure of an issue by collateral estoppel is weakened when the specific issue in the earlier proceeding is uncontested, although a related issue was contested. *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 695 nn.8 & 9 (1982). A totally uncontested construction permit proceeding is not the equivalent of prior actual litigation of the issue required for collateral estoppel.

SITE SUITABILITY: LOW POPULATION ZONE

To satisfy 10 C.F.R. § 100.11(a)(3), distance to the population center from the reactor must be at least one and one-third times the distance from the reactor to the outer boundary of the low population zone (LPZ).

SITE SUITABILITY: POPULATION CENTER

An aggregate population of several recreational facilities is not a population center where the separate areas are located in different directions from the nuclear plant. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33, 42-53 (1977).

SITE SUITABILITY: LOW POPULATION ZONE

The Board is free to reject aggregation of the population in different directions to form the population center of 25,000 or more persons, particularly when no change would be effected in the LPZ, even assuming such aggregation was proper. *See Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33, 42-53 (1977).

RULES OF PRACTICE: LATE FILED CONTENTIONS

The Licensing Board must balance the five factors of 10 C.F.R. § 2.714(a)(1) when determining whether an untimely contention may be admitted. The good cause factor necessitates that Intervenor demonstrate a convincing and reasonable explanation for the tardiness of their petition. *See South Carolina Electric and Gas Co.* (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 887 n.5 (1981).

RULES OF PRACTICE: LATE FILED CONTENTIONS

When Intervenor indicate an ongoing awareness of facts which could have been employed in support of the contention, and the petition is extremely late, the good cause factor is not met.

RULES OF PRACTICE: LATE FILED CONTENTIONS

The 2nd and 4th factors are generally accorded less emphasis than other factors of § 2.714(a)(1). *See Detroit Edison Co.* (Enrico Fermi Atomic Power Plant, Unit 2), ALAB-707, 16 NRC 1760, 1767 (1982).

RULES OF PRACTICE: LATE FILED CONTENTIONS

A Licensing Board may take into account representation provided by Intervenor's counsel in a previous NRC licensing proceeding when determining whether the Intervenor will contribute to the record, at least where the issue being raised in both proceedings is similar and involves allegations against the same Applicant.

RULES OF PRACTICE: LATE FILED CONTENTIONS

Admission of any new contention may broaden the issues and thereby delay the completion of a proceeding simply by virtue of there being more issues on which evidence must be presented. Tardiness in filing a contention does not *per se* broaden the proceeding. If the late filed contention would have been admissible if timely filed, there is no net increase in the number of issues to be tried.

RULES OF PRACTICE: LATE FILED CONTENTIONS

There is strong reason to reject a contention when it is filed late without good cause close to the hearing date such that admission of the con-

tention would deprive the other parties of the opportunity to obtain necessary information about the contention. *See South Carolina Electric and Gas Co.* (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 889 (1981).

RULES OF PRACTICE: LATE FILED CONTENTIONS

Delay caused by broadening the issues due to admission of a new contention is mitigated by a Licensing Board's requirement that Intervenor's resubmit a detailed petition (including the underlying data supporting the contention) so the adjudication will encompass only a carefully focused, well-reasoned contention which raises significant issues.

RULES OF PRACTICE: LATE FILED CONTENTIONS

The Board may include in its analysis of 10 C.F.R. § 2.714(a)(1)(v) the fact that other contentions originally scheduled for litigation were withdrawn by Intervenor's.

RULES OF PRACTICE: LATE FILED CONTENTIONS

Enlargement of the proceeding may be offset by limiting the proceeding to only those issues which are necessary for a determination of whether to authorize a low power operating license.

RULES OF PRACTICE: LATE FILED CONTENTIONS

If the issues underlying the contention are viewed as serious and significant (e.g., QA/QC questions), the Board may balance the contention's potential significance with the possibility of minor delay and some net broadening of issues in the proceeding.

RULES OF PRACTICE: CONTENTIONS; QUALITY ASSURANCE

It is particularly crucial to set forth with specificity the bases of a broad QA/QC contention.

RULES OF PRACTICE: CONTENTIONS; DISCOVERY

An NRC Licensing Board may permit Intervenor's to depose an NRC Staff official if other means are unavailable to enable Intervenor's to

more specifically explain the related portion of Intervenors' contention based on testimony by that NRC Staff official.

RULES OF PRACTICE: LATE FILED CONTENTIONS

A Licensing Board may reject a late contention in its original form for lack of specificity and basis, but provide Intervenors with an opportunity to resubmit an amended contention. The Board may require specification with exactitude including each alleged quality assurance deficiency, data on which each deficiency is premised and the overall unacceptable patterns formed when individual incidents are aggregated.

SPECIAL PREHEARING CONFERENCE ORDER

INTRODUCTION AND PROCEDURAL BACKGROUND

In this Order the Board rules on the admissibility of three contentions not previously subject to Board disposition. Two of the contentions (Neiner 4 and 8) were submitted timely during the early stages of this proceeding and the third is an untimely contention filed on March 8, 1985, pursuant to 10 C.F.R. § 2.714(a)(1). As will be discussed below, Contention 4 asserts that the use of the Illinois Central Railroad to transport explosive materials from the Joliet Arsenal creates a hazardous condition due to the proximity of the railroad tracks to the Braidwood facility. Contention 8 alleges that the population center figures used to meet the "population center distance" requirements of 10 C.F.R. Part 100 were incorrectly determined. We deny Contention 8's admission but have found Contention 4 to be appropriate for litigation in the Braidwood operating license proceeding.¹ The late filed quality assurance contention is not admitted at this point, but the Board has provided Intervenors with an opportunity to submit an amended petition addressing their quality assurance (QA) and quality control (QC) concerns by May 20, 1985. We also establish the schedule leading to the October 1, 1985 commencement of the evidentiary hearing, and address some miscellaneous matters.

The issues before us arise from the application for an operating license sought by Commonwealth Edison Company ("Applicant") in

¹ The affected parties were advised of this conclusion by telephone on April 8, 1985, as confirmed in our unpublished Order, dated April 9, 1985.

1978 for the Braidwood Nuclear Power Station, Units 1 and 2. The NRC noticed Commonwealth Edison's operating license application in the *Federal Register* on December 15, 1978. 43 Fed. Reg. 56,659-60. A Notice of the Opportunity to Request a Hearing was also published indicating that petitions for leave to intervene were to be submitted by January 15, 1979. Timely petitions for intervention were received from three sources. Two of these petitions were eventually admitted to this proceeding. Bridget Little Rorem submitted a petition on behalf of herself, individually, and as the representative for the group Bailly Alliance.² Bob Neiner Farms, Inc. submitted a separate petition. A third petition for intervention was received from Mr. Marty Westerman. The Board rejected Mr. Westerman's petition for its failure to identify a legally cognizable "interest" in the licensing proceeding necessary to satisfy the requirements of standing. Board Order, dated March 22, 1979 (unpublished).

On June 7, 1979, the Atomic Safety and Licensing Board appointed in the Braidwood Operating License case was reconstituted and two of the original Board members were replaced. Judge Marshall E. Miller became the Board's Chairman and Judge Richard F. Cole was assigned to take the place of the technical judge who had resigned.³ The newly appointed Board issued a notice of a special prehearing conference to be held on July 26, 1979, in Joliet, Illinois.⁴ The notice required petitioners to file their supplemental petitions describing the contentions they wished submitted for litigation 15 days prior to the conference. Notice of Special Prehearing Conference, dated June 8, 1979.

The Special Prehearing Conference was held on August 23, 1979, in Joliet. Prior to the conference, Intervenor Rorem *et al.* and Neiner Farms had submitted their contentions, to which the NRC Staff and Applicant responded.⁵ During the conference the Board issued rulings on the admissibility of the submitted contentions allowing a total of nine

² On August 7, 1979, Intervenor submitted an amended petition indicating Bailly Alliance no longer intended to participate in the proceeding but that the Applesed organization wished to be substituted as a party for intervention in its place. Intervenor Rorem *et al.* Amended Petition, August 7, 1979. Neither the Staff nor the Applicant objected to the substitution of Applesed for Bailly Alliance. Answer of NRC Staff to Amended Petition of Bridget Little Rorem, *et al.*, August 20, 1979. Answer of Commonwealth Edison Company to Amended Petition of Bridget Little Rorem, *et al.*, August 10, 1979.

³ Judge Lawrence Brenner has since been appointed Chairman in Judge Miller's stead, as of January 31, 1985.

⁴ The conference was postponed until August 23, 1979. See 44 Fed. Reg. 40,984 (July 13, 1979).

⁵ Answer of Commonwealth Edison to Amended Petition of Bridget Little Rorem, *et al.*, August 10, 1979; Answer of Commonwealth Edison Company to the Contentions of Bob Neiner Farms, August 22, 1979; Answer of NRC Staff to Amended Petition of Bridget Little Rorem, *et al.*, August 20, 1979; Answer of NRC Staff to Amended Petition of Bob Neiner Farms, Inc. *et al.*, August 20, 1979.

contentions into the proceeding. Two of the nine were submitted by Intervenor Rorem *et al.*, and the remaining seven were those admitted from the Neiner petition. The Board deferred its ruling on Neiner Contentions 4 and 8 (subjects of this Order) pending further briefing of the issues.

It has been almost five years since the Special Prehearing Conference was held. In the interim, status reports were requested to keep the Board apprised of the status of construction of the Braidwood plant (which Applicant had deferred) and of any continuing negotiations among the parties which the Board had ordered to facilitate the hearing process. Board Order Directing Status Reports, dated October 1, 1982; Board Order, dated June 8, 1984 (both orders unpublished). The latest Board requests for a case update were issued in unpublished Orders on January 10 and February 6, 1985. In compliance with those Orders, the parties submitted their filings on March 1, 1985, including a stipulation agreed upon by all of the parties. The stipulation addressed the withdrawal of certain contentions earlier admitted (Rorem Contention 2, Neiner Contentions 5, 6, 10 and 11), the present wording of previously admitted contentions still in dispute on the merits (Rorem Contention 1, Neiner Contentions 1, 3, and 7), and the present wording of two proposed contentions awaiting a Board disposition (Neiner Contentions 4 and 8). The Board approves the stipulation as filed. The admitted contentions are set forth in an attachment to this Order. We commend the parties for their coordination in this effort and expect the fruits of the negotiations will markedly improve the efficiency of the proceeding. In addition, on March 7, 1985, Intervenor Rorem *et al.* submitted a motion to the Board for leave to file a new quality assurance contention out of time. The Board must now determine the admissibility of the two pending Neiner contentions (4 and 8) and the newly submitted quality assurance contention.

NEINER CONTENTIONS 4 AND 8

Contentions 4 and 8 are subject to the regulatory requirements of 10 C.F.R. § 2.714 and the general legal principles of NRC case law governing contentions. Because a primary purpose of requiring contentions is to make it incumbent on intervenors to provide Applicant and NRC Staff with a fairly precise delineation of those issues the intervenor wishes litigated, the regulations mandate that a specific basis be asserted for each contention and the matter be pled with reasonable specificity. 10 C.F.R. § 2.714(b). The determination regarding the specificity with

which the basis of a contention is to be pled obviously involves a case-by-case judgment of the licensing board. *Philadelphia Electric Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974). The Appeal Board has ruled that a licensing board in making its determination is not to delve into the merits of the contention when ruling on admissibility. Thus, evidence in support of the contention need not be detailed when the contention is initially filed, *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-150, 6 AEC 811, 812 (1973), but the intervenor must state the basis for the assertions which comprise each contention. *Houston Lighting and Power Co.* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-590, 11 NRC 542, 548-49 (1980). We agree with the Licensing Board in the *Perry* case that intervenors may initially submit a reasoned explanation for raising the contention which later will be buttressed with factual data after the parties engage in discovery. *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-24, 14 NRC 175, 182 (1981). The *Perry* Board set out six guidelines for determining admissibility of contentions, five of which we list below as we find them useful in their general applicability to Contentions 4 and 8.

- Is the contention sufficiently specific so that Applicant has general notice of the issues on which it may bear the burden of proof at a hearing?
- Is there either a reasonable explanation or plausible authority for factual assertions?
- If a contention has been thoroughly litigated in the construction permit proceeding and has been challenged on that ground, is intervenor's allegation significantly different from the construction permit issue or has it shown sufficiently changed circumstances or policies to permit relitigation?
- If all the facts alleged in the contention were proved, would those facts require imposition of a licensing condition or the denial of an operating license?
- Has intervenor indicated enough familiarity with the subject of its contention so that its contribution to the proceeding may be expected to be helpful and so that minor shortcomings should be overlooked?

Perry, supra, 14 NRC at 184.

a. Contention 4

Contention 4 reads as follows:

Intervenors contend that the proximity of the Illinois Central Railroad to the plant site and the use of the rail system to transport explosive materials from the

Joliet, Illinois arsenal and other plants or depositories creates an unacceptably hazardous condition not considered by the Atomic Safety and Licensing Board, which issued the partial initial decision on environmental and site suitability matters for the Braidwood Station (LBP-75-1, 8 AEC 1197 (January, 1975)). At the construction permit stage the analysis of the probability of an explosion was inadequate in that:

- a) the six-month period during 1974 for which the traffic from the Joliet arsenal was analyzed is not representative of other traffic periods in the past and may not be representative of the traffic to be expected in the future.
- b) the analysis of the traffic was based on peacetime traffic only.
- c) only the probability of accidental or inadvertent explosions were assessed and the probability of sabotage or purposefully caused explosions were not explored.

This contention is essentially the same as that contained in Neiner Farms' initial petition for intervention. Bob Neiner Farms, Inc., Petition to Intervene, January 12, 1979. (The original last paragraph, which had set forth the relief sought, has been dropped from the wording presented in the current stipulation.) The Board deferred ruling on its admissibility at the special prehearing conference subject to the filing of briefs by the parties. Tr. 36-37. Both the Staff and Applicant object to its admission primarily because they contend the railroad accident scenario was adequately evaluated and decided during the construction permit proceeding.

In addition to NRC regulations and general principles of law applied to contentions when determining their admissibility (*see infra* pp. 616-17) collateral estoppel must be considered here, as at the construction permit stage the subject of this contention was indisputably addressed in findings of fact reached by the Licensing Board in the Braidwood construction permit proceeding. *Commonwealth Edison Co.* (Braidwood Station, Units 1 and 2), LBP-75-1, 8 AEC 1197, 1226-27 (1975). We note at the outset that this Board's February 6, 1985 Order urged the parties to make current, in light of any new factual developments and case law, the arguments contained in their briefs submitted some years ago. Board Order, slip op. at 2. Our directive was a reasonable one. In fact, it would have been a prudent measure for the parties to have sought leave on their own volition to supply such updating since the number of years since the briefs were filed made high the probability that there would be new decisions relevant to issues presented here. And, as might be expected, there have been significant NRC cases decided since 1979 which discuss the issue of collateral estoppel. We will not list them in wholesale fashion at this juncture as we apply those

pertinent to Contention 4 in the discussion which follows. But, we consider each party involved in this contention derelict in not providing this updated authority in a comprehensive manner responsive to the Board's Order.

Before launching into an analysis of the more recent cases dealing with collateral estoppel, we pause to explain how this issue arises in the context of Contention 4. Contention 4 is concerned with the hazardous condition allegedly created when the Illinois Central Railroad, whose tracks are located within close proximity to the Braidwood facility, is used to transport explosive material to and from the Joliet Arsenal. Issues associated with transporting explosive substances by rail were considered and ruled upon in the Partial Initial Decision dealing with site suitability for the Braidwood plant when the first limited work authorization (a precursor to the eventual issuance of a construction permit) was adjudicated. Four separate findings on this issue were included. *Commonwealth Edison Co.* (Braidwood Station, Units 1 and 2), LBP-75-1, 8 AEC 1197, 1226-27 (1975), Findings 85-88.

In the Answer submitted shortly before the Special Prehearing Conference, Applicant took the position that "Contention 4 should be dismissed because this matter was explored fully by the Licensing Board during the review at the construction permit stage." Answer of Commonwealth Edison Company to the Contentions of Bob Neiner Farms, August 22, 1979, at 4-5. Although Applicant did not specifically delineate the legal theory on which its argument was predicated, Applicant in substance asserted that Contention 4 was barred from relitigation by collateral estoppel. In a Supplemental Brief (dated September 17, 1979), which had been requested of the parties by the Board during the prehearing conference (Tr. 37), Applicant set out its argument in greater detail. Applicant claims Intervenor has not shown newly discovered facts or changed circumstances nor has Intervenor demonstrated a special public interest, either of which may cause a relitigation of the issue in question. *Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), CLI-74-12, 7 AEC 203 (1974). In its Supplemental Statement, the Staff agreed with Applicant's position that Contention 4 issues are not litigable in the operating license proceeding due to collateral estoppel. Staff Letter to Board, dated September 12, 1979. Bob Neiner Farms, Inc. also filed a Supplemental Information Statement in which assertions contrary to those made by Applicant and Staff were put forth:

Intervenors have not been able to determine if the possibility of sabotage was discussed at the evidentiary hearing and believe that if it was not then considered it should be at this stage. In addition, Intervenors contend that peacetime traffic calcu-

lations are not adequate to indicate the potential hazards that may exist during war-time. Intervenor also contend that in order to avoid an unacceptable hazard to health and safety a plan should be submitted by Commonwealth Edison Company which will indicate how this rail line can be secured to avoid accidents because of acts of sabotage.

Supplemental Statement, Bob Neiner Farms, Inc., September 12, 1979.⁶ Intervenor argues that substantive areas of the railroad transportation of explosive material were not investigated nor adequately considered during the construction permit proceeding so as to preclude their consideration in this operating license proceeding.

Thus, the question presented is whether Contention 4 issues were previously adjudicated and determined so as to foreclose their consideration during the operating license case.

Res judicata and its companion when dealing with different causes of action, collateral estoppel, is the legal theory allowing a claim against a party to be litigated only once provided certain standards are met. Collateral estoppel principles are generally appropriate in administrative proceedings, *United States v. Utah Construction & Mining Co.*, 384 U.S. 394, 421-22 (1966); *Toledo Edison Co.* (Davis-Besse Nuclear Power Station, Units 1, 2, and 3), ALAB-378, 5 NRC 557 (1977), and have been made applicable to NRC adjudications. *Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), ALAB-182, 7 AEC 210, 211-16 (1974), *rev'd on other grounds*, CLI-74-12, 7 AEC 203 (1974). In order to apply collateral estoppel several requirements must be met: The prior tribunal must have had jurisdiction to render the decision, there must have been a prior valid final judgment on the merits, the issue must have been actually litigated and necessary to the outcome of the first action, and the party against whom the doctrine is asserted must have been a party or in privity with a party to the earlier litigation. *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), LBP-79-27, 10 NRC 563, 566 (1979), *aff'd*, ALAB-575, 11 NRC 14 (1980); *Parklane Hosiery Co. v. Shore*, 439 U.S. 322, 326 n.5, 99 S. Ct. 645, 58 L. Ed. 2d 552 (1979); *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 694-96 (1982).

There is no question that jurisdiction was proper here. On September 20, 1973, the application to construct pressurized water reactors at Braid-

⁶The Board has also taken account of the parties' status reports filed during the summer of 1984 in reaching our conclusions on the admissibility of this contention. Commonwealth Edison Company's Status Report and Motion to Establish a Hearing Schedule, June 27, 1984; Status of Contentions — Proposed Revisions and Amendments, July 5, 1984; NRC Staff Status Report and Recommendations Regarding a Proposed Schedule, July 9, 1984.

wood was docketed by the Atomic Energy Commission pursuant to § 103 of the Atomic Energy Act of 1954, as amended. *See also* 8 Fed. Reg. 29,633. On October 26, 1973, an Atomic Safety and Licensing Board was appointed by the Commission to conduct the construction permit proceeding. *See* 38 Fed. Reg. 29,634. The Partial Initial Decision containing site suitability determinations is the fruit of the adjudicatory proceeding before that Board. 10 C.F.R. § 2.760(a). Under § 2.760(a) an initial decision issued in a construction permit proceeding or operating license adjudication constitutes final Commission action within 45 days, if it is not appealed or directed to the Commission for certification. No appeal was initiated here and thus the site suitability finding in the Partial Initial Decision constitutes a final, valid judgment on those issues. A review of the Partial Initial Decisions was conducted by the Appeal Board on a *sua sponte* basis. The Appeal Board affirmed the previous decisions of the Licensing Board. *Commonwealth Edison Co.* (Byron Station, Units 1 and 2 and Braidwood Station, Units 1 and 2), ALAB-312, 3 NRC 91 (1976).

Clearly, the site suitability findings were determinations made on the merits of some of the same issues which comprise Contention 4. There is, however, an important difference in the contexts in which they were made. During the phase of the construction permit proceeding in which this issue was considered, the Board only evaluated the record to determine whether the site under consideration was suitable for reactors of the general type and size proposed for Braidwood. This was all it had to find, since its decision was one on a request for a Limited Work Authorization pursuant to 10 C.F.R. § 50.10(e) (1) and (2). *See* 8 AEC at 1203, 1226-27. Such a so-called "LWA-1" does not involve any construction or installation of safety-related facilities, but only permits non-safety-related work. Compare Applicant's own successful argument to this effect. 8 AEC at 1200-1201. Thus, the Board had decided that the reactor proposed for Braidwood *could be* designed such that there would be an acceptably low probability of adverse radiological consequences caused by a serious railroad accident and derivative explosion. 8 AEC at 1227. For example, there are no findings regarding the design load which the various safety-related structures can withstand. The distinction we have drawn leads to the conclusion that although the construction permit Board made its site suitability decisions on the merits and appears to have given thoughtful consideration to the testimony presented by Applicant and Staff, the focus of the analysis for general site suitability

purposes is so disparate from that in an operating license proceeding as to make this factor weigh against applying collateral estoppel here.⁷

To be sure, it may be that the case on the merits would demonstrate that the probability of occurrence of a railroad explosion is so low that it need not be considered for the design of the Braidwood plant. It is not clear that this was the case at the site suitability stage, since that Board's decision repeatedly casts its findings in terms of the "probability of unacceptable damage to the Braidwood plant," or similar phrases, rather than simply the probability of the occurrence of an explosion. 8 AEC at 1226-27. Therefore, we cannot discern that the presumed future design capability of the plant's safety-related structures played no part in that Board's findings.

Moreover, we have no assurance that it is proper now to base important assumptions about the probability of an unacceptable railroad explosion in part on an old survey of actual shipments from the Joliet Arsenal for only six months of 1974. The present and foreseeable future situation might strengthen or weaken the Applicant's case, but that is a matter for the merits, either by way of summary disposition or after an evidentiary hearing.

Another factor unfavorable to the application of collateral estoppel is whether the parties in the second proceeding are identical to those in the first. The construction permit adjudication involved only the Applicant and the Staff. Since no petitions to intervene were submitted, 8 AEC at 1199, the proceeding was *uncontested*. The logical conclusion is that the party against whom the doctrine is being asserted not only is not the same in both cases, but that here there was *no* party adverse to the position of the Applicant on this issue at the construction permit stage. While we are fully aware of the decision by another Licensing Board in the *Perry* case, LBP-81-24, *supra*, 14 NRC at 199-200 (collateral estoppel may be applied to prevent an intervenor who was not a party at the construction permit proceeding from raising issues during the operating license proceeding which were litigated at the construction permit stage), we find *Perry* to be distinguishable from the case before us.

Reasoning similar to that in *Perry* was also espoused by the *San Onofre* Licensing Board in precluding litigation of the Christianitos fault from *San Onofre's* operating license hearing. *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-3,

⁷ The later Initial Decision of the Licensing Board, which made the remaining findings prerequisite to issuance of a construction permit, recites generally for all site suitability issues, that the Board has considered the site characteristics in light of the particular design proposed and finds that Braidwood "conforms to the requirements of Part 100." LBP-75-74, 2 NRC 972, 977 (1975). Such a finding gives no indication of any considerations of design as related to the postulated railroad explosion.

15 NRC 61, 78-82 (1982). In *San Onofre* the Licensing Board determined that when an issue is known at the construction permit stage and was the subject of intensive scrutiny, *anyone who could have* (even if no one had) litigated the issue at that time could not later seek to do so at the operating license hearing without a showing of newly discovered evidence. The Appeal Board review of the *San Onofre* decision determined the Licensing Board was incorrect on the premise undergirding its conclusion that neither identity (or privity) of parties nor actual prior litigation and decision of the issue were prerequisite to employing the bar of collateral estoppel in NRC proceedings. That is, the Appeal Board disagreed with the Licensing Board's belief that organizations or persons who share general common views will provide adequate representation for each of those points of view during NRC proceedings. *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 694-96 (1982). In the case before us, the entire construction permit proceeding was uncontested. There was no party with even a general view that the railroad explosion analyses performed by the Applicant and Staff were unacceptable. Therefore, the *San Onofre* Appeal Board decision applies with even more force to the circumstances of Braidwood.⁸

Moreover, beyond the fatal flaw of lack of identity or privity of parties, in the circumstances of the Braidwood case before us, we decline to consider findings in an uncontested construction permit proceeding to be the equivalent of the prior "actual litigation" of the issue required for collateral estoppel. The *San Onofre* Appeal Board declined to reach the question of whether collateral estoppel would be inapplicable because the sub-issue of the capability of the Christianitos fault was not a contested issue in the construction permit proceeding (although other matters related to the overall subject of seismicity were vigorously contested, LBP-82-3, *supra*, 15 NRC at 78). However, the Appeal Board pointed out that the fact that the Christianitos fault sub-issue was uncontested made the case for foreclosure of the issue somewhat weaker. ALAB-673, *supra*, 15 NRC at 695 nn.8 & 9. The case for foreclosure is further weakened in the Braidwood proceeding because the overall railroad

⁸ Contention 4 arises under the Atomic Energy Act as a nuclear health and safety issue. Different considerations could apply to an analysis of whether construction permit findings bar or limit consideration at the operating license stage where the issues are environmental ones arising under the National Environmental Policy Act (NEPA). See *San Onofre, supra*, ALAB-673, 15 NRC at 696, and a later *San Onofre* decision, ALAB-717, 17 NRC 346, 354 (1983). See also *Tennessee Valley Authority* (Watts Bar Nuclear Plant, Units 1 and 2), ALAB-413, 5 NRC 1418, 1422 n.5 (1977); *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1423, 1458-61 (1982); 10 C.F.R. § 51.53(a), 51.95(a).

explosion subject (indeed, the entire case) was uncontested at the construction permit stage.

The Appeal Board later affirmed its earlier decision that the *San Onofre* Licensing Board erred in foreclosing intervenors from fully litigating the capability of the Cristianitos fault at the licensing stage. *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 353-54 (1983). The language contained in both *San Onofre* Appeal Board decisions supports our decision to hold collateral estoppel inapplicable to Contention 4, especially since the Braidwood construction permit proceeding was uncontested.⁹

Our discussion above indicates why Neiner Farms' present contention, for purposes of judging its admissibility, sufficiently alleges matters which should now be considered on the merits at this operating license stage, even assuming, *arguendo*, that collateral estoppel could have been technically applied. Given the difference in analytical focus between the old site suitability findings and the present operating license stage considerations, facts material to full consideration of this contention on the merits would include consideration of the hazards presented by postulated railroad explosion forces on the loading design of the facility, unless the Applicant chooses to limit consideration to its possible position that the probability of the occurrence of any railroad explosion is too low to merit any consideration in the design of the facility.

b. Contention 8

Bob Neiner Farms, Inc. Contention 8 reads as follows:

Intervenors contend that for purposes of determining compliance with 10 C.F.R. 100.11(a)(3), Applicant and the NRC Staff should have used the population expected to be at the nearby (within 8 miles) recreational facilities in aggregate as a population center. (Table 2.2-7 ER-OLS.)

This contention was briefed by the Applicant and NRC Staff to set forth the bases for their opposition to its admission in the proceeding.¹⁰

⁹ None of the Applicant's or Staff's several pleadings on this issue disclosed that the construction permit proceeding was uncontested. This was a material omission from the Board's point of view, and even viewing it from the Applicant's and Staff's subjective perspective, it was at least a potentially material omission given the well-known criteria for the application of collateral estoppel. Such a failure to disclose falls short of the level of advocacy expected in NRC proceedings.

¹⁰ We explain at the outset that we will not deal with the Applicant's (or NRC Staff's) arguments on emergency planning with respect to this contention as we believe those arguments entail a misapprehension of the issues.

Contention 8 was also the subject of party negotiations seeking to combine it with the Neiner emergency planning contention.¹¹ Intervenor is unwilling to either withdraw Contention 8 or to combine it with Contention 3. Contention 8 remains unchanged in its wording since its initial submission. The arguments previously espoused by Applicant and Staff in their briefs and status reports are still relevant to our determination here.

During the August 23, 1979 prehearing conference, counsel for Intervenor was given the opportunity to provide the Board with further evaluation of Contention 8, but chose not to do so. Tr. 39. Presumably, Intervenor's position is that the aggregate population of several recreational facilities, a population which is not steady throughout the year but is subject to a seasonal influx, should be considered as a single population unit for the purposes of determining the population center and the associated low population zone under 10 C.F.R. §§ 100.11(a)(2) and (3), and 100.3(c).

In its Answer, Applicant premised its objection to Contention 8 on the Appeal Board's ruling in *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33, 42-53 (1977). Applicant's Answer asserts that Contention 8 suggests the Board adopt a definition for a population center contrary to the dictates of the *Seabrook* decision. The "aggregate" population concept urged by the Neiner contention appears to be akin to the "doughnut" population concept which the Intervenor in *Seabrook* recommended for use in determining the population zone there. 6 NRC at 48-49. Among other reasons, the Appeal Board rejected the "doughnut" shape (actually a semi-circle around the nuclear plant) for a population center configuration because it encompassed much more than one general direction in which the wind could move a radioactive cloud potentially emitted in a serious accident. 6 NRC at 49-51. Rather, the Appeal Board's review of 10 C.F.R. Part 100 contemplates one general direction wind path for purposes of determining a population concentration which could be defined as a Part 100 "population center." *Id.* From our reading of the Appeal Board's analysis, it appears Applicant's argument concerning this aspect of the *Seabrook* decision is well founded, assuming, as appears to be the case from Table 2.1-6 of the Braidwood Environmental Report-OL stage (and Table 2.2-7 of the ER-CP stage), that the recreational facilities which are the subject of the contention are spread over many different

¹¹ Contention 3 alleges Applicant has devised an inadequate emergency plan. This contention was admitted during the August 23, 1979 Special Prehearing Conference and remains in the proceeding, as reworded. See Prehearing Conference Tr. at 31, and Stipulation dated March 1, 1985, at 3.

directions (sectors of a circle) from the plant. (These Tables were attached to Applicant's August 22, 1979 Answer.) However, the Board's review of Contention 8 finds an independent basis for its denial, also urged by Applicant.

In this case the Applicant has chosen a low population zone (LPZ) radius of 1-1/8 miles to satisfy the siting requirement of 10 C.F.R. § 100.11(a)(2). Braidwood Station, Units 1 & 2, NRC Staff Safety Evaluation Report, November 1983, at p. 2-5. Applicant designated Joliet, Illinois as the nearest densely populated center, meeting the standard that the chosen population center contain at least 25,000 or more persons. 10 C.F.R. § 100.3(c). Joliet is approximately 20 miles from the plant in a north north-easterly direction. The requirement that the population center be a distance of at least 1-1/3 times the low population zone radius is satisfied, as 20 miles is far in excess of 1-1/3 times the LPZ radius of 1-1/8 miles ($1.33 \times 1.125 = 1.5$ miles). 10 C.F.R. § 100.11(a)(3). Or, as expressed in *Seabrook*: "In other words, the LPZ cannot extend beyond three quarters of the distance between the facility and the population center." *Seabrook, supra*, 6 NRC at 44.

Even if the Board accepted Intervenor's theory of an aggregate population of the multi-directional recreational facilities as the population center, there would be no change effected in the low population zone. The Board notes that the vagueness of the contention impedes our evaluation of it because it is difficult to determine whether the alleged aggregate population center is eight miles at its nearest point, or somewhere within the eight mile radius area. If it is the former, the mathematical calculations above indicate that this distance would still be far in excess of the formula governing the minimum permissible population center distance. Thus, there would be no change in the LPZ. If Intervenor intended to put the latter assertion into issue, as appears to be the case from the ER tables referenced above, Intervenor nevertheless have not pointed to an aggregate population remotely approaching 25,000 or more persons within, or even close to, the required 1.5 miles from the plant. Applicant, in its August 22, 1979 Answer (at 7), asserted that only one recreational facility (Chicago Beagle Club) is less than this minimum distance, and that club had an estimated peak daily attendance of 1,500 persons, far short of the 25,000 person population requirement. In the several years since Applicant submitted its Answer, Intervenor has had the opportunity, but has not contradicted Applicant's assertions, which are based on the same table which Intervenor apparently meant to reference in the contention. Therefore, assuming *arguendo*, we accept this contention as correct on the merits, it is still immaterial to the

compliance of Braidwood with the applicable LPZ requirement. See the fourth *Perry* guideline, *supra*, at p. 617 of this Order.

In addition, the bases and specificity with which contentions are to be pled were not artfully employed here. The contention suffers from the lack of a factual basis or well-reasoned explanation in support of the litigability of this siting criteria issue. For all these reasons, Contention 8 is denied admission in this proceeding.

ROREM CONTENTION ON QUALITY ASSURANCE ISSUES

On March 8, 1985, Intervenors Bridget Little Rorem *et al.* filed a new contention asserting that serious deficiencies exist in the quality assurance (QA) and quality control (QC) program at the Braidwood facility. The contention as proposed by Intervenors Rorem *et al.* reads:

Commonwealth Edison has not implemented, maintained and overseen an adequate quality assurance program for the construction of Braidwood. Edison has not and does not adequately supervise the quality assurance programs of its construction contractors. This is illustrated by, e.g.:

- The \$100,000 fine imposed against Edison for the faulty QA program of the Philips-Getschow Corporation;
- the non-compliance history of Edison and its contractors at Braidwood;
- the NRC Regional Administrator's testimony in August, 1984, that there are "serious quality assurance questions at Braidwood";
- the February, 1985 NRC CAT inspection report, which documented continuing quality assurance deficiencies, as well as inadequacies in the Braidwood Construction Assessment Program ("BCAP").

Because without an adequate QA program, Edison cannot show reasonable assurance that Braidwood will safely operate, no operating license may issue.

Because the QA/QC contention was filed long after the deadline for submitting contentions had passed, the Board must evaluate the contention under standards set forth in 10 C.F.R. § 2.714 and associated NRC case law.¹² As is evidenced by the parties' briefs on the QA/QC contention, there is no dispute that the Board must engage in balancing the factors governing the admission of untimely contentions (10 C.F.R.

¹² As we have already noted the general tenets of case law controlling admissibility of contentions, we will not reiterate them at this point. The requirements of basis and specificity under 10 C.F.R. § 2.714(b), as well as the late-filed criteria for admission, are applicable to late-filed contentions.

§ 2.714(a)(1)(i-v)) to determine whether the proposed contention is admissible. The factors to be weighed are:

- (i) Good cause, if any, for failure to file on time.
- (ii) The availability of other means whereby the petitioner's interest will be protected.
- (iii) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.
- (iv) The extent to which the petitioner's interest will be represented by existing parties.
- (v) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

We examine these factors *seriatim* and weave the Applicant and Staff arguments opposing this contention into our discussion.

Good cause to file a contention late necessitates that Intervenors demonstrate a convincing and reasonable explanation for the tardiness of the submission. Intervenors Rorem *et al.* articulate no specific reason for filing the QA/QC contention beyond the 1979 deadline other than the broad assertion that the facts on which the contention is based have arisen since 1979. Intervenors Rorem *et al.* Motion for Leave to File Additional Contention, March 8, 1985 at 3, 6 ("Rorem Motion"). That statement, while true, is not sufficient under the present facts to show good cause. Applicant's brief in response to Intervenor's late-filed petition correctly points out that where information is available to the public several months before a contention is filed and the contention is untimely submitted, then good cause for the tardiness is negated. Commonwealth Edison Co. Answer to Intervenor's Motion for Leave to File Additional Contention, March 25, 1985, at 16 ("Applicant's Answer"). By Intervenors' own statement, "there has been a long and continuing history of QA/QC deficiencies at Braidwood." Rorem Motion, at 3. This indicates an ongoing awareness by Intervenors of apparent difficulties in the QA/QC program. Specifically, the Staff makes the point that the NRC-imposed fine, used by Intervenors to substantiate their claim of QA/QC deficiencies, was initiated in February 1983 and made final in June of that year. NRC Staff Response to Bridget Little Rorem, *et al.*, Motion for Leave to File Additional Contention April 1, 1985, at 5 ("NRC Staff Response"). At the very latest, Intervenors could have filed the contention immediately subsequent to August 1, 1984, when testimony was given by the NRC Region III Director pointing out QA/QC problems at Braidwood. Intervenors do not claim that they waited to submit the contention because of a prerequisite need for the NRC Construction Appraisal Team (CAT) inspection report which was

not produced until February 1985, and the Board would have rejected this argument had it been propounded.

Intervenors have made little effort to convince the Board that there is good cause for their lateness in filing the QA/QC contention. In our own review of the time frame formed by the facts relied upon in the explanatory material accompanying the contention, we find that certainly by August 1984 Intervenors had ample material to propound the essential elements of the QA/QC contention. Thus, because Intervenors have not prevailed in showing good cause, the burden as to the other four factors is substantially increased. See, e.g., *Virginia Electric and Power Co.* (North Anna Station, Units 1 and 2), ALAB-289, 2 NRC 395, 398 (1975); *Project Management Corp.* (Clinch River Breeder Reactor Plant), ALAB-354, 4 NRC 383, 389 (1976); *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 2), ALAB-384, 5 NRC 612, 615 (1977).

The second and fourth criteria refer to alternative means of protecting a petitioner's interest and the extent to which other parties may represent a petitioner's interest. Our analysis of these two criteria leads us to conclude that Intervenors' interest may not be voiced by means other than their participation in the proceeding. There appears to be no other forum in which Intervenors could litigate this issue. Neither Applicant nor Staff are likely to adopt a perspective similar to that of Intervenors, and thus the representation afforded by another party would not suffice to express concerns likely to be expressed by the Intervenors. Although we find these factors weigh in favor of protecting the Intervenors' hearing right with respect to the QA/QC matter, factors 2 and 4 are generally accorded less emphasis than the others. *Detroit Edison Co.* (Enrico Fermi Atomic Power Plant, Unit 2), ALAB-707, 16 NRC 1760, 1767 (1982); *Mississippi Power & Light Co.* (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-704, 16 NRC 1725, 1730-31 (1982); *South Carolina Electric and Gas Co.* (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 884-85 (1981). Both Applicant and Staff agree with our assessment that factors 2 and 4 are favorable to Intervenors. Applicant Answer, at 19. NRC Staff Response, at 7.

The third factor in 10 C.F.R. § 2.714(a)(1) compels the Board to prospectively ascertain whether Intervenors' participation in the proceeding will assist in developing a sound record. From the QA/QC contention Intervenors submitted, our answer to the above question might be negative. But the Board's background knowledge encompasses the fact that BPI, the law firm which now represents Intervenors, contributed to the development of a sound record in the *Byron* operating license hearing by bringing Commonwealth Edison's QA/QC deficiencies at the Byron

plant to that Licensing Board's attention.¹³ Additionally, although this contention is more broadly worded and open-ended than is acceptable at this time, we derive from the contention a sense of the issues Intervenor wish to pursue. The requirements we impose below for acceptance of an amended contention will reasonably assure that Intervenor will assist in developing a sound record on significant QA issues.

The fifth factor of 10 C.F.R. § 2.714(a)(1) requires a rather lengthy discussion. At issue is the extent to which Intervenor's litigation of the late-filed contention will delay the proceeding, or broaden the issues. The possible delay bears on determining the admissibility of a contention under 10 C.F.R. § 2.714(a)(1), as the later the petition the greater the likelihood of delay. *Detroit Edison Co.* (Greenwood Energy Center, Units 2 and 3), ALAB-476, 7 NRC 759-62 (1978); *Clinch River, supra*, ALAB-354, 4 NRC at 394-95. As Applicant points out, the Board is to focus on delay in the licensing proceeding, not delay in the plant's fuel load schedule which might be created by the admission of the QA/QC contention. Applicant's Answer, at 21. While we agree with Applicant that the admission of a QA/QC contention "likely would require additional time for adjudication," the Board does not envision an unreasonable delay of the proceeding based on the schedule presently conceived and set out at the end of this Order.

It seems difficult to refute the fact that the admission of any new contention broadens and delays the completion of a proceeding simply by virtue of there being more issues on which evidence must be presented. Here the effect seems less onerous than it could perhaps be if (1) it were closer to the scheduled date of the hearing or (2) discovery in the proceeding was engaged in greater depth than what has actually thus far been pursued. Even if we were to adopt the schedule set out by Applicant, whose interest is greatest in seeing the litigation of Braidwood's operating license to a conclusion at its earliest date, the admission of the QA/QC contention would not appreciably alter projected target dates in the proceeding. Applicant, in agreement with the other parties, proposes that the hearing commence on October 1, 1985. Commonwealth Edison's Status Report, March 1, 1985, at 4. We intend to adhere to this proposed hearing schedule, which the Board has approved in this Order. See "schedule" section *infra*.¹⁴

¹³ This Board's two technical members were also members of the Board which presided in the *Byron* operating license proceeding.

¹⁴ Experience teaches that it is difficult to state long term projections with absolute certainty. The date for commencement of the hearing is a presently intended one, but we recognize that the exigencies of litigation at times serve to make precise long term scheduling an inaccurate exercise.

The potential delay caused by late-filed contentions was addressed by the Appeal Board in the *Summer* decision. There, the Appeal Board reversed the Licensing Board's order to admit late-filed contentions into the operating license proceeding. *South Carolina Electric and Gas Co.* (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881 (1981). The Appeal Board opined in *Summer* that Intervenor Fairfield United Action's (FUA) tardiness in filing contentions created a situation where the other parties were "effectively deprived of the opportunity to obtain its 'fullest possible knowledge' of what FUA propose[d] to adduce in support of its contentions." *Id.* at 889. This seems to be reasonably concluded by the Appeal Board because the contentions were submitted about three months prior to the hearing's scheduled commencement date, thereby not permitting the Licensing Board to rule on the admissibility of the contentions until less than two months before the start of the hearing. *Id.* at 884. One simple and obvious distinction to be drawn between the *Summer* situation and the one at hand is the closeness of the FUA petition to the hearing date. Even if the QA/QC contention proposed in Braidwood is admitted subsequent to the filing of the amended petition, which we schedule below, there will be an adequate opportunity for the parties to pursue discovery on this issue.

Another fact is present which should serve to minimize any delay in the Braidwood operating license proceeding caused by the litigation of an additional contention. That is, we require Intervenor to provide much greater specification for their contention if they choose to submit an amended petition. As we explain herein, if Intervenor are to litigate proposed QA/QC issues, they must submit a highly detailed petition tailoring their allegations and the underlying data so we may adjudicate a carefully focused, well-reasoned contention. In addition to reducing delay often produced by exploring extraneous matters of lesser importance because of an imprecisely worded contention, the steps we require of Intervenor in supplying greater specification and basis will provide assurance that only significant issues, if any, will be examined.

Determining whether an untimely petition will broaden the issues covered by the proceeding is a more intricate component of § 2.714(a)(1)(v) as applied to the circumstances before us. It has long been recognized that a licensing board is entitled to considerable discretion in the method it employs to balance the factors in § 2.714(a)(1). *Virginia Electric and Power Co.* (North Anna Power Station, Units 1 and 2), ALAB-342, 4 NRC 98, 107 (1976). The Board finds it necessary in this situation not only to balance the five factors relative to each other, but also to balance competing interests which arise within our evaluation of the broadening of the issues portion of the fifth factor.

To begin, we note that the scope of an adjudication is not necessarily broadened because of the tardiness of the filing. A timely petition, if admitted, would produce an examination of issues identical to those in the same petition late filed. There is no net difference in the number of issues to be litigated where the late filed contention would have been admissible if timely submitted.

The Board is also aware that negotiations unrelated to this QA/QC contention among the parties have produced the voluntary withdrawal by Intervenors Rorem *et al.*, and Neiner Farms of five previously admitted contentions. Stipulation, March 8, 1985, at 3. When the Board balances the broadening of the issues with the admission of a potentially significant QA/QC contention, we find ourselves bound to include in that evaluation the fact that other contentions which originally were to be litigated will not be because they were withdrawn of the Intervenors' volition. At bottom, it seems to us, we are faced with the effect of substituting a QA/QC contention for others already withdrawn which translates to little, if any, *net* broadening effect.

We also foresee the flexibility, if it becomes useful to do so, of limiting a first segment of the evidentiary hearing to only those issues which must be litigated in the context of a low power operating license. Such a limitation would obviously have the effect of offsetting at least some of the enlargement of the proceeding caused by admission of the QA/QC contention. Specifically, we have in mind Rorem Contention 1 and Neiner Contention 3, both of which deal (except for a single common subpart) with offsite, full power emergency planning measures. Adjudication of such emergency planning matters is not required for a license to operate at low power. 10 C.F.R. § 50.47(d). Also, depending on the factual data Applicant reports in response to the Board's request for information on Neiner Contention 1 (*see infra* p. 638) litigation of that contention may be postponed until after the conclusion of the low power proceeding.

The fact that fewer contentions may be scheduled for hearing combined with the voluntary withdrawal of the several contentions commendably accomplished through stipulation, serve to counterbalance the broadening effect admission of the QA/QC contention might have. Another element tipping the scale in favor of finding that the contention is unlikely to excessively broaden the proceeding is the requirement we explicitly impose on Intervenors which will allow litigation of the QA/QC contention, if at all, only after it has been reformulated to comport with the specification we mandate herein.

We have made clear throughout that the Board regards potential QA/QC problems as serious and significant considerations bearing heavi-

ly on the issuance of a license to operate a nuclear facility. The proposed contention compels us to balance its potential significance with the possibility of minor delay and some minimal net broadening, if any, of the issues in the proceeding. We recognize that it may appear the Board is placing emphasis on a contention that is as yet too abstract in form. But because of the statements contained in testimony given by an NRC official during the *Byron* remand proceeding, the contention does not present an abstract concept lacking a reasonable foundation. The contention, at least in part, is a reiteration of concerns expressed by Mr. James G. Keppler, whose position with the NRC causes the Board to take greater notice of his testimony than perhaps we might of other witnesses'. Mr. Keppler is a high ranking NRC Staff official. He is the Regional Administrator of the Nuclear Regulatory Commission's Region III office located in Glen Ellyn, Illinois. His responsibility for inspection and enforcement activities includes some 23 operating nuclear plants and ten plants currently under construction. Mr. Keppler is charged with the responsibility for reviewing and analyzing the implementation of QA/QC programs in the facilities in his region, which include Commonwealth Edison's nuclear power plants.

Mr. Keppler referred to Braidwood's QA/QC program when testifying on August 1, 1984, before the Atomic Safety Licensing Board hearings in the *Byron* operating license remand proceeding. The statements arose in the course of Mr. Keppler's response to the Staff attorney's request for Mr. Keppler's explanation of the *Byron* reinspection program (an NRC investigation of quality assurance matters at *Byron*), and the results derived from the Staff's analysis of the reinspection data. Atomic Safety Licensing Board *Byron* Hearing, August 1, 1984. Tr. 10,139. Mr. Keppler included in his response an assessment of the work produced by his staff and the confidence he placed in the thoroughness of their review. That is the context in which Mr. Keppler made the statements on which Intervenor's rely for part of their contention. We quote Mr. Keppler:

Another point, though, I would like to make, if I could, is, I tried to express to this Board the confidence that I have — more importantly the Board ought to be interested in the confidence my Staff has — and I say this because the Staff has had to contend with major quality problems at *Zimmer*, at *Midland*. We've got serious quality assurance questions at *Braidwood* and at *Clinton*, and major reinspection efforts are underway to deal with these concerns.

Tr. 10,143.

It is not simply the substantive content of Mr. Keppler's testimony which is of consequence, but also the fact that *Braidwood* and *Byron* are both owned by the Commonwealth Edison Company. Although the

quoted testimony was provided at the remand of the licensing proceeding, the initial decision in *Byron* contained findings which established the inadequacy of Applicant's management of several aspects of its quality assurance and quality control program. *Commonwealth Edison Co.* (Byron Nuclear Power Station, Units 1 and 2), LBP-84-2, 19 NRC 36, 42-44, 213-18 (1984). While we do not in any way assert that the management methods applied to one plant will necessarily be similarly imposed on another facility owned by the same company, we perceive this as a reasonable inference at least meriting further exploration.

Based on the reasons articulated in the foregoing, had the Intervenor not proposed to make Mr. Keppler's testimony the foundation of a formal issue in the proceeding, the Board intended to obtain detailed information from the Staff with respect to Mr. Keppler's testimony and other concerns the Staff may harbor about Braidwood's QA/QC program and its implementation. Our efforts to gain a more complete understanding of Mr. Keppler's statements would have enabled us to determine if the facts and data undergirding his comments merited our raising a QA/QC issue on a *sua sponte* basis at an evidentiary hearing.

As a practical matter, we are in general agreement with the Staff's and Applicant's identification of deficiencies in Intervenor's proposed contention. Applicant claims "Intervenor has failed to show any special expertise in the area of QA, have failed to state with any particularity the issues they plan to address, and have failed to identify any witnesses or evidence they might present." Applicant's Answer, at 20. From that statement Applicant arrives at the conclusion that "these failures indicate that Intervenor's participation in sponsoring the proposed QA contention would likely not be of assistance in developing a sound evidentiary record." *Id.* We will not leap to reach the same conclusion as did the Applicant, but we also will not accept the contention as it was filed.

Setting forth with specificity the contention's basis is crucial to the submission of any contention, but particularly one involving potentially broad quality assurance and quality control issues. The Board will accommodate Intervenor's need to provide specificity to develop what we believe may become an important part of the record, by permitting Intervenor to depose Mr. Keppler before submitting an amended contention. The NRC Staff and Intervenor may also wish to include as deponents a panel of NRC Staff personnel knowledgeable about Braidwood QA/QC issues. This could supplement the testimony Mr. Keppler provides at his deposition with underlying data and any in-depth analysis Staff may have performed. The Board's own concern with QA/QC matters here, together with the importance of Mr. Keppler's testimony and the position he holds at the NRC, and the apparent lack of other means available

to Intervenor to more specifically explain this portion of their proposed contention, encourages us to view Mr. Keppler's deposition as imperative if an important part of Intervenor's QA/QC allegations are to be adequately composed and addressed. Indeed Applicant may also wish to depose Mr. Keppler. In the event that either Intervenor or Applicant seek to depose Mr. Keppler, it shall take place as soon as the parties can reasonably coordinate their schedules and marshal the necessary resources. We urge celerity in this process in light of the May 20, 1985 deadline date for receipt of an amended proposed contention.

As already noted, both Staff and Applicant criticize Intervenor's QA/QC contention for being vague and overly general. NRC Staff Response, at 9; Applicant's Answer, at 5, 18. That will be ameliorated in part if the parties depose Mr. Keppler and possibly other members of the Staff. The deposition process will enable Intervenor to amend the contention to include the particular examples of alleged improper actions taken by Applicant with regard to Braidwood's QA/QC program which Mr. Keppler had in mind during his testimony. We find some precedent for a modified version of our deposition plan in the *Limerick* case, where a QA/QC contention was admitted subject to certain requirements imposed by the Licensing Board. *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), LBP-84-31, 20 NRC 446, 509-511 (1984). See also Limerick Memorandum and Order Confirming Rulings Made at Prehearing Conference, slip op. at 5-6 (October 28, 1983) (unpublished). The *Limerick* Licensing Board, in essence, required an intervenor to sharpen the contention's focus and comprehensively define its parameters. We find the *Limerick* Board's approach to be appropriate here. We are fully aware, however, that the Appeal Board in the *Catawba* litigation met head on the issue of admitting a vague and imprecise contention conditioned upon intervenors later providing additional information. The Appeal Board in *Catawba* unequivocally stated:

Given the terms and history of Section 2.714(a), we are compelled to the conclusion that a licensing board is not authorized to admit conditionally for any reason, a contention that falls short of meeting the specificity requirements. . . .

....

... Stated otherwise, neither Section 189a of the Act nor Section 2.714 of the Rules of Practice permits the filing of a vague, unparticularized contention, followed by an endeavor to flesh it out through discovery against the applicant or staff.

Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 467-68 (1982) (emphasis in original).

The key question in *Catawba* was how the Licensing Board is to handle the situation where one or more documents bearing on the

licensing action are not yet in existence or available to the public, making it difficult, if not impossible, for an intervenor to file a precisely enunciated contention. The lack of available documents is not in issue in the case at hand as most, if not all, documents on which Intervenor's have relied or will need to formulate their contention are publicly available. The Board is bound, however, by the ruling in *Catawba* which prohibits the admission of contentions on a conditional basis.

The *Catawba* decision compels the Board, in effect, to reject Intervenor's proposed QA/QC contention. The contention's language is so broad and the lack of specificity so damaging that it cannot be admitted under traditional contention-admissibility criteria. However, the Board's cognizance of the important function served by an adequate QA/QC program within the safety context moves us to allow Intervenor's to amend the contention in accordance with several requirements to which we will stringently adhere.

Intervenor's amended contention must set out the exact bases for each allegation asserted. At a minimum this includes a precise specification of each occurrence of an alleged QA/QC deficiency, the data on which each alleged deficiency is premised (e.g., NRC inspection reports), the particular overall unacceptable pattern(s) purported to exist when the allegedly related individual incidents are aggregated and an explanation of why each specified deficiency supports the overall unacceptable pattern under which it has been grouped. See *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), LBP-83-39, 18 NRC 67, 88-89 (1983). For example, when a group of specific QA/QC deficiencies can be shown by their bases to be apparently related to the same repeated root cause, this could form an unacceptable pattern. The data supporting each alleged deficiency shall be attached in an orderly, indexed fashion keyed to the specifications in the contention. Intervenor's case on the merits will be limited to the specific incidents and patterns alleged, unless substantial good cause is shown.

We demand Intervenor's meet these requirements because we agree with the observation made by the Appeal Board that in any construction project of the magnitude and complexity of a nuclear plant there are bound to be isolated instances of inadequate workmanship due to imperfect quality assurance supervision. *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983). However, the pertinent overall issue on the merits (aside from whether there are specifically alleged individual deficiencies which remain uncorrected) would be whether there has been a "pervasive failure to carry out the quality assurance program . . ." such that "there has been a breakdown in quality assurance procedures of sufficient dimensions to raise legitimate doubt as to

the overall integrity of the facility” Intervenors must supply an amended contention which, at this late stage, demonstrates clear and specific bases that significant QA/QC questions exist which rise to the level of this pertinent overall issue.

The Board will consider the specificity, bases and significance of any amended proposed QA/QC contention received from Intervenors *Roem et al.* by the due date of May 20, 1985. It would assist Intervenors’ position with regard to these three criteria, and would provide more information about Intervenors’ expected assistance in developing a sound record, if Intervenors include a specification of the factual and expert witnesses they expect to present at the hearing, and the subjects on which each witness or witness panel will testify. *Cf. Washington Public Power Supply System* (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167, 1177-78, 1181, and 1182-83 (concurring opinion of Mr. Edles) (1983).

If Intervenors file an amended contention, the Applicant and Staff shall file answers which are received by June 3, 1985. If the Board admits an amended QA/QC contention, any further discovery which may be necessary (in addition to the information already available and that which will be supplied by the above requirements for the specification and bases of the contention) can be scheduled for completion by about the middle to the last half of July 1985. If Applicant or Staff wish to file motions for summary disposition of all or part of any admitted QA/QC contention, such motions can be scheduled for about three weeks after the close of discovery, with answers to any such motions scheduled for about two weeks thereafter. This would complete that process by late August or early September. The scheduled dates for receipt of testimony (September 13) and commencement of the hearing (October 1) would be retained. We point out such future scheduling accommodations to show that the opportunity for such procedures exist for a late admitted QA/QC contention. The Board is not implying that all such procedures will be necessary; or even useful. For example, the Board is preliminarily skeptical that a proposed QA/QC contention which meets the specification, bases and significance requirements we have imposed would be a likely candidate for later summary dismissal, except perhaps in relatively small part. The parties shall provide their recommendations for any further discovery and other prehearing procedures for any QA/QC contention which may be admitted in their May 20 and June 3 respective filings.

The contention specification procedure we set out does not require discovery in its traditional sense. Rather, Intervenors can rely on documents which are either currently available or public documents to which

Intervenors would be entitled upon request, even outside the context of a proceeding. While we understand that the deposition of Mr. Keppler, and possibly of other members of the NRC Staff, is not the ordinary means of proceeding prior to admitting a contention, in this situation this process provides perhaps the only effective means for all of the parties to sharpen the areas of potential litigation based on Mr. Keppler's testimony, thereby ultimately aiding us in our overall goal of achieving fairness and judicial economy. The parties are also directed to attempt to reach agreement (preferably prior to May 20, but no later than June 3, 1985) on the admissibility of part or all of an amended proposed contention, and on an appropriate prehearing schedule for the QA/QC contention which retains the October 1, 1985 hearing date.

NEINER CONTENTION 1

Neiner Contention 1 regarding alleged impacts of the electric field produced by 765 kV transmission lines was admitted by the Board at the August 23, 1979 Special Prehearing Conference. Tr. 25-26. The Applicant had objected to the contention because it was not then proposing to install 765 kV transmission lines for purposes of transmitting or otherwise integrating electrical power to or from the Braidwood plant as part of its distribution system. However, the transmission line rights of way for Braidwood were being obtained and the system was being constructed such that 765 kV lines could be added in the future. The Applicant was equivocal as to its potential future plans for such 765 kV lines associated with the Braidwood plant. *See* Tr. 16-26.

Much time has passed since the Board and the parties last visited this contention. Therefore, the Applicant shall, as soon as practicable, file a report (supported by affidavits of knowledgeable persons in authority) of its presently known and potential future plans for adding 765 kV lines to its transmission system which would in any way be associated with the Braidwood plant. The contents of the Applicant's report shall be discussed among the affected parties (Applicant, Staff and Neiner Farms) prior to its being filed, with the object of reaching agreement on whether, given the Applicant's plans, the contention should remain as an issue in controversy. If agreement cannot be reached which settles the issue, the parties shall attempt to agree on whether the issue can be removed from this proceeding, subject to Neiner Farms' right, upon request, to a prerequisite NRC hearing on the contention if and when Applicant proposes to install 765 kV lines associated with the Braidwood

plant. In addition, the parties shall attempt to agree on whether the contention, if not otherwise disposed of, could be litigated as part of this proceeding at an evidentiary hearing held after the possible approval of a low power or full power operating license for the Braidwood plant.

The parties remain free, of course, to apply their ingenuity to attempt to settle this contention to their mutual advantage on any other basis. The parties shall make every effort to file a joint report or coordinated reports on the above matters on the same day as the Applicant's report is filed. If necessary, due to some unanticipated failure of coordination, the Staff and Neiner Farms may each file a later answer to the Applicant's report within ten days of the date of service of the Applicant's report. Although the Board has not set a specific due date so as to allow time for full discussions and coordination among the affected parties, we contemplate that the report(s) could be filed by the end of May 1985.

NEGOTIATION AND VOLUNTARY RESPECIFICATION OF CONTENTIONS

The parties are expected to engage in informal discussions for the several related purposes of avoiding formal discovery disputes, exchanging information on an efficient basis, and attempting to settle or narrow the admitted contentions. In order to keep ourselves apprised of the situation on an interim basis, the Board is requiring a joint or coordinated report from the parties after discovery, stating whether any of the admitted contentions have been settled in whole or in part, what the prospects are for future potential settlement, and whether any of the contentions should be voluntarily respecified to more specifically reflect what is actually in controversy within the scope of the contention. This report shall be received by June 3, 1985.

SCHEDULE

The Board adopts the following schedule, which, with some adjustments and additions, is based on the schedule agreed upon by the parties. All dates are for *receipt* of filings by the Board and lead counsel for each affected party; it is the parties' obligation to transmit documents in a manner and time to assure receipt on the due date. Other persons on the service list not affected by a particular filing may be served by deposit in the mail on the due date.

- May 20, 1985: Discovery period ends
- May 20, 1985: Required specification of Intervenor
Rorem *et al.* QA/QC contention
- June 3, 1985: Applicant's and Staff's answers on
admissibility of specified Rorem QA/QC
contention
- June 3, 1985: Reports on voluntary respecifications of
admitted contentions
- June 14, 1985: Motions for summary disposition, if any
- July 12, 1985: Answers to any motions for summary
disposition
- Week of
July 22, 1985
(Estimated): Prehearing conference for the purposes
specified in 10 C.F.R. § 2.752, for
argument on any summary disposition
motions deemed necessary by the Board,
and to take up any other pending matters.
- September 13, 1985: Written direct testimony, qualifications of
witnesses and all exhibits
- September 20, 1985: Any motions to strike written direct
testimony
- September 27, 1985: Answers to any motions to strike written
direct testimony
- September 27, 1985: Cross-examination plans (received only by
the Board, if a party desires to keep its plans
confidential)
- October 1, 1985: Commencement of evidentiary hearing

APPLICANT AND STAFF FORMAL REPORTS

To the Board's knowledge, the NRC Staff has not issued any supplements to the November 1983 Safety Evaluation Report (SER) regarding the application for operating licenses for the Braidwood plant. The Staff shall inform us, as soon as practicable, as to whether any matters still pending for review by the Staff relate to any of the admitted contentions. If so, the Staff shall set forth the estimated schedule for issuance of any such further evaluations. In addition, the Staff shall inform us of the

schedule for issuance of the portions of the 10 C.F.R. § 50.47(a)(2) findings and determinations by the Federal Emergency Management Agency (FEMA) which would be relevant to Rorem Contention 1 and Neiner Farms Contention 3.

The Applicant shall supply the Board, at its Bethesda, Maryland office, with one updated copy of the Braidwood operating license stage application, including the FSAR and ER. Copies of any future amendments to these application documents shall be served on the Board and the parties.

RECONSIDERATION

Pursuant to 10 C.F.R. § 2.751a(d), parties other than the NRC Staff may file "objections" (motions for reconsideration) to this Order with the Licensing Board within five days after service of the Order; the Staff may file objections within ten days after service. (As the parties may know, computation of time for service by mail or express mail is governed by 10 C.F.R. § 2.710. *See also* 10 C.F.R. § 2.712.) Parties may not file answers to any objections unless the Board so directs.

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Lawrence Brenner, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland
April 17, 1985

ATTACHMENT TO SPECIAL PREHEARING CONFERENCE ORDER

The following contentions are admitted:

Bridget Little Rorem et al. — Contention 1

Intervenor contends that an adequate emergency plan for the Braidwood Station should include the following:

- a) a program for informing the public within 10 miles of the Station of the means for obtaining instructions for evacuation or other protective measures in the event of a radiological emergency originating at the Station.
- b) assurance that institutions within 10 miles of the Station, such as hospitals and nursing homes, can be evacuated or adequately protected in the event of a radiological emergency.
- c) a suitable plan for providing medical treatment to operating personnel who might be exposed to radiation in the event of an accident, including transportation to medical facilities equipped to treat radiation casualties.

Bob Neiner Farms, Inc. — Contention 1

Intervenors contend that the 765 kV transmission lines that will be used to transport the electrical output from the Braidwood Station create an unacceptable, hazardous and dangerous condition to persons living or working on a daily basis within 600 feet from the closest line, and that the 765 kV transmission lines should not be placed closer than 600 feet from any structure or area in which people can be expected to be present six or more hours per day. The hazardous and dangerous conditions include: audible noise impairing hearing, increasing tension, interfering with sleep, interfering with speech; interference with the operation of cardiac pacemakers; biological effects on humans because of exposure to electric fields excluding the use of nearby areas for working, living or recreation, and the danger of shock to persons and animals.

The basis for this contention is that Commonwealth Edison testified before the Illinois Commerce Commission that as of March 3, 1978, approximately 60% of all transmission right-of-way acquisitions included right-of-way for 345 kV and 765 kV transmission lines. Opinion No. 78-13, involving Case No. 26529, issued by the Public Service Commission of New York discusses the hazards associated with 765 kV lines.

Bob Neiner Farms, Inc. — Contention 3

Intervenors contend there are inadequate emergency plans for the Braidwood Station in case of a radiological emergency and that such plans should include the following:

- a) a program for educating and informing the public within 10 miles of the Station of the response they should take and also of the means for obtaining instructions for evacuation or other protective measures in the event of a radiological emergency originating at the Station.
- b) a specific plan for notifying people residing within 10 miles or using recreational facilities within ten miles of the Station of the existence of a radiological emergency.
- c) assurance that institutions within 10 miles of the Station, such as hospitals and nursing homes, can be evacuated or adequately protected in the event of a radiological emergency.

- d) identification of the medical facilities and available transportation that may be needed to provide treatment to members of the general public who may be exposed to radiation in the event of a radiological emergency and assurance that these facilities are capable of handling the treatment of persons injured as a result of a nuclear accident.
- e) a suitable plan for providing medical treatment to operating personnel who might be exposed to radiation in the event of an accident, including transportation to medical facilities equipped to treat radiation casualties.
- f) an identification of the public and private organizations which will have primary responsibility to organize and execute evacuation plans or other protective measures.

Bob Neiner Farms, Inc. — Contention 4

Intervenors contend that the proximity of the Illinois Central Railroad to the plant site and the use of the rail system to transport explosive materials from the Joliet, Illinois arsenal and other plants or depositories creates an unacceptably hazardous condition not considered by the Atomic Safety and Licensing Board, which issued the *partial initial decision on environmental and site suitability matters for the Braidwood Station (LBP-75-1, 8 AEC 1197 (January, 1975))*. At the construction permit stage the analysis of the probability of an explosion was inadequate in that:

- a) the six-month period during 1974 for which the traffic from the Joliet arsenal was analyzed is not representative of other traffic periods in the past and may not be representative of the traffic to be expected in the future.
- b) the analysis of the traffic was based on peacetime traffic only.
- c) only the probability of accidental or inadvertent explosions were assessed and the probability of sabotage or purposefully caused explosions were not explored.

Bob Neiner Farms, Inc. — Contention 7

Within ten miles of Braidwood Station there are public and private recreational facilities with a total annual attendance of 1,053,873 persons (Table 2.2-7 ER-LOS).

Intervenors contend that the potential that these facilities would have to be closed, either temporarily or permanently, due to the release of substantial quantities of radioactive materials during an accident creates an unacceptable environmental impact.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Morton B. Margulies, Chairman
Dr. Jerry R. Kline
Mr. Frederick J. Shon**

In the Matter of

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

**LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Station,
Unit 1)**

April 17, 1985

In this Partial Initial Decision the Licensing Board considers whether a utility-sponsored offsite emergency plan meets the requirement of 10 C.F.R. § 50.47(a)(1) that there be reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The utility plan does not rely on participation of the State or local government. Although the Board makes findings of fact on each contention litigated, the Board does not reach an ultimate conclusion on the adequacy of the utility plan because the record has been reopened to take evidence concerning the identification of the relocation center. When this matter is resolved the Board will decide whether the utility plan provides the requisite assurance.

STATE STATUTES: FEDERAL PREEMPTION

New York State and Suffolk County statutes prohibiting Applicant from performing activities necessary to implement emergency plans are not preempted by federal law where the State and local laws exist for

purposes of exercising the State's traditional police powers, such as regulation of traffic. The Board does not agree with Applicant that recent NRC Authorization Acts allowing the NRC to consider a utility-sponsored emergency plan in the absence of State or local government planning provide a basis for finding preemption.

TECHNICAL ISSUES DISCUSSED

- Evacuation shadow phenomenon
- Emergency planning zone boundary
- Notification and information to public
- Sheltering
- Selective evacuation and selective sheltering
- Wind shifts
- Nomogram
- Evacuation time estimates
- Road obstacles and cars without fuel
- Weather
- Buses for the public
- Protection for schoolchildren
- Ingestion pathway
- Recovery and reentry
- Loss of offsite power.

ISSUES DISCUSSED CONCERNING IMPLEMENTATION OF EMERGENCY PLAN BY UTILITY EMPLOYEES

- Utility employees' role conflict
- Conflict of interest for utility employees
- Credibility of utility
- Notification and mobilization of utility employees
- Communications with utility employees
- Training of utility employees
- Strike by utility employees
- Utility's legal authority to implement plan.

APPEARANCES

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Fabian G. Palomino, and Richard J. Zahnleuter, Esqs., Albany, New York, for the Governor of the State of New York.

Bernard M. Bordenick, Donald F. Hassel, Sherwin E. Turk, and Oreste Pirfo, Esqs., Bethesda, Maryland, for the Nuclear Regulatory Commission Staff.

TABLE OF CONTENTS

	Page
INTRODUCTION	648
I. HUMAN BEHAVIOR	655
A. Shadow Phenomenon (23.A, 23.B, 23.C)	655
B. Role Conflict (25)	671
II. CONFLICT OF INTEREST AND CREDIBILITY	679
A. Conflict of Interest (11)	679
B. Credibility (15)	687
III. EPZ BOUNDARY (22.D)	701
IV. LERO WORKERS	707
A. Notification (26)	707
B. Mobilization (27)	716
C. Communications (28-34, 24.L)	725
V. TRAINING (24.S, 39-41, 44, 98-100)	744
VI. NOTIFICATION AND INFORMATION TO PUBLIC .	756
A. Notification (24.T, 55-59)	757
B. WALK-AM (20)	763
C. Zones and Routes (18)	765
D. Hispanics (21.C)	766
E. Brochure (16.E)	768
VII. SHELTERING (61)	770

	Page
VIII. MAKING PROTECTIVE ACTION RECOMMENDATIONS	775
A. Selective Evacuation and Selective Sheltering (60, 63)	775
B. Wind Shifts (64)	778
C. Nomogram (49)	779
IX. EVACUATION	781
A. Evacuation Time Estimates (65, 23.D, 23.H)	781
B. Road Obstacles and Cars Without Fuel (66)	809
C. Weather (97)	816
D. Buses for the Public (67, 24.I, 24.F.2)	817
X. RELOCATION CENTERS (24.O, 24.P, 74, 75, 77) ...	827
XI. THE HANDICAPPED, HOSPITALS, AND NURSING HOMES	827
A. Ambulances (24.G, 24.K)	828
B. Hospitals and Nursing Homes (24.J, 24.N, 72)	833
C. Registration of Handicapped Persons (73.A)	847
D. Notification and Evacuation of Handicapped People at Home (73.B.1, 73.B.3, 58, 73.B.4, 73.B.5)	849
XII. SCHOOLS (24.E, 24.F, 24.M, 24.N, 61.C, 68-71)	855
XIII. INGESTION PATHWAY	875
A. Fifty-Mile EPZ (81)	875
B. Recovery and Reentry (85, 88)	878
C. New York State Plan (92)	882
D. Connecticut (24.R)	885
XIV. LOSS OF OFFSITE POWER (93-96)	887
XV. STRIKE BY LILCO EMPLOYEES (<i>SUA SPONTE</i>) ...	888
XVI. LEGAL AUTHORITY ISSUES (1-10)	895
CONCLUSION	919
APPENDIX A — LIST OF WITNESSES	921
APPENDIX B — LIST OF EXHIBITS	930
APPENDIX C — LIST OF CONTENTIONS	958

PARTIAL INITIAL DECISION ON EMERGENCY PLANNING

INTRODUCTION

A. Scope of Decision

This is a contested operating license proceeding within the meaning of 10 C.F.R. § 2.4(n). In this Partial Initial Decision, the Board considers offsite emergency planning issues pertaining to the application of Long Island Lighting Company (LILCO) for an operating license for Unit 1 of the Shoreham Nuclear Power Station (Shoreham).

The Shoreham facility consists of a boiling water reactor with a rated electrical output of 820 megawatts. It is located on the Applicant's site in Brookhaven, New York, which is in the north-central part of Long Island. A 10-mile radius drawn from the location takes in land wholly within Suffolk County, New York. It also includes a part of Long Island Sound. There are 138,500 individuals in the land segment, and 160,000 during the summer months.

More than seventy contentions were litigated in the proceeding, challenging various aspects of the Applicant's offsite emergency plan for Shoreham. The contentions are grouped into sixteen categories which provide the basis for the format for their consideration in this decision. The categories include: I. Human Behavior; II. Conflict of Interest and Credibility; III. EPZ Boundary; IV. LERO Workers; V. Training; VI. Notification and Information to Public; VII. Sheltering; VIII. Making Protective Action Recommendations; IX. Evacuation; X. Relocation Centers; XI. The Handicapped, Hospitals, and Nursing Homes; XII. Schools; XIII. Ingestion Pathway; XIV. Loss of Offsite Power; XV. Strike by LILCO Employees; and XVI. Legal Authority Issues.

The contentions within the sixteen categories are reviewed in this Partial Initial Decision except for those in category X. Relocation Centers. On January 28, 1985, in an unpublished Memorandum and Order, the Board ruled to reopen the record in the proceeding to consider LILCO's proffered evidence concerning a relocation center to be used in the event of an emergency at Shoreham. The matter remains open and it keeps the other contentions in category X from being decided. When the record is completed on the matter of the relocation center, the unresolved contentions in that category and any other undecided issues will be determined and will become part of the final initial decision to be served.

In this Decision the Board passes upon the merits of each contention except for that mentioned above, determining on an individual basis

whether the deficiencies alleged to exist as to the regulatory requirements do exist and if so, to what degree. The contentions in categories I-XV are reviewed separately from those in category XVI. Legal Authority Issues. In the Legal Authority Issues the Board finds that certain of LILCO's proposed actions are beyond the utility's authority. The Board did not relate those findings to the contentions in categories I-XV because it wanted to determine whether the Plan was adequate, within the regulatory requirements, aside from Applicant's authority to perform the operation. The Plan was presented to the Board for review in this manner and we are so considering it in order to provide the parties with a full and complete analysis. We will relate the two categories of contentions in the final initial decision. The Board does not consider the emergency plan proposed as a totality to determine whether it provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at Shoreham, as U.S. Nuclear Regulatory Commission (NRC or the Commission) regulations require for the issuance of an operating license. 10 C.F.R. § 50.47(a)(1). This ultimate conclusion can only be reached when the record is completed and reviewed in its entirety.

B. Procedural Development

Suffolk County (the County), New York, was a party intervenor in the application proceeding for an operating license for Shoreham being heard by the Board with general jurisdiction to adjudicate the matter. The Board members were Lawrence Brenner, Chairman, Dr. James H. Carpenter, and Dr. Peter A. Morris. On February 17, 1983, on the basis of a record made before it, the County legislature determined that the conditions on Long Island rendered effective emergency preparedness unworkable. It determined not to adopt or implement an emergency plan for Shoreham. The legislature in so doing relied on its governmental police power "to protect the health, safety and welfare" of the County's residents. (County Leg. Res. No. 111-1983). On February 23, 1983, the County moved to terminate the operating license proceeding on the basis of the alleged impossibility of LILCO to demonstrate compliance with NRC regulatory requirements because of the County's decision not to adopt or implement a radiological emergency response plan for Shoreham. On April 20, 1983, the Board denied the motion, which was limited to the legal issue of whether a county's refusal to prepare or implement a radiological emergency response plan operates as a veto, precluding as a matter of law the issuance of a full-power operating license for a nuclear power plant. LBP-83-22, 17 NRC 608 (1983). The Board referred its

ruling for interlocutory review, which finding was affirmed by the Commission on May 12, 1983. CLI-83-13, 17 NRC 741 (1983). At page 743 the Commission stated,

Indeed, as we read the applicable regulations we are not only authorized but also obligated to at least consider any proffered utility offsite emergency plan. . . . [A]s we read the applicable regulatory provisions, the agency is obligated to consider a utility plan submitted in the absence of State and local government-approved plans and has the ultimate authority to determine whether such a submission is sufficient to meet the prerequisites for the issuance of an operating license. . . .

It further commented, "the licensee will bear the burden of showing that its plan can meet all applicable regulatory standards." *Id.*

On May 11, 1983, a separate Board, consisting of James L. Laurenson, Chairman, Dr. Jerry R. Kline, and Dr. M. Stanley Livingston, was established to preside over all emergency planning issues in the Shoreham proceeding. On August 12, 1983, Mr. Frederick J. Shon replaced Dr. Livingston. The Board remained so constituted until January 31, 1985, at which time Morton B. Margulies replaced Judge Laurenson as Chairman, on the latter's departure from the employ of the Commission.

On May 26, 1983, LILCO filed its "transition plan" consisting of a series of five alternative plans. Under four of those alternative plans, off-site emergency response procedures would be implemented by LILCO personnel with the participation of various governmental entities: Suffolk County, New York State (the State), Federal Emergency Management Agency (FEMA), and the U.S. Nuclear Regulatory Commission. The fifth alternative plan, the "LILCO Transition Plan," (hereinafter Plan) would rely wholly on the services of LILCO personnel and contractors for the performance of emergency functions. LILCO has established a local emergency response organization (LERO). Since LILCO could not show that any of the four governmental entities had consented to perform the responsibilities assigned under the first four plans, on June 10, 1983, the Board ordered the scope of this proceeding limited to the LILCO Plan.

In mid-1983 opponents to the Plan submitted some 174 pages of contentions. After a prehearing conference on July 13, 1983, the Board ordered that the contentions be reorganized, consolidated, and redrafted. In its Prehearing Conference Order dated July 20, 1983 (unpublished), the Board noted New York State's absence from the prehearing conference and expressly invited the State to participate in the proceeding. In January 1984, the Governor of the State informed the Board of the State's intention to participate in the proceeding and it has done so since then. Parties in opposition to the LILCO Plan are Suffolk County, the

State of New York, the Town of Southampton, the Shoreham Opponents Coalition, and the North Shore Coalition (Intervenors). The Intervenors concur in their opposition to the Plan. The NRC Staff (Staff) participates in the proceeding under its assigned agency role of an independent party.

Intervenors on July 26, 1983, filed ninety-seven contentions, with many subparts, covering 177 pages. Following a special prehearing conference, the Board on August 19, 1983, admitted seventy of the ninety-seven contentions. From time to time the Applicant has revised its Plan, which has given rise to the filing of additional contentions. Some have been admitted and others denied. Several contentions have been dismissed on the basis of the Applicant's motion for summary disposition. Intervenors withdrew some contentions. On July 24, 1984, the Board raised a contention, *sua sponte*, on the possible adverse effects a strike at the utility may have on the Plan. The Commission on August 22, 1984, permitted the Board to pursue this issue.

The hearing, which began on December 6, 1983, ended on August 29, 1984, and the evidentiary record was closed. A total of more than eighty witnesses testified. Proposed findings of fact and conclusions of law were filed by the Applicants on October 5, 1984, by the Intervenors on October 26, 1984, and the Staff on November 5, 1984. LILCO made a reply filing on November 14, 1984. In response to the Board's finding that LILCO's "failure to identify a relocation center constitutes a void in the record," on January 11, 1985, LILCO filed a motion to reopen the record. After reviewing the positions of the parties, the Board, on January 28, 1985, ordered the reopening of the record on that issue. The matter of whether or not the Board will hold oral hearings and if so, their extent, is now pending.

The Board's efforts to encourage settlement have been unavailing. This Partial Initial Decision is in conformity with the format agreed to by the parties. Included as part of this Decision are appendices consisting of (A) a list of the witnesses with their affiliations, (B) a list of the exhibits, and (C) a list of the litigated contentions.

C. Regulatory Requirements

Section 50.47 and Appendix E to Part 50 of Title 10 of the Code of Federal Regulations (10 C.F.R.) contain the Commission's basic regulatory requirements for emergency planning. As pertinent, they provide that no operating license for a nuclear power plant will be issued unless the NRC finds that there is 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). With regard to the adequacy of offsite

emergency measures, the NRC must base its findings on a review of the FEMA findings and determinations as to whether there is reasonable assurance that they can be implemented. 10 C.F.R. § 50.47(a)(2). Emergency planning zones (EPZs) are a mainstay in the development of offsite emergency planning. The regulatory scheme contemplates the establishment, for planning purposes, of two such zones: a plume exposure pathway EPZ, a more or less circular area extending approximately 10 miles from the plant, and an ingestion pathway EPZ with a 50-mile radius. 10 C.F.R. § 50.47(c)(1). The plume exposure pathway EPZ is established principally to protect the public from possible (1) whole-body external exposure to gamma radiation from the plume and from deposited materials, and (2) inhalation exposure from the passing radioactive plume in the event of a nuclear facility accident. The ingestion pathway EPZ is established primarily to protect the public from exposures traceable to contaminated water or foods.

Offsite emergency response plans must meet the sixteen standards set forth in 10 C.F.R. § 50.47(b). The standards provide for a role by State and local government organizations. For example, 10 C.F.R. § 50.47(b)(1) states that offsite emergency response plans for nuclear power reactors must meet the following standard:

Primary responsibilities for emergency response by the nuclear facility licensee and by State and local organizations within the Emergency Planning Zones have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis.

In addition to the criteria contained in 10 C.F.R. § 50.47, Appendix E to Part 50 sets forth in greater detail criteria that Applicant's emergency plans must meet.

Guidance as to how these regulatory standards can be satisfied is provided by an NRC regulatory guidance document, NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980. This document was written by a joint committee of staff from the Commission and FEMA. It is cited hereinafter as NUREG-0654. The document was specifically considered in the rulemaking proceeding in which current emergency planning regulations were developed, and the language of the regulations restates standards set forth in NUREG-0654. The regulations require that emergency response plans must meet the standards addressed in NUREG-0654. See 10 C.F.R. § 50.47(b) & n.1 thereto and § IV of Appendix E to 10 C.F.R. Part 50 & n.4 thereto.

NUREG-0654 is accorded "considerable weight" by NRC licensing boards when evaluating emergency plans. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), LBP-83-32A, 17 NRC 1170, 1177 n.5 (1983). Reviewers of emergency plans may determine that measures other than those the criteria recommend are adequate to bring the plans into conformity with the standards in 10 C.F.R. § 50.47(b). See *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-644, 13 NRC 903, 937 (1981).

The finding a Board must make on emergency planning is necessarily a predictive finding. Emergency planning is an ongoing process and should continue through the life of a plant. Thus, the NRC does not require that all aspects of the plans be complete before a final licensing decision is reached. See *Detroit Edison Co.* (Enrico Fermi Atomic Power Plant, Unit 2), ALAB-730, 17 NRC 1057, 1066 (1983). Furthermore, Boards do not need to inquire into the details of implementing procedures. *Louisiana Power & Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1103-04, 1106-07 (1983). On the basis of the record before it, the Board need find only reasonable assurance that adequate measures can and will be taken.

The Commission's regulations do not require that extreme or unreasonable emergency planning measures be taken. See *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), CLI-83-10, 17 NRC 528 (1983). The planning standards of 10 C.F.R. § 50.47(b) and NUREG-0654 provide a reasonable planning basis rather than absolute planning requirements. This Board does not have to find that all individuals are covered by the plans under all circumstances. The Commission explained in *San Onofre*:

It was never the intent of the regulation to require directly or indirectly that state and local governments adopt extraordinary measures, such as construction of additional hospitals or recruitment of substantial additional medical personnel, just to deal with nuclear plant accidents. The emphasis is on *prudent* risk reduction measures. The regulation does not require dedication of resources to handle every possible accident that can be imagined. The concept of the regulation is that there should be core planning with sufficient planning flexibility to develop a reasonable *ad hoc* response to those very serious low probability accidents which could affect the general public.

Id. at 533.

Therefore, in reaching its decision on the Intervenor's contentions, the Board has applied the basic test of whether or not the Applicant's emergency plans take the necessary "*prudent* risk reduction measures."

In apparent recognition of the complexities of the Commission's emergency planning requirements and the limited control that applicants

exercise over offsite emergency planning, 10 C.F.R. § 50.47(c)(1) provides that a failure to meet the standards set forth in 10 C.F.R. § 50.47(b) will not necessarily result in the denial of an operating license. Rather, the applicant will be given "an opportunity to demonstrate to the satisfaction of the Commission" that deficiencies in the plan "are not significant for the plant in question," that "adequate interim compensating actions" have been or will be taken, or that there are "other compelling reasons" to permit plant operation.

Additional law bearing on the issues at hand is contained in the 1984-85 NRC Authorization Act, Pub. L. No. 553, § 108, 98 Stat. 2825 (1984):

Sec. 108. Of the amounts authorized to be appropriated under this Act, the Nuclear Regulatory Commission may use such sums as may be necessary, in the absence of a State or local emergency preparedness plan which has been approved by the Federal Emergency Management Agency, to issue an operating license (including a temporary operating license under section 192 of the Atomic Energy Act, as amended) for a nuclear power reactor, if it determines that there exists a State, local, or utility plan which provides reasonable assurance that public health and safety is not endangered by operation of the facility concerned.

Similar language exists in the 1980 and 1982-83 NRC Authorization Acts.

The fact that the State and County have chosen not to participate in emergency planning and its implementation for Shoreham in no way lessens the burden LILCO must meet for satisfying emergency preparedness requirements. As the Commission stated in *Shoreham*, CLI-83-13, *supra*, "the licensee will bear the burden of showing that its plan can meet all applicable regulatory standards." 17 NRC at 743.

D. Decisionmaking

All of the proposed findings of fact and conclusions of law submitted by the parties have been considered. Any such finding or conclusion not incorporated directly or inferentially in this Partial Initial Decision is rejected as unsupported in fact or law or unnecessary to the rendering of this Decision.

It should be noted that this Partial Initial Decision is limited to resolving contested emergency planning matters that have been admitted in this proceeding. All matters, other than offsite emergency planning issues, which need to be considered before the issuance of an operating license are the responsibilities of other licensing boards or the NRC Staff.

In all, eighty-six expert witnesses testified, many of them on multiple issues. The transcript consists of more than 15,000 numbered pages and approximately 7,000 additional pages of prefiled written direct testimony and exhibits. At the outset the Board notes that its rulings do not turn on the issue of credibility as that term is generally used. It is not basing its decision on the comparative demeanor of the various experts who testified. Rather, it has evaluated each witness' testimony in the light of the following factors: education, experience, reputation in the field of expertise, familiarity with the underlying facts, corroboration, and bias or interest in the outcome. In many cases, the apparently conflicting opinions can be attributed to divergent assumptions of underlying facts. In some instances, well-qualified experts in one particular field of study ventured an opinion in an unrelated area and stated no further foundation to support such an opinion. Where it is necessary to resolve conflicting testimony, the Board has explained the basis and reasons for selecting the evidence of one party over that of another.

The Board treated FEMA findings, as required by 10 C.F.R. § 50.47(c)(2), as rebuttable presumptions. As such they have the effect of deciding questions only in the absence of persuasive contrary evidence. Where the FEMA evidence was significant or a deciding factor in the ruling on a contention, the Board has set that forth in the Decision.

I. HUMAN BEHAVIOR (CONTENTIONS 23.A, 23.B, 23.C, 25)

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

Contention 23 alleges that in an accident at Shoreham there would be large numbers of people who would evacuate voluntarily even if not ordered to do so. (The evacuation shadow phenomenon.) LILCO has failed to take the shadow phenomenon into account. The LILCO Plan therefore fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(1), 50.47(c)(2), and NUREG-0654, § 11.J.

The consequences of the evacuation shadow phenomenon to LILCO's planned protective actions are alleged in numerous subparts to Contention 23, of which we here decide 23.A, 23.B and 23.C.

I.A.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, John A. Weismantle, Dr. Russell R. Dynes, Dr. Dennis S. Mileti, Dr. John H. Sorensen, William G. Johnson, and David N. Richardson. Suffolk County presented the testimony of Dr. Donald J. Ziegler, Dr. James H.

Johnson, Jr., and Dr. Steven J. Cole. Dr. Andrea Tyree appeared on rebuttal.

I.A.2. Meaning of Evacuation Shadow Phenomenon

The phrase "evacuation shadow phenomenon" was coined by researchers of the Three Mile Island (TMI) accident to refer to a situation in which people in an emergency believe themselves to be at risk and evacuate even though not ordered or recommended to do so by authorities. Ziegler and Johnson, ff. Tr. 2789, at 5.

I.A.3. Matters in Controversy

LILCO does not disagree with Suffolk County as to whether the evacuation shadow phenomenon will occur in some degree in the event of a radiological emergency at Shoreham. The controversy centers on the likely magnitude and consequences of this phenomenon. Applicant's Finding (A.F.) 28; Tr. 2012, 2061 (Mileti). In essence, Suffolk County believes that overreaction of Long Island residents in a radiological emergency would likely be very large, perhaps involving up to half the families on Long Island, even though an evacuation advisory would apply at most to the families living within the 10-mile radius of the plume emergency EPZ. Intervenors' Finding (I.F.) 53. LILCO argues that the overreaction will not be great, because it can be limited or controlled by disseminating information to help people have accurate perceptions about an emergency that is taking place, and that in any event overreaction in moderate degree, although unnecessary, is not a threat to public health and safety. Cordaro *et al.*, ff. Tr. 1470, at 49. A technical controversy exists as to what constitutes the driving force for an evacuation in a radiological emergency. Suffolk County experts believe that the principal determinant of public behavior during a radiological emergency will be a general preexisting fear of radiation that is sufficiently strong to cause people to disregard specific information they receive during the emergency about who should evacuate or the extent of hazard. I.F. 54; Cole and Tyree, ff. Tr. 3907, at 3; Tr. 2893 (Johnson). LILCO witnesses, on the other hand, see preexisting fear of radiation as only one factor among many that will influence public behavior. They believe that public response can be effectively influenced during a radiological emergency by a public information system that disseminates accurate information according to several sociological principles which they enumerate and discuss. A.F. 29.

Another technical controversy exists as to the predictive power of public opinion polls in which people are asked in various ways what their behavior would be in the event of a radiological emergency. Suffolk County believes that polls taken now have value in predicting future public evacuation behavior, whereas LILCO sees public opinion polls as virtually worthless predictors because LILCO believes public behavior will be determined by the situation during an emergency and not by pre-formed attitudes. A.F. 38; I.F. 57.

Suffolk County also differs with LILCO on the fundamental matter of what sources of information are reliable and important to reach a predictive conclusion as to the likely behavior of the public in an emergency. The County considered principally (1) the experience with the TMI accident, and (2) results of public opinion polls that ask people what they would do if an emergency occurred at Shoreham. LILCO relied most heavily on the scholarly sociological literature describing past public disaster response to develop a theory of how and why people responded in other disasters as they did. The LILCO witnesses attempt to develop principles of human behavior from other disasters that could be used by officials to influence public response in an emergency at Shoreham. They discount outright the predictive value of public opinion polls and consider the public response to the TMI and Ginna reactor accidents to be consistent with their theories.

The Board finds that the three classes of evidence may bear on the question of likely public response to a radiological emergency at Shoreham; (1) radiological accidents, (2) natural and technological disasters, and (3) public opinion polls.

I.A.4. Evidence from TMI

The evacuation shadow phenomenon was observed by surveying persons who reside in the vicinity of Three Mile Island within about 1 month after the accident. Ziegler and Johnson, ff. Tr. 2789, at 4. The survey by Suffolk County witnesses, as well as other surveys, show that about 144,000 people within a 15-mile radius of the TMI plant actually evacuated, although only about 2500 pregnant women and young children within about 5 miles of TMI were advised to evacuate. Of the population in three communities more than 15 miles from the plant, 9% also evacuated although not advised to do so. *Id.* at 7-8. In the survey by County witnesses the large number of people who evacuated during the TMI accident said they did so for a number of reasons. Principal among these were that they were "concerned about safety" and there were "conflicting reports from government and utility company officials." Of

the evacuees, 91% gave the former reason for evacuating and 48% gave the latter. The reasons given are not mutually exclusive. Clearly, people were influenced by more than one factor in their decision to evacuate. The survey also identified numerous persons at varying distances from the plant who did not evacuate in the accident, and attempted to elicit reasons for this behavior. *Id.* at 3-6, Attach. 3.

Other research on the TMI accident performed for the NRC shows that 91% of those who evacuated said they did so because "the situation seemed dangerous." Of those who evacuated, 83% also said that "confusing information" was a reason for evacuation. We find that the results of this poll are reasonably consistent with those found by Suffolk County witnesses. Cordaro *et al.*, ff. Tr. 1470, at 57.

An analysis of information given to the public during the accident at TMI supports a conclusion that reasonable people would think at the time that the situation was dangerous. Messages at various times that there was radiation in the environment, that a hydrogen bubble might explode, that general evacuation was being considered, and that pregnant women and children under 5 years of age should evacuate a 5-mile radius around the plant are all sufficient for a reasonable person to reach a conclusion that a dangerous situation exists. *Id.*, Attach. 9, 10.

Information given to the public during the accident at TMI supports a conclusion that reasonable people would think that confusing information was being disseminated to the public. At various times the public was told that the crisis was over, or that it was not over; that general evacuation might be needed, or that evacuation was unnecessary; that the hydrogen bubble might explode, or that there was no danger of explosion. Such contradictory messages are sufficient for us to conclude that confusing information was disseminated to the public during the accident. *Id.*

The responses of the TMI residents about their perception of danger and the quality of public information clearly relate to perceptions they had at the time of the accident. There is no evidence that respondents said that their preexisting fear of radiation was their principal reason for evacuating. *Id.* at 58.

The sense of immediate danger endured by residents in the TMI vicinity as the accident situation unfolded, and the inadequate and confusing information that was released during a time of perceived danger, are sufficient to account for the evacuation of 144,000 residents during the accident. Preexisting awareness in the population that radiation is potentially dangerous was a necessary precursor to evacuation behavior since without that there would have been no sense of danger in the

actual incident. Cole and Tyree, ff. Tr. 3907, at 2-6. However, the evidence from TMI does not support the County's position that preexisting fear was the predominant factor in causing the large-scale evacuation that occurred. Given the above conditions at TMI, it appears that the greater unexplained mystery is why many residents of the area chose not to evacuate. Cordaro *et al.*, ff. Tr. 1470, at 54-58.

I.A.5. Evidence from Ginna

Public behavior during the accident at the Ginna Nuclear Power Plant provides evidence that is consistent with the foregoing conclusions. On January 25, 1982, a steam generator tube ruptured at the Ginna Nuclear Plant in New York. The incident resulted in the declaration of a site area emergency, a release of radiation, and evacuation of about 150 onsite workers. Information about the accident was communicated to the public in warning messages; however, no offsite evacuation of the public was ordered. No spontaneous public evacuation occurred. Cordaro *et al.*, ff. Tr. 1470, at 62.

The public conformance to recommendations broadcast during the Ginna incident demonstrates that in that case the public chose not to act on the basis of pre-emergency fear of radiation, but chose instead to act on the situation-specific information they received during the incident. This is consistent with the proposition that information broadcast during an emergency can influence the predominant public response. It is inconsistent with the County's view that preexisting fear will dominate public response. *Id.*

I.A.6. Evidence from Other Disasters

Evidence relevant to the projected behavior of populations during a nuclear accident is scant because there have not been enough such accidents to develop an extensive data base. Cole, ff. Tr. 2792, at 25-26. Sociologists therefore attempt to draw on experience from other natural and technological disasters to develop predictive or explanatory models of the behavior of populations that can be used to prepare for a radiological disaster. Human behavior is sufficiently consistent in various situations to permit general behavioral principles to be identified. Ziegler and Johnson, ff. Tr. 2789, at 5, Attach. 3; Tr. 1505 (Mileti). The Board considers the principles of human behavior that are relevant to disaster response in the following paragraphs.

The number of persons who overreact by evacuating when not necessary or ordered to do so during natural disasters has generally been rela-

tively small. Ziegler and Johnson, ff. Tr. 2789, at 8; Cordaro *et al.*, ff. Tr. 1470, at 17-19. Human behavior in Suffolk County during a radiological emergency is likely to be fundamentally similar to human behavior elsewhere under similar circumstances. Ziegler and Johnson, ff. Tr. 2789, at 7-8. Members of the public do not panic in emergencies that involve community or neighborhood. *Id.* at 14.

Overreaction, if it occurs, is not the same as panic or hysteria. Overresponse is instead a reasoned response to individual perception of risk at the time of the emergency on the part of some individuals. *Id.* at 11-12.

The Board concludes that the concept of overreaction in an emergency is a consequence of the planning process wherein planners or observers decide *a priori*, or during an emergency, or *a posteriori*, what an appropriate public response should be. Members of the public, however, individually conduct a reasoned assessment of their situations, based on available information, and decide for themselves what their responses will be. The evacuation shadow phenomenon therefore represents a difference of opinion between planners or researchers on the one hand, and individual members of the public on the other, as to what the magnitude of hazard during an emergency actually is and what the response should be. Thus, although overresponse can occur, it is not founded on irrational thought. Tr. 1479-80 (Sorensen); Tr. 1994-98 (Dynes); Cordaro *et al.*, ff. Tr. 1470, at 17-19.

Accurate prediction of public response in an emergency cannot be obtained reliably simply by describing actual public reactions during emergencies and then projecting that behavior to future emergencies without more understanding. Study of natural or technological emergencies is relevant to prediction of behavior in radiological emergencies to the extent that these studies enable observers to discover how and why people behave as they do. Both LILCO's and Suffolk County's witnesses attempted to develop a theoretical understanding of human behavior in emergencies through studies of individual cases, and we find that there is no meaningful controversy on this point. Ziegler and Johnson, ff. Tr. 2789, at 12-15, Attach. 3, Fig. 1.

People do not simply react to notice of an emergency in a stimulus-response mode. Instead, they consider various aspects of the decision confronting them before they act. The decisionmaking process consists of the following steps: (1) hearing that an emergency is going on; (2) understanding what is happening; (3) believing that the warning is real; (4) personalizing the warning as applying to them; (5) deciding what to do; (6) responding by acting on the decision. Cordaro *et al.*, ff. Tr. 1470, at 21-26.

The Board finds in adopting this finding from LILCO's testimony that there is little scholarly disagreement on this point. Suffolk County experts constructed a decisionmaking diagram in their published paper that explicitly contains points 4 through 6 in the above analysis. The accompanying text implicitly recognizes what is no more than common sense; that the public must hear, understand, and believe emergency information before a reasoned decision can be made. Whatever disagreement exists between the County's and LILCO's experts appears to be more of style and emphasis than of conceptual substance. Ziegler and Johnson, ff. Tr. 2789, Attach. 3, Fig. 1.

The decisionmaking process in an emergency is affected by a number of factors that are characterized as sender determinants and receiver determinants. These determinants may influence the overall or predominant public response to an emergency. They do not, however, exert a precise deterministic effect on that response. Cordaro *et al.*, ff. Tr. 1470, at 26-41, 47-49.

There are ten sender determinants that relate primarily to the information that is given to the public during an emergency. These are credibility of source, consistency, accuracy, clarity, certainty, sufficiency, guidance, frequency of repetition, location of affected areas, and multiple channels of information. *Id.* at 26-35.

There are seven categories of receiver determinants of public behavior during an emergency.¹ These are the physical characteristics of the emergency; the social setting; social ties such as family cohesion; social structural factors such as age or gender; physiological factors such as hearing ability; psychological factors such as cognitive ability, personality, attitude, and prewarning perceptions. *Id.* at 36-41.

We adopt the foregoing analysis of LILCO's experts because it is the most complete, detailed, and documented analysis of its kind in our record. The analysis is uncontroverted by Suffolk County witnesses. Although the County did not make a formal factor analysis of the determinants of behavior, the witnesses give credence to factors of like kind. For example, they assert that warning messages alone will not affect the magnitude of the evacuation shadow phenomenon because other factors may come into play. These they list as fear of impending crisis, perception of likelihood that it will materialize, distance and direction from the source, faith or trust in officials, prior disaster experience, socioeconomic status, stage in life cycle, and family cohesiveness. Ziegler and Johnson, ff. Tr. 2789, at 35-36. Although the list is not identical to the more

¹ The testimony states that there are five categories but then goes on to list seven.

analytical approach of Mileti and Sorensen, the similarity of concept between the contending parties might be considered a remarkable convergence of views among independent researchers in other, less litigious arenas.

Some people may evacuate in an emergency even if not ordered to do so because (1) they perceive a greater risk than exists, (2) they do not believe the information provided, (3) they inappropriately personalize the risk, i.e., interpret the warning as intended for them when it is not. Cordaro *et al.*, ff. Tr. 1470, at 41-46.

Pre-accident fear of radiation exists in the general population. *Id.* at 61; Tr. 1740-50 (Sorensen); Ziegler and Johnson, ff. Tr. 2789, Exh. 2. Pre-accident fear of radiation is not by itself a direct cause of evacuation in a radiological emergency. Instead, this fear helps shape how people use information and perceive the threat during an accident. Cordaro *et al.*, ff. Tr. 1470, at 61.

We adopt this finding from LILCO's testimony because of its reasonableness and because we do not accept the notion that people caught in an emergency situation simply abandon reason and respond blindly to preexisting fear. The Board can hardly imagine that anyone would evacuate in a radiological emergency unless fear of radiation preexisted as part of the common knowledge. However, we conclude that reasonable people need and will seek information on which to base their actions, particularly in the urgent conditions of emergency. If the information is inadequate or conflicting, they may act inappropriately. If it is complete and consistent, they will accept it and use it as intended.

The evidence from natural and technological disasters supports a conclusion that information given to the public during a radiological emergency that is specific to the developing situation will influence the predominant public response. *Id.* The Board disagrees with Suffolk County witnesses who would have us believe that the public will disregard public information that is essential to cope with a current developing situation and instead rely on preexisting generic information. It would be difficult to escape the conclusion that preexisting generic impressions of the general public about radiation are themselves shaped by publicly disseminated information. The Board is not convinced that the public as a general matter would place overwhelmingly greater reliance on previously acquired, publicly disseminated information than on current situation-specific information.

The Board's reasoning on this point does not lead in any way to a false proposition that public information during an emergency will cause all persons to react to warnings in perfect unison. It is unlikely that the off-site response to a radiological emergency can be managed with deter-

ministic or mechanistic precision. Our conclusion is therefore stochastic in nature. The principles we reviewed establish that the public can collectively and predominantly be influenced in its action by properly framed information disseminated at the time of an emergency. However, because response depends on individual reasoning and judgment we conclude that some people will act differently according to their own unique perceptions. Therefore, a distribution of behaviors will likely occur in an emergency that will lead to some degree of both over and underresponse by the public. A.F. 28.

The Board's reasoning does not discount the reasons cited by Suffolk County in support of the proposition that considerable fear of radiation exists among members of the public. Ziegler and Johnson, ff. Tr. 2789, at 23-25. We agree that fear exists. The evidence, however, does not support the County's assertion that fear will override all other information given during an emergency. *Id.* at 35.

I.A.7. Evidence from Public Opinion Polls

Five public opinion surveys concerning emergency planning at Shoreham were taken of Suffolk and Nassau County residents by both Suffolk County and LILCO witnesses at various times during 1982, 1983, and 1984. The surveys, although not identical in format, all attempted to elicit what residents' response would be to one or more postulated accident scenarios at the Shoreham plant. Dr. Cole conducted three of the surveys, one for Suffolk County and two for a Long Island Newspaper, *Newsday*. Mr. Johnson conducted an independent but more limited survey for LILCO using a modified form of the survey instrument used by Dr. Cole in his survey for Suffolk County. The firm of Yankelovich, Skelly and White (YSW), represented by LILCO's witness Mr. Richardson, conducted an independently designed or modified survey for LILCO. Cole, ff. Tr. 2792, at 3-5, 15-17; Cordaro *et al.*, ff. Tr. 1470, 99-111.

Each of the surveys was conducted on a stratified random sampling design which permitted information to be gathered on intended accident behaviors of respondents who live at various points within the plume EPZ and those living at varying distances outside the 10-mile EPZ, both to the east and to the west. The surveys each postulated one or more accident scenarios to respondents and gave them a number of possible projected responses from which to choose, ranging generally from an intention of taking no protective action to an intention to evacuate. Multiple scenarios were structured to reflect a sequence of increasing seriousness of radiological emergency. The Suffolk County survey, for exam-

ple, asked people in sequence what their response would be if an accident at Shoreham occurred and (1) the public was advised to stay indoors within a radius of 5 miles, (2) pregnant women and preschool children living within 5 miles were told to evacuate and others living 6-10 miles from the plant were told to stay indoors, and (3) everyone living within 10 miles of the plant was told to evacuate. Cole, ff. Tr. 2792, at 13-14. In subsequent surveys for *Newsday*, only one scenario similar to scenario 2 above was used. Surveys conducted for LILCO by YSW and Bill Johnson Associates differed to some degree in wording and approach from that of the County, but otherwise were conceptually similar to the County survey with regard to the questions about intended response in an accident.

In summary, the County survey found that for scenario 1, 25% of the residents of Long Island or 217,000 families said they would evacuate. In scenario 2, 34% or 290,000 families said they would evacuate, and in scenario 3, 50% of Long Island residents or 432,000 families said they would evacuate. Results from the *Newsday* surveys and those conducted for LILCO showed similar magnitudes. All indicate that people on the order of hundreds of thousands would evacuate, contrary to instructions, if a radiological emergency occurred at Shoreham. The number who say they would evacuate exceeds by thousands the number that might be advised to evacuate. Cole, ff. Tr. 2792 at 13-15, 16-18, 23, 24; Cordaro *et al.*, ff. Tr. 1470, at 99-111.

The Board lists the numerical findings of the County survey to illustrate the general magnitude of the responses and not because we believe that they accurately reflect future evacuation behavior of large populations. We reject the use of these results for quantitative purposes because the experts themselves express no confidence in them as quantitative predictors. Cordaro *et al.*, ff. Tr. 1470, at 66-81; Ziegler and Johnson, ff. Tr. 2789, at 30, 32. That being the case, there is no need to reproduce here all of the numerical findings of the other surveys that were taken. Suffice it to say that at face value they all tend to confirm one another in assessing the general magnitude of professed intentions to evacuate. Cole, ff. Tr. 2792, at 23-25.

It is at this point that Suffolk County and LILCO part company. The County urges that the Board accept the plain results of the surveys as generally, though not precisely, valid. The County says in essence that the general magnitude of the likely overresponse is so great that the results have value for emergency planning even though an exact predictive estimate cannot be obtained. LILCO must be prepared to cope with a very significant overresponse in the event of an emergency at Shoreham. *Id.* at 30-31.

LILCO disagrees. It asserts that survey results of this nature (i.e., predictive) are not the best available evidence. Indeed, such results are the worst available (and worst conceivable) information that could be assembled. This is so because the behavior of people will be determined by circumstances that prevail at the time of an accident, not by preexisting beliefs. Among the prevailing circumstances will be the active preplanned intervention of managers or decisionmakers who will use established sociological principles to properly inform the public as to what an appropriate response should be. Thus, an accident situation can and will be actively managed toward an appropriate conclusion. If this is so, the poll results are not called into question simply because they are quantitatively imprecise. They are in fact misleading and irrelevant to resolving the question of future public response in a radiological accident. Cordaro *et al.*, ff. Tr. 1470, at 66-68. LILCO witnesses buttress their views by citation of research literature showing that poll results that reflect people's attitudes or beliefs are not related to subsequent actions. This is an empirically well-established observation, although admittedly counterintuitive. *Id.* at 69-74.

We pause at this point to acknowledge that the Suffolk County and LILCO experts each alleged that the other's surveys were in some degree invalid because they were biased. A.F. 39; I.F. 64. We find all such allegations lacking in merit. All of the polls represented professional efforts to elicit information from the public. There is no evidence of deliberate intent to bias the results. The variations among individual surveys therefore represent differing professional approaches to the same problem. Any inadvertent or subtle bias that might have escaped professional notice is insignificant in the light of how the results are used by the Board. We therefore pursue the question no further.

What then do the five public opinion polls, all of which are in substantial agreement, have to teach about public attitudes and future intentions toward a radiological emergency? In spite of the controversy in this case, the Board finds significant threads of agreement among the experts. The Board first quotes from and adopts the conclusions of Dr. Cole.

- a. The survey data do show that people who are against Shoreham are more likely to say they will evacuate than those people who are in favor of Shoreham. The more plausible explanation for this correlation is that both responses — attitudes towards Shoreham and evacuation — are influenced by the same variable: fear of radiation from nuclear power plants. Cole, ff. Tr. 2792, at 36-37.
- b. People who believe that living near a nuclear power plant is very dangerous are significantly more likely to say they would evacuate than those people who be-

lieve that living near a nuclear power plant is not too dangerous. *Id.* at 8-9, Attach. 2.

People who have relatively low levels of knowledge about nuclear energy are more likely to fear nuclear energy and are therefore more likely to say they would evacuate. *Id.*

The Board adopts and quotes next from applicable summary findings of the YSW survey:

- a) Three quarters of residents [of Nassau and Suffolk] express concern about the plant opening . . . Cordaro *et al.*, ff. Tr. 1470, Attach. 13, at 14-16.
- b) The level of concern is higher in Suffolk County where half the population indicates they would be very concerned than in Nassau County where the comparable figure is 38%. *Id.*
- c) Half of all respondents believe strongly that a nuclear plant can blow up. *Id.*
- d) More than 4 in 10 believe there would not be sufficient time to evacuate safely in the event of an emergency. *Id.*
- e) Furthermore, since no instructions have been disseminated to residents of the area regarding what to do in an emergency, most people must react in an information vacuum; lacking specific guidance their reactions are a relatively close reflection of their more general attitudes about the plant. *Id.* at 27.

I.A.8. The Meaning of the Poll Results

Both the County and LILCO experts agree that large numbers of people in Suffolk and Nassau Counties fear radiation and are specifically concerned about the Shoreham plant. The Board accepts that these attitudes were measured with reasonable precision by the polls at the time they were taken. The poll results therefore confirm what we have already concluded from other evidence about the fear of radiation harbored by the population surrounding Shoreham. The polls, however, did not and could not supply respondents with the urgent tone and situation-specific information that would be publicly available in a real emergency. The missing information is precisely that which LILCO says it will disseminate in an emergency. All of the polls, therefore, treated the public as if it was likely to act in a simple stimulus-response mode and that all that was necessary was to measure the degrees of response. We have found from other evidence that that response is unlikely. None of the polls measured likely public response under LILCO's plan to manage the response by broadcasting situational information at the time of an emergency. The most the polls show is that the projected response is likely if

there was no information disseminated. Without the inclusion of that information in the questions the Board cannot attribute literal predictive value to the results. Predictive value cannot be inferred simply because people who were given no other choice responded to questions that were framed in prospective language. The more reasonable conclusion is simply that the stated intention to evacuate in the future is a surrogate for currently held beliefs and attitudes that are based on scant current knowledge. These attitudes have not been influenced, however, by the additional information that would become available at the time of an accident. The poll results have no literal predictive validity because the residents of Suffolk and Nassau Counties do not now have that additional information that respondents would need to determine their actions in an emergency. We give little weight to the predictive findings of the public opinion polls.

We conclude from evidence considered earlier in this contention that in a radiological emergency at Shoreham most members of the public will, on learning that an emergency exists, first seek additional information specific to the situation before they act. They will take seriously the information by evaluating it before they individually decide what they must do. They will not act solely on the basis of preformed attitudes about radiation.

I.A.9. Implementation of Sheltering Recommendations (Contention 23.A)

This contention asserts that a recommendation of sheltering could not be implemented because a large number of people will choose to evacuate instead. Those who are evacuating when they should be sheltering might be caught in a passing plume while in their automobiles and be exposed to radiation.

The Board finds for the reasons stated in its analysis of Contention 23 that Contention 23.A is without merit. The Suffolk County witnesses bring no new information to bear on this contention but rest their arguments on evidence from TMI and the results of opinion surveys, which the Board has already considered. Although the Board agrees with the County (as does LILCO) that this scenario might be followed by some individuals, we do not find that it will happen in such numbers as to make a sheltering recommendation impossible to implement. People will act predominantly in accordance with the emergency information given to them. Moreover, there is no reason that this very scenario could not be part of the emergency warning given to the public if the

conditions warranted that action. The Board agrees with LILCO witnesses in this regard: "People are not stupid." Ziegler and Johnson, ff. Tr. 2789, at 25-27; Cordaro *et al.*, ff. Tr. 1470, at 115-17.

I.A.10. Public Evacuation in Absence of Protective Action Recommendation (Contention 23.B)

This contention asserts that any notice of an emergency at Shoreham will result in public evacuation even if no protective action is recommended. This could have the consequence of exposing people to radiation in their vehicles if the emergency should then escalate and a sheltering recommendation be made.

Contention 23.B is without merit. The Board has found that the public will respond in predominant numbers in accordance with the emergency information it receives. Before acting, people will seek information beyond the first notice that an accident has occurred. They will pause to consider what they have heard. The Board knows from previous findings that their individual decisions as to the best course to follow will not likely form a perfect consensus. Thus, some will evacuate even though not advised to, whereas most will not. We see nothing in this that is in conflict with NRC regulations or guidance on emergency preparedness. Since the Board finds that the scenario postulated in the contention will not occur to a significant degree we need not say more about the postulated consequences.

I.A.11. Staged Evacuation (Contention 23.C)

This contention asserts that LILCO's plans for a staged evacuation of only some of the nineteen subzones of the 10-mile EPZ is unworkable. This is because residents of bordering zones, and probably other zones as well, will also evacuate. People in bordering zones will not wait while their immediate neighbors evacuate in response to a recommendation to do so.

LILCO will base its protective action recommendations on a dose minimization principle that requires consideration of dose projections, field radiation measurements, evacuation times for zones in the EPZ, and shielding value of structures. Recommendations either to shelter or evacuate will be made depending on which results in a lower population dose. A recommendation to evacuate will utilize a zoned or keyhole approach. Cordaro *et al.*, ff. Tr. 2237, at 9, Attach. 14.

There are three basic zones for which evacuation can be recommended other than an evacuation of the entire EPZ. These are (1) the area

within 2 miles of the plant, (2) the area within 2 miles plus a downwind sector of $67\frac{1}{2}^\circ$ extending to 5 miles, and (3) the area within a radius of 5 miles from the plant plus a downwind sector of $67\frac{1}{2}^\circ$ extending to 10 miles. *Id.* at 9-10. If evacuation of a sector is recommended, all zones within it will be evacuated simultaneously. Evacuation in staged time sequence is not planned and would only occur if changing conditions during an evacuation required it. *Id.* at 10.

LILCO has conducted studies showing the effect of 20-25% excess evacuation on time estimates for zoned, keyhole-type evacuations. These are given in the Plan in Table II of Appendix A and are therefore available to guide decisionmakers. *Id.* at 11.

If very large excess evacuation occurred when only a sector evacuation was recommended, the effect on evacuation time would be small. In the extreme case, for example, where the 2-mile area around the plant was designated for evacuation and instead the entire population of the 10-mile EPZ chose to leave, the evacuation time would increase by 1 hour, 20 minutes. The time estimate for evacuation of the entire EPZ (4 hours, 55 minutes — case 12) is the limiting case for the effect of excess response within the EPZ in a sector evacuation. *Id.* at 12.

The Board agrees with Suffolk County that a public evacuation of some sectors within the EPZ likely could not be executed with high precision. It would in fact be unrealistic to suppose that a partial evacuation could be held to the exact boundaries of specified zones. However, nothing in the LILCO Plan or in LILCO's prefiled testimony suggests that this could be done or that, if it could, it would be a desirable or necessary outcome. The Board also sees nothing in NRC guidance or regulations that would require in the interest of public health and safety a great deal of precision in public compliance with a recommendation for a zoned evacuation. The County has not presented anything in its testimony that the Board has not previously considered, and in particular it has not stated why it is a hazard to public health and safety if some persons evacuate from one safe zone to another, albeit unnecessarily. The Board rejects outright for reasons previously stated that the public would irrationally plunge from a safe zone to an unsafe one. We therefore adhere to our previous findings. The general public will respond rationally to information it receives during an accident and will behave predominantly in accordance with public notification. Contention 23.C is without merit.

I.A.12. Conclusion (Contention 23)

The evidence is compelling that populations of people are both rational and diverse in thought and action. Thus, thousands of individual rational

analyses performed at the time of an accident will not lead to an unbroken unity of opinion on the best course of action to follow. We therefore expect a diverse spectrum of population response in a radiological emergency. Some will refuse to evacuate when advised they should. Some will take time to be convinced and will evacuate later than advised. Many will follow instructions, and some will evacuate when not advised to do so. Our finding of rationality, however, compels the conclusion that the public will consider the information it receives and will react predominantly in a manner that is consistent with the advice given.

The ability of LILCO to manage an offsite emergency response is heavily dependent on its ability to frame appropriate messages and to disseminate them to the public. We find here only that LILCO has taken account of the need for public notification and has prepared to meet that need. A.F. 31, 32. We do not decide at this point whether each element of the public notification system is adequate, since those elements are the subjects of other contentions.

On the basis of the preponderance of evidence on Contention 23, the Board finds that LILCO has sustained its burden of proof. This contention is highly subjective, to be sure, and the Board agrees with Suffolk County (as does LILCO) that some evacuation shadow phenomenon would likely occur in the event of a serious radiological emergency at Shoreham. The conclusion of the County that the overresponse would be so great as to preclude adequate protection of public health and safety in a radiological emergency is, however, based on flawed interpretation of research evidence. LILCO has adequately demonstrated that a rational public will behave predominantly in accordance with public information that is disseminated at the time an emergency happens. It will not react by following some predetermined tendency that urges a shadow evacuation. The Board finds further that, contrary to the contention and based on the entire record, LILCO has given adequate consideration to the evacuation shadow phenomenon in its emergency planning process.

The Board's ultimate finding on this contention strongly depends on there being clear nonconflicting notice and instructions to the public at the time of an accident. If for any reason confused or conflicting information was disseminated at the time of an accident, the Board accepts that a large excess evacuation on Long Island could materialize. We add this cautionary note at this point for the obvious reason that the opposing parties in this case are those that are normally assumed by FEMA and the NRC Staff to act with an integrated approach in emergency planning and preparedness. 10 C.F.R. § 50.47(b)(1); *see also* NUREG-0654, at 23-24. The Board does not find a basis in the record for reasonable assurance that there would be an integrated response to an emergen-

cy by the State and local governments regarding concerns raised in this contention. The record is unclear on the actions the State or Suffolk County might take in a serious emergency or whether they would be integrated with the LILCO Plan. Our finding of adequacy is therefore grounded on our conclusion that the LILCO Plan is technically adequate if implemented as LILCO has outlined. The lack of assurance of integrated action on the part of State and local governments constitutes a substantive deficiency in the Board's confidence that public health and safety could be protected as well by LILCO acting alone as by actions that were fully integrated with State and local governments.

I.B. Role Conflict (Contention 25)

Contention 25 asserts that in the event of an accident at Shoreham many of the emergency workers relied on by LILCO will experience a conflict between their emergency work roles and their family obligations and that they will resolve this conflict in favor of their families. Accordingly, Intervenors contend that a substantial number of emergency workers needed to implement the LILCO Plan will not be available promptly to perform their assigned duties.

I.B.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Dr. Russell R. Dynes, William G. Johnson, Dr. Dennis S. Mileti, Dr. John H. Sorensen, and John A. Weismantle. Suffolk County presented testimony of Dr. Kai T. Erikson, Dr. James H. Johnson, Jr., Dr. Stephen J. Cole, Donald J. Dilworth, Dr. David Harris, Robert W. Petrilak, Dr. George Jeffers, Anthony C. Rossi, Nick J. Muto, and J. Thomas Smith. FEMA presented the testimony of Philip McIntire.

I.B.2. Definitions

The definition of role conflict is not in dispute. For our purposes, role conflict arises when an individual is confronted with a situation in which the obligations of one role conflict with the obligations of another role. In other words, role conflict occurs when an individual is faced with contradictory demands as a result of membership in different groups. Dynes *et al.*, ff. Tr. 831, at 10; Erikson *et al.*, ff. Tr. 1455, at 4. Although the LILCO witnesses prefer the term "role strain" (Dynes *et al.*, ff. Tr. 831, at 10), we find for our purposes, the terms "role conflict" and "role

strain” are synonymous. Since “role conflict” is the more commonly accepted term and is the one used in the contention at hand, the Board will use that term.

I.B.3. History and Literature Concerning Role Conflict

The sociologists on both sides are in apparent agreement that the focused concern about role conflict stems from a 1952 article by Lewis Killian titled “The Significance of Multiple Group Membership in Disaster” in the *American Journal of Sociology*, January 1952, at 309-14. Dynes *et al.*, ff. Tr. 831, at 11; Erikson *et al.*, ff. Tr. 1455, at 5. Killian observed:

When catastrophe strikes a community, many individuals find that latent conflict between ordinarily nonconflicting group loyalties suddenly becomes apparent and that they are faced with the dilemma of making an immediate choice between various roles.

Am. J. Sociol. at 310. Since 1952, disasters and role conflict have been studied extensively. The expert witnesses have surveyed the literature concerning the Seveso, Italy, chemical disaster; Hiroshima and Nagasaki; Hurricane Carla; and many other disasters. Indeed, Ohio State University established the Disaster Research Center where Dr. Dynes was Co-Director. In that capacity, he studied disaster responses in more than 100 emergencies, including responses by 6000 emergency workers. Dynes *et al.*, ff. Tr. 831, at 3. The primary thesis of the Suffolk County expert witnesses is that the majority of the experts in the field are in agreement that families tend to evacuate or take protective action as a unit or in intact groups. Erikson *et al.*, ff. Tr. 1455, at 13 *et seq.* The Suffolk County experts cite various authors to support the proposition that a large number of people facing a role conflict — between reporting for duty as emergency workers and remaining with their families — will resolve the conflict in favor of loyalty to their families even though they are also members of disaster response organizations. *Id.* LILCO’s experts respond that although there have been occasions when the first thing people did in an emergency was to go home to their families, “emergency workers who have a clear notion of what their emergency role is perform their jobs in emergencies.” Dynes *et al.*, ff. Tr. 831, at 43. The LILCO witnesses then analyzed the disasters at Seveso, Buffalo Creek, Hiroshima, and Nagasaki. *Id.* at 44 *et seq.* The LILCO experts conclude that these events “provide no evidence that trained emergency workers do not do their emergency jobs or perform emergency roles in emergencies.” *Id.* at 51. LILCO’s experts admit that the literature cited by Dr.

Erikson and Dr. Johnson support the County's view that role conflict exists in emergencies and can result in role abandonment. *Id.* at 58. However, LILCO's experts criticize those sources and rely on other publications including an unpublished paper by E.L. Quarantelli (coauthored by Dr. Dynes) titled "Structured Factors in the Minimization of Role Conflict: A Re-examination of Significance of Multiple Group Membership in Disasters." *Id.* at 69-70. After examining 150 disaster events involving over 6000 emergency workers, the report concluded that "role conflict was not a serious problem in the loss of manpower in emergency situations." The LILCO witnesses concede that they are not in a position to assert that their view on role conflict is supported by a majority of the experts in the field. They state that there may be many who hold an uninformed opinion based on Killian's 1952 article, but they argue that "role abandonment simply does not happen if people have a clear idea about what their emergency job is." *Id.* at 71.

I.B.4. Three Mile Island and Ginna

Suffolk County's witnesses contend that role conflict was a problem during the TMI crisis. Erikson *et al.*, ff. Tr. 1455, at 21. They rely on published articles describing the exodus of physicians, nurses, and technicians required to staff medical facilities. *Id.* One of the authors concluded that "administrators can expect significant absences from staff members who have family responsibilities and should anticipate a shortage of physicians." *Id.* at 22-23. LILCO's witnesses concede that one passage in the "Report of the President's Commission on Three Mile Island" (the Kemeny Report) apparently supports the claim that some hospital workers left their jobs. Dynes *et al.*, ff. Tr. 831, at 72. In response to this, Dr. Mileti testified that he had engaged a Ph.D. candidate to call a variety of organizations that had emergency responsibilities during the TMI accident to determine if any role abandonment had occurred during that accident. *Id.* at 74-75. On the basis of this telephone survey, Dr. Mileti concluded that "not one case of role abandonment was reported by any organizational respondent in reference to teachers, bus drivers, the police, civil defense, the state troopers, the National Guard, or the Pennsylvania Emergency Management Agency." *Id.* at 75. After reviewing the articles cited by Suffolk County's experts, Dr. Mileti concluded, "neither of these articles suggest that trained emergency workers did not do their emergency jobs during the Three Mile Island accident." *Id.* at 83.

At the time of the radiological accident at Ginna, the emergency operations center was activated and offsite radiological monitoring teams

reported for duty. Tr. 1123 (Weismantle). During that accident, all utility workers remained at their jobs and police and firemen who had offsite emergency jobs responded. Tr. 1166-67 (Weismantle, Cordaro).

I.B.5. Differences Between Emergency Workers and the General Public

Emergency workers who have a clear understanding of their emergency role perform their jobs in emergencies. People who are not emergency workers and who have no emergency roles, or whose emergency roles are unclear, are more likely to abandon these roles. Dynes *et al.*, ff. Tr. 831, at 43-44. Suffolk County's witnesses contend that the LILCO employees assigned emergency duties are not accustomed to danger or to performing public service roles. These experts go on to conclude that in the event of an emergency, role conflict is even more likely to be resolved in favor of not reporting promptly for duty in connection with some potentially dangerous and relatively unfamiliar job. Erikson *et al.*, ff. Tr. 1455, at 28. Dr. Erikson conceded that there is no empirical evidence available on the subject of whether people who have roles in an established emergency plan, would, because of role conflict, report late or not report at all. Tr. 1400 (Erikson). Many of the LILCO employees relied on to perform emergency work under the LILCO Plan, are members of LILCO's Emergency Restoration Organization who are called on to restore power in emergencies. There is no evidence of any such LILCO employee failing to report for duty. Tr. 1171 (Weismantle). Although the Board agrees with the Suffolk County witnesses that many LILCO emergency workers will be performing jobs that are different from their regular work, we find that training and drills will compensate for the lack of day-to-day experience. Tr. 938 (Weismantle). Accordingly, the Board finds that emergency workers under the LILCO Plan will not experience the role conflict encountered by the general public.

I.B.6. Emergency Consensus

In an emergency, protection for threatened people becomes the highest priority while other values diminish in importance. This phenomenon is called "emergency consensus." Dynes and Milet, ff. Tr. 831, at 18-19. The emergency consensus reduces role conflict because it makes clear the appropriate behavior of those who work for organizations with emergency responsibilities. *Id.* at 20.

I.B.7. Family Contingency Plans

When emergency workers know their roles before the emergency, they can plan in advance for the protection and care of their families during an emergency. *Id.* FEMA's experience is that because of training, most emergency workers develop procedures to ensure the safety of their families during an emergency, and the implementation of these procedures would cause only minimal delay in performing the emergency job. McIntire, ff. Tr. 2086, at 4. The development of contingency plans to provide for the safety of the family while the worker performs his or her job reduces role conflict. Tr. 887-88 (Dynes, Mileti).

I.B.8. Cohesiveness of LERO Work Group

A major reason emergency workers fulfill their emergency obligations, in spite of personal danger, is that they do not want to let others down. Dynes and Mileti, ff. Tr. 831, at 25-26. During an emergency, work groups develop a strong cohesion, and the LERO work group can be expected to do likewise. Tr. 1147 (Dynes).

I.B.9. Availability of Extra Workers

To compensate for emergency workers who are unavailable at the time of the accident, LERO contains more than the minimum number of emergency workers to staff all necessary positions. Weismantle, ff. Tr. 831, at 28. For many of the LERO jobs, a number of extra workers are on call. Tr. 1143 (Weismantle). The fact that LERO workers know that there are extra workers available will not adversely affect the reporting responses of LERO workers. Tr. 1146 (Mileti).

I.B.10. Public Opinion Surveys/School Bus Drivers

A survey was conducted in September 1982 among school bus drivers employed by several school districts located within the 10-mile EPZ. Of those interviewed, 69% said that if there were an accident at Shoreham requiring the evacuation of the 10-mile EPZ, they would first make sure that their families were safely out of the evacuation zone; 24% said they would first report to work so that they could pick up schoolchildren in the evacuation zone and drive them to a shelter; 4% stated that they would first check on their families and then go to drive the school bus; and 3% said they would immediately leave the evacuation zone. Cole, ff. Tr. 2789, at 7.

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

I.B.11. Uniqueness of Radiation

The preponderance of the evidence indicates that emergency workers would respond to a radiological emergency in essentially the same manner as they respond to nonradiological emergencies. Although ionizing radiation cannot be sensed in any direct way, short of doses sufficiently large to induce radiation sickness (Erikson *et al.*, ff. Tr. 1455, at 19), the fear of radiation can be reduced by adequate pre-emergency training to understand the job, its importance, and the use of dosimeters. Dynes and Mileti, ff. Tr. 831, at 97-98; Tr. 938 (Weismantle). The evidence does not indicate that a fear of radiation would exacerbate role conflict among emergency workers.

I.B.12. Training/Equipment

The emergency workers relied on by LILCO are not experienced in dealing with public-health-threatening emergencies. Dilworth, ff. Tr. 1213, at 4. However, emergency workers at Shoreham will preplan their activities and undergo training to enable them to perform their emergency roles. Dynes and Mileti, ff. Tr. 831, at 32-33. Training will reduce role conflict and eliminate role abandonment. Tr. 939 (Sorensen).

I.B.13. Residence of LERO Workers

Of the approximately 1600 LERO emergency workers, only 73 live within the 10-mile EPZ. Cordaro and Weismantle, ff. Tr. 831, at 15. Although some emergency workers who live outside the 10-mile EPZ may have a spouse who is employed or a child who is in school within the

10-mile EPZ, there is no evidence to establish that such numbers would significantly change the above results. Tr. 864 (Weismantle).

I.B.14. Department of Energy (DOE) Personnel

DOE personnel from Brookhaven National Laboratory, consisting of health physicists and others trained in radiation measurement, are part of a Federal Radiological Monitoring and Assessment Plan (FRMAP) team that is prepared to respond to emergencies at nuclear plants around the country. Tr. 955-56 (Cordaro, Weismantle). Moreover, there are forty DOE personnel in the available pool to fill the eight positions specified in the LILCO Plan. Tr. 1155 (Weismantle). DOE conducts its own training program, and there is no reason to believe that DOE personnel will be adversely affected by role conflict. Cordaro and Weismantle, ff. Tr. 831, at 34.

I.B.15. Schoolteachers

If an accident were to occur during school hours, LILCO would advise the schools to implement an early dismissal of students in most cases. LILCO Plan at 3.6-7, and Appendix A at IV-169. In the school districts, teachers are relied upon for assistance in supervising and coordinating early dismissal. *Id.* The five school officials called as witnesses by Suffolk County testified that, in their opinions, a significant number of schoolteachers and administrative personnel would abandon such roles upon the announcement of the emergency, in favor of caring for their own families. Petrilak, ff. Tr. 3087, at 4-5; Muto *et al.*, ff. Tr. 3087, at 4; Jeffers *et al.*, ff. Tr. 3087, Attach. 1. The Board finds that this testimony is outweighed by the FEMA testimony that the "history of disaster response has consistently shown that nonemergency workers, and particularly teachers, also more than meet responsibilities when faced with emergency situations." McIntire, ff. Tr. 2086, at 5. The Board also accords greater weight to the testimony of Dr. Mileti that in the event of an actual radiological emergency, most schoolteachers would remain with their students long enough to see them safely dismissed or safely onto school buses. Mileti, ff. Tr. 831, at 36. Moreover, even if some schoolteachers deserted their classes, there is no reason to believe that there would not be a sufficient number remaining to supervise students on evacuation buses or in shelters if those procedures were ordered. Cordaro and Weismantle, ff. Tr. 831, at 36; Mileti, ff. Tr. 831, at 36; McIntire, ff. Tr. 2086, at 5. Even Dr. Erikson testified that teachers did not

abandon their posts in the early stages of the TMI accident prior to any evacuation advisory. Tr. 1347-48 (Erikson).

I.B.16. Ambulance Drivers

LILCO has entered into agreements with ambulance companies to provide ambulances with drivers in the event of a radiological emergency at Shoreham. The ambulance drivers will receive radiation training; be reimbursed for their time spent during training, drills, and an actual emergency; and be provided with dosimeters. Cordaro and Weismantle, ff. Tr. 831, at 37. Dr. Harris' opinion that ambulance drivers will choose to avoid the risk to themselves and their families and not report to assist with protective actions (Harris, ff. Tr. 1218, at 14-15) is outweighed by the historical response of such drivers as testified to by FEMA (McIntire, ff. Tr. 2086, at 5) and by the failure of Dr. Harris to document any such role abandonment by ambulance drivers in any prior emergency. Moreover, Dr. Sorensen's testimony that role abandonment has not occurred in disasters that have been studied was uncontroverted. Tr. 1135 (Sorensen).

I.B.17. Red Cross/Salvation Army

The only responsibility of the American Red Cross under the LILCO Plan is to set up and operate relocation centers well outside the 10-mile EPZ. Cordaro and Weismantle, ff. Tr. 831, at 37. The Salvation Army's role is to support the Red Cross, including providing clothing for evacuees. *Id.* at 39. Intervenor presented no credible evidence that role conflict would impair the performance of the American Red Cross or Salvation Army. On the contrary, the Red Cross activated relocation centers during the Three Mile Island accident. *Id.* at 38. FEMA evaluated the participation of the Red Cross and the Salvation Army in other emergencies as "outstanding." McIntire, ff. Tr. 2086, at 6. Intervenor in their proposed findings of fact conceded that the evidence does not support a finding that Red Cross volunteers at relocation centers would be seriously affected by role conflict. I.F. 149.

I.B.18. Emergency Worker Tracking System and Relocation Center for LERO Families

The emergency worker tracking system has been established to permit family members of the LERO workers to send messages to the workers. Cordaro and Weismantle, ff. Tr. 831, at 23-24. Dr. Erikson stated that a

phone call to the emergency worker after the family had safely evacuated would be reassuring. Tr. 1347 (Erikson). A special relocation center for the families of LERO workers will be established. Cordaro and Weismantle, ff. Tr. 831, at 21. This relocation center will be only for LERO workers' family members and will not be used as a decontamination center. Any family members who were contaminated would have to go first to the relocation center for the general public. Tr. 903 (Weismantle). The emergency worker tracking system and the relocation center for LERO families will enable LERO workers to feel more comfortable in knowing that the safety of their families is ensured as they perform their emergency jobs (Dynes and Mileti, ff. Tr. 831, at 25) and will reduce the potential for role conflict. *Id.*

I.B.19. Conclusion

On the basis of the above findings of fact, the Board concludes that although some emergency workers may experience a conflict between their emergency duties and their family obligations, the preponderance of the credible evidence of record establishes that this will not be a significant problem at Shoreham and that a sufficient number of emergency workers will respond in a timely fashion to perform their assigned duties. Moreover, the Board finds that the LILCO Plan contains many provisions not present in other offsite emergency plans that will minimize potential problems attributable to role conflict. Illustrative of such factors are (1) the emergency worker tracking system, (2) the relocation center for LERO families, and (3) the small fraction of LERO workers who reside inside the 10-mile EPZ.

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

II.A. Conflict of Interest (Contention 11)

Contention 11 alleges that LILCO employees filling LERO command and control positions are not sufficiently independent of LILCO and may experience a conflict between LILCO's financial and institutional interests and the public interest. This may hamper their ability to act in the public interest. In particular, LILCO employees may tend to minimize the public's perception of the danger, and may fail to recommend appropriate protective action promptly.

II.A.1. Identification of Witnesses

LILCO presented the following witnesses: Dr. Matthew C. Cordaro, Dr. Dennis S. Mileti, John A. Weismantle, and Jay R. Kessler. Suffolk County presented Dr. Arthur H. Purcell, Dr. David J. Olson, Dr. Michael Lipsky, Dr. Susan C. Saegert, and Dr. Stephen J. Cole. (Dr. Cole's prefiled testimony addressed Contention 15, but Contentions 15 and 11 were heard together and he was present throughout cross-examinations on both.) The Board requested additional witnesses on this contention and the Staff presented John R. Sears and Sheldon A. Schwartz.

II.A.2. Independence of Command and Control Personnel

Intervenors believe that the independence of command and control personnel is essential to proper emergency response and that LERO workers lack this independence. LILCO appears to concede the desirability of independence, but believes LERO workers are sufficiently independent of LILCO. The NRC Staff believes that independence is unnecessary and may, in fact, be undesirable.

Intervenors testified that "command and control" personnel must be independent of any organization which could be viewed as the "source or cause" of an emergency. Purcell *et al.*, ff. Tr. 10,727, at 9. In particular, they fault the Directors and Managers of Local Response. *Id.* at 8. Intervenors' witnesses argue that "independence from the source or cause of an emergency — or objectivity — is essential to command and control of an emergency response." *Id.* at 9. The witnesses further point out that at Shoreham the fact that the Directors and Managers of Local Response are high corporate officers places them in a dependent corporate status to superior officers of the company. That relationship fundamentally compromises their ability to act objectively. *Id.* at 12-13. Further, Intervenors argue that nuclear utility executives have a "mind set" which results in a lack of objectivity when they assess an accident and causes them to underestimate the accident's seriousness, especially when announcing it to the public. *Id.* at 10-11. While utility employees may serve well in an advisory capacity, Intervenors believe that the same familiarity with the system that makes such employees good sources of technical advice causes biases and "mind sets" which lead to ineffective emergency response. *Id.* at 12. They are "inherently non-objective." *Id.* at 15.

Intervenors cite the frequent mention of the term "mind set" in the *Report of the President's Commission on Three Mile Island* as evidence that this sort of bias, a tendency to downplay an accident, is to be expected of nuclear utility executives. *Id.* at 11-12. This attitude is for the most

part an unconscious one and Intervenor's witness Lipsky specifically disclaimed the notion that it would involve deliberate conscious deception. Tr. 10,752-53 (Lipsky).

While the Applicant appears to accept, at least tacitly, the proposition that independence is desirable in decisionmakers, its witnesses point out that:

1. No LERO personnel are associated with the Shoreham plant in their everyday jobs.
2. LERO personnel in the Emergency Operations Center are of equal or superior rank in their regular jobs at LILCO to the site response personnel at the Emergency Operations facility.
3. Department of Energy personnel, knowledgeable about radiation, are an integral part of LERO and will be represented at the EOC.
4. All procedures and protective actions are prepared in advance to the extent possible.

Mileti *et al.*, ff. Tr. 10,196, at 28, 29; Tr. 10,345-48 (Weismantle, Cordaro). Further, the chief person responsible for advising on protective actions is the Radiation Health Coordinator, who is not a LILCO employee but a consultant. Mileti *et al.*, ff. Tr. 10,196, at 14.

Under cross-examination, however, LILCO witnesses admitted that the LILCO Plan did not call for LERO command and control personnel to divest themselves of LILCO stock, resign their positions, or forego pension benefits. Tr. 10,343-44, 10,353 (Weismantle). Nor could these witnesses explain any way in which the first two points listed above would enhance the independence from LILCO of the command and control personnel to whom they applied. Tr. 10,345-48 (Weismantle, Cordaro).

Curiously, the position of the Staff's witnesses is that there is no need for LERO command and control personnel to be independent of LILCO. Sears, ff. Tr. 15,143, at 7; Schwartz, ff. Tr. 15,143, at 4; Tr. 15,211 (Sears); Tr. 15,222 (Schwartz). While Mr. Schwartz's explanation of the grounds for this position is unclear to the Board (Tr. 15,222-23; Schwartz, ff. Tr. 15,143, at 4.) Mr. Sears provides three bases for it:

1. The important consideration is not independence but a sense of responsibility, in particular the responsibility to act in accordance with the Plan.
2. Having the decisionmakers part of the same overall organization is more likely to ensure prompt notification, in part because of the opportunity thus offered for action at the operations level.
3. The fact that here, LERO, as part of LILCO, is subject to direct enforcement actions by NRC will make prompt and appropriate action more probable than it is where the decisionmaker is not legally under NRC authority.

Sears, ff. Tr. 15,143, at 5-6, 7-8; Tr. 15,211, 15,242-43 (Sears).

Nevertheless, the Staff's witness who has been most closely involved in evaluating the attitudes and responses of command and control personnel admitted that he had elicited one response to the effect that one Director of Local Response expected to check with LILCO management before making a key decision. Tr. 15,249 (Sears). That particular Director no longer is with the company, but the witness did not specifically explore the point with present Directors (Tr. 15,221 (Sears)), and it seems to the Board that in future years others might react similarly. Staff's conclusions are based only upon interviews with the people who would fill the positions, interviews which were conducted under nonaccident conditions (Sears, ff. Tr. 15,143, at 2) where the interviewees might well have anticipated that such answers were expected of them. The Staff witnesses further conceded that they had read neither the testimony nor the cross-examination of the other witnesses who testified on this issue. We are inclined to give the Staff's testimony little weight here.

II.A.3. Conclusion

In view of the very important ties of livelihood and company loyalty which normally exist (and, indeed, quite properly exist) between upper-level management and a corporation, we cannot find that the LERO decisionmakers are truly independent of LILCO. The steps taken to introduce a measure of independence between those decisionmakers and the plant operating crew are all well and good, but it is clear that any accident at the plant would be LILCO's accident and, by the very nature of their jobs, top management's accident. It would "belong" to these people in a sense in which it would never "belong" to local government officials. The pressure to minimize the accident and to delay vigorous response would operate for LILCO executives in a way in which it would not operate for local officials.

Nor do we accept the Staff's view that independence is neither necessary nor desirable. The Intervenors' evidence seems much the stronger. Even the Staff noted a tendency on one Director's part to take his orders from company management. While that Director may no longer be with LILCO, there is no assurance that others will not act according to company loyalty. In this matter, we must find for the Intervenors: the LERO command and control organization is not independent of LILCO. Further, that lack of independence is undesirable because it may delay implementation of necessary measures or may lead decisionmakers to underestimate the seriousness of an accident, especially where the nature of the accident is not crystal clear.

II.A.4. Conflict of Interest: the Contrast Between the Private and the Public Sectors

Intervenors believe that conflict of interest is inherent when utility managers direct the response to an emergency the utility has caused. They hold that utility managers (in contrast to local government authorities) will experience a very special kind of conflict: the conflict between managing to promote corporate profit (as they usually do) and acting to ensure the health and safety of the public. Purcell *et al.*, ff. Tr. 10,778, at 18. This, Intervenors say, is because the functions which LERO employees are expected to perform under the emergency plan are not consistent with the profit goals of LILCO as a private company. *Id.* at 17. On the one hand, as high-level employees of LILCO, their mandate is to enhance LILCO's profit and reputation. On the other hand, as primary decisionmakers in the offsite emergency response organizations, their mandate is to ignore LILCO's interests and put public health and safety first. These two mandates, say Intervenors, involve inherent, irreconcilable conflicts. *Id.* at 20. Intervenors cite the question of when to announce the existence of a radiological emergency, how to describe the emergency conditions, what protective actions to take and when to take them to illustrate when conflict might occur. *Id.* at 22-23. They argue that a LILCO employee, being aware of possible damage to LILCO's reputation and interests would be likely to delay the start of protective actions, minimize the severity of the occurrence, and thus hamper emergency response. *Id.* at 24-25.

Local government authorities, on the other hand, are much less subject to such conflicting forces. Intervenors' witnesses pointed out the body of law and a set of practices which have been developed to prevent conflicts of interest in those who occupy public office. Tr. 10,733 (Olson). Public officials are subject to reelection; governmental institutions embody the classic system of checks and balances; public office holders are often required to divest themselves of any private holdings which could engender conflicts. Tr. 10,746-47 (Olson). Where the situation requires rapid decisionmaking, the influence "in the back of one's mind" urges a public official to consider what the electorate will think, while it urges a company official to consider what his or her superiors will think. Tr. 10,729-30 (Lipsky).

Applicant's witnesses see no substantial difference in the potential conflicts of interest confronting public officials and officials of a private corporation. Mileti *et al.*, ff. Tr. 10,196, at 20-24. They cite anecdotal instances where public officials have failed to initiate prompt responses or downplayed the seriousness of emergencies, and where officials of private companies have acted to protect people while disregarding company

property. *Id.* at 8, 9, 22. Nor would Applicant's witness, Dr. Mileti, agree that there are more mechanisms to control conflict of interest in the public sector than in the private sector. Tr. 10,335-36 (Mileti). Applicant's witnesses point out that the fact that a person (or an organization) is in whole or part responsible for the occurrence of an emergency in no way precludes that entity from telling the public about it. Mileti *et al.*, ff. Tr. 10,196 at 7, 9, 24. Sociologist Mileti notes that the important point is not whether, historically, people in emergencies have or have not downplayed risks; they indeed have done so, and such downplaying has occurred in both the private and the public sector. The important point, in his view, is that sociology knows why people do so and can offer ways to solve the problem. *Id.* at 10. He offers four conditions aimed at removing individuals' fears, biases, and personal beliefs from decisions involved in discovering and disclosing a public threat. The possibility of "conflict of interest" can be minimized if:

1. key decisions are formalized;
2. the substance, process, and spacing of public information are formalized;
3. participants in the system know they are to carry out these tasks in a formalized manner; and
4. participants know that there will be a post-event audit of their actions.

Applicant's witnesses admit that decisionmakers must be allowed some flexibility, but they assert that plans must provide "clear guidance" to decisionmakers in order to avoid conflict of interest. *Id.* at 13. The witnesses allege that the four conditions above have in fact been incorporated into the Shoreham emergency plan, and they cite the Emergency Action Levels (defined in terms of gauge and meter readings) and the system for making protective action recommendations as examples of the level of formal definition which prevails in the Plan. *Id.* at 13-14. As to the fundamental notion that a conflict may exist which would shade the decision in cases involving the residual flexibility, LILCO's witnesses believe that it is "obviously in LILCO's best interest" to recommend appropriate protective actions and to be open and frank about the emergency, although they do not indicate why this is "obvious." *Id.* at 27-28.

While the Staff recognizes that, in decisionmaking, conflicts may arise between safety and other interests, Staff witness Schwartz asserts that "what matters is that overriding emphasis is placed on safety interests" and that such emphasis is monitored by NRC. Schwartz, ff. Tr. 15,143, at 2. Further, this Staff witness "cannot perceive of any difference in kind between a decision or action a utility may be called upon to take in the regular operation of a plant or in regard to onsite or offsite emergency response." *Id.* Presumably the press of an emergency would not, in

the Staff's view, affect the balance a decisionmaker would strike in such a conflict. The Staff's position appears to be that as long as individuals are constantly aware of their responsibilities and monitored by NRC, conflict of interest presents no serious problem. *Id.* at 4; Tr. 15,211, 15,250 (Sears). Further, in this particular case, Staff witness Sears interviewed the people who would occupy posts such as Director of Local Response, Manager of Local Response, and Customer Service Operator, each of which might be called upon to initiate public notification or protective action, and he is satisfied that they have the necessary understanding of their responsibilities. Sears, ff. Tr. 15,143, at 3, 5, 6; Tr. 15,197-205 (Sears). As to the matter of formalizing the circumstances under which notification or protective action should be taken, Staff witness Sears foresaw no possibility of ambiguity, "there is nothing ambiguous about a large amount of radiation in containment," (Tr. 15,209 (Sears)) and "10⁴ R/hr would trigger a protective action" (Tr. 15,228 (Sears)). As to the comparison of conflicting forces acting on public officials and executives of a nuclear utility, the Staff's position seemed to present something of a dichotomy: On the one hand, the Staff asserts that the absence of State and local public officials may even enhance the emergency procedure. Sears, ff. Tr. 15,143, at 7. On the other hand, Staff witnesses seem to place considerable reliance on the NRC Staff as public officials who are not subject to conflicting interests, in that the Staff points out its ability to override LERO decisions as a factor enhancing safety. Tr. 15,243 (Sears); Tr. 15,243-48 (Schwartz).

II.A.5. Conclusion on Conflict of Interest: the Contrast Between the Private and the Public Sectors

Here again, the Board believes the Intervenor's witnesses present the weightier case. Persons holding important positions in a nuclear utility's day-to-day organization will experience strong forces urging them to interpret any ambiguous situation in the company's favor. Nor do we believe, despite the Staff's position, that no ambiguities will ever remain in an accident. Indeed, the very need for emergency planning is predicated on the notion that the course of each and every accident cannot be perfectly predicted in advance. If the only situations ever encountered are those for which the proper course is clearly predetermined, no accident need ever happen. Similarly, we do not agree that the first of Dr. Mileti's conditions can be certainly fulfilled. Key decisions cannot be completely formalized. As to the fourth, the post-event audit, it will always be unclear during an incident whether that audit would sanction a strong or a weak response.

With the important matters of livelihood and career deeply bound to the company, utility executives will, we fear, be much more subject to conflict of interest than would local officials, whose interests clearly parallel those of the populace, and whose accountability is clearly to the public. The notion that the NRC will readily step in to fulfill the role of independent decisionmaker is likewise ill-founded. Although the Staff witnesses stressed this idea, neither could point to specific NRC regulations or procedures covering the method by which NRC could order protective actions. Indeed, at different points in the transcript, we were variously told that such a decision would be made by the Chairman of the Commission (Tr. 15,234 (Schwartz)), a member of NRC's Executive Team (Tr. 15,245 (Schwartz)), or the resident inspector (Tr. 15,245-46 (Schwartz)), and we hesitate to rely on such ill-defined procedures in this important matter.

II.A.6. Board's Overall Conclusion

We conclude that the Intervenors have, indeed, carried the day on Contention 11. Applicant has not met the burden of demonstrating that the employees in command and control positions in LERO are sufficiently independent from LILCO to maintain independence and objectivity. In ambiguous accident situations, their loyalties, personal interests, and career inclinations would dispose them to minimize their estimate of the possible hazard and might cause delay in or omission of proper public notification and protective actions. Applicant has not, for these reasons, provided adequate assurance that these persons would make correct and appropriate command and control decisions. It is clear that the regulations and Commission guidance contemplate that command and control decisions will be made by officials of State and local governments during radiological emergencies. *Cf.* 10 C.F.R. § 50.47(b)(1); NUREG-0654, § II.A. The Board concludes that the reason the Commission's regulations are structured in this fashion is to assure independence in emergency decisions. Clearly an entire spectrum of independence could be envisioned, and it is to LILCO's credit that the utility has made a considerable effort to remove the LERO decisionmakers from LILCO influence, but we do not find that the effort gives a result comparable to that contemplated by the regulations. It may well be that this flaw is curable, and there is, of course, no bar to LILCO's proposing a plan that would meet the requirements. The present LILCO Plan is not such a plan.

II.B. Credibility (Contention 15)

Contention 15 concerns the effect of LILCO's alleged low credibility on LILCO's ability to implement the Transition Plan. The major issues are whether LILCO does in fact lack credibility and whether LILCO's recommendations would be followed by the public and by non-LILCO response personnel. There are seven subparts designated 15.A through 15.G.

II.B.1. Witnesses

Suffolk County presented a witness panel consisting of Dr. Stephen J. Cole, Dr. Arthur H. Purcell, David J. Olson, Michael Lipsky, and Dr. Susan C. Saegert. LILCO presented testimony of Dr. Matthew C. Cordaro, Dr. Steven Barnett, Dr. Dennis S. Mileti, Dr. John H. Sorensen, Carol A. Clawson, and Elaine D. Robinson.

II.B.2. LILCO's General Credibility

The overall question of LILCO's credibility is closely connected with the behavior of the public and non-LILCO organizations during an accident. That is, would information and directives issued by LILCO be believed and obeyed? Intervenors believe that one can determine this from present surveys and that the answer is "no." Applicant believes that present surveys are poor indicators of behavior during an accident and that the LILCO Plan embodies principles which will enhance public belief and cooperation.

Developing the notion that present-day surveys make it appear unlikely that the public would believe LILCO, Intervenors' witness Cole points out that a Social Data Analysts' survey of May 1982 showed that 58% of Long Island residents said they would not trust a LILCO official at all to tell the truth about an accident at Shoreham. Cole, ff. Tr. 10,727, at 7. He notes that even a study commissioned by the Applicant shows "profound distrust" of nuclear energy and also shows most of LILCO's customers think LILCO is "inherently untrustworthy." *Id.* at 10-11. Further, in his view, credibility of the source is a necessary condition for good emergency response. Tr. 10,807 (Cole).

Three other studies, similar in form to the Social Data Analysts' survey above, found 60%, 65%, and 64% of eastern Suffolk County residents saying they would not trust a LILCO official to tell the truth about an accident at Shoreham. Cole, ff. Tr. 10,727, at 11-12. A LILCO-funded study by Yankelovich, Skelly and White (YSW) found that only 23% of

the sample rated information from LILCO as very believable, while 37% rated it very unbelievable. *Id.* at 13.

In addition to the surveys mentioned by Dr. Cole, other members of the panel cite the findings and conclusions of the New York State Fact Finding Panel on the Shoreham Nuclear Facility (the Marburger Commission) which said:

The Shoreham plant's long construction time and its staggering expense have contributed to a loss of public confidence on Long Island in traditional sources of judgment on utility planning and regulation

and:

LILCO did not prepare itself adequately for its foray into the technology of nuclear power, and still lacks credibility as an operator of a nuclear plant.

Purcell *et al.*, ff. Tr. 10,727, at 35.

The witnesses offer resolutions passed by school boards and similar organizations affiliated with school districts in and near the Shoreham EPZ. All the proffered resolutions are to the effect that these organizations do not believe LILCO would supply valid information in an emergency. *Id.* at 36-38. These witnesses also point out that such distrust is quite general and is not necessarily limited to LILCO. A study by Steven Barnett showed that the nuclear utility industry as a whole has serious credibility problems concerning its competence and honesty. Barnett, ff. Tr. 9689, at 18-20. Lastly, Intervenors' witness Dr. Saegert suggests that the Plan itself is incredible: "If you say to people that they should do something which they think to be impossible, then your plan will lack credibility." Tr. 10,876 (Saegert). Nor would NRC approval of the Plan make local residents believe it is feasible. Tr. 10,871-72 (Saegert).

LILCO's expert witnesses believe that the important finding of the polls and studies is that no one source is trusted by everyone, and good planning therefore requires that an emergency public information system elicit belief regardless of the pre-emergency "trust" by the public in different groups or organizations. Cordaro *et al.*, ff. Tr. 10,396, at 15. To increase the credibility of a warning, the warning message should convey the notion that the information has been scrutinized and validated by different sources and that it originates from emergency planning experts and other experts. *Id.* at 17. Further, any organization, whether it be a governmental or private one, would need to take the steps LILCO is taking to ensure the credibility of the information it gave to the public. Even organizations with high pre-emergency credibility

would have to take such steps because credibility changes over time. *Id.* at 18.

Applicant's witnesses Mileti and Sorensen point to data gathered at Three Mile Island by Cynthia Flynn and by Field Research Co. Flynn's figures show that people rated information from State government sources as among the most "useful," while Field Research figures show that people rated State government officials among the least "believable" of sources. Cordaro *et al.*, ff. Tr. 10,396, at 30. Thus, these witnesses reason that a source can issue useful information even if its credibility is low. Cordaro *et al.*, ff. Tr. 10,396, at 28-29.

Drs. Mileti and Sorensen further cite data to indicate that people assign believability to others more on the basis of profession than affiliation. Thus, "scientists" are rated more believable (or reliable) than "officials" in a nuclear emergency, even if the scientists are affiliated with the nuclear industry. *Id.* at 31-32; Tr. 10,457 (Sorensen). It thus becomes important to use believable people, scientists and engineers especially, as part of the warning process. Cordaro *et al.*, ff. Tr. 10,396, at 32-33. The witnesses conclude that the important determinants of belief in emergency warning systems are the scientific reputations of those giving the warning and the fact that the sources of the warning are multiple.

LILCO witnesses Cordaro and Weismantle attest that these ideas have been incorporated into the LILCO-LERO strategy. Scientists and nuclear engineers will be referenced in emergency broadcast system (EBS) messages as will DOE and NRC. Thus the conditions of scientific imprimatur and multiple sources will be fulfilled. *Id.* at 38-39; Tr. 10,454-60 (Weismantle). These witnesses also note that LERO and its implementing organization LERIO represent "probably the most extensive" work on offsite planning of any nuclear plant in the United States. They feel that once the public becomes familiar with the depth and expertise involved in this planning effort, LERO's credibility will rise. Cordaro *et al.*, ff. Tr. 10,396, at 40.

Elaborating on the theory expressed above, Dr. Mileti sets forth seven characteristics which foster belief in proffered emergency information:

1. The emergency information should be internally consistent, such that it does not raise questions in the minds of those who hear it and "disconfirm" itself.
2. The emergency information should be accurate, such that people do not perceive that something is being withheld.
3. The emergency information should be clear, such that it is understood and not discounted because of a lack of understanding.

4. The emergency information should convey certainty about what is being said, so that people are not left with doubts because of how they might perceive doubts in the minds of those supplying the information.
5. The emergency information should be issued frequently enough to reduce the believability of rumors and misinformation and to enhance "confirmation" for people.
6. The emergency information should come from a mix of people, e.g., officials, scientists, and so forth, because no one source is credible for all people.
7. The emergency information should come from multiple channels rather than a single one so that it enhances the "confirmation" process for people.

Id. at 54-55; Tr. 10,554 (Mileti). Dr. Mileti feels certain that by applying these principles low credibility can be overcome. Tr. 10,556-57 (Mileti). He was unable, however, to cite specific data to prove this precisely. Tr. 10,559-63 (Mileti).

Dr. Cordaro and Mr. Weismantle assure us that they have "deliberately applied" the principles set forth by Dr. Mileti. Cordaro *et al.*, ff. Tr. 10,396, at 56.

As to the argument that the public would perceive LILCO (and hence LERO) was responsible for any radiological emergency, and thus less reliable as an information source, these witnesses point out many situations in which people willingly obey emergency orders from employees of an organization seen as responsible for the emergency. These situations range from transportation mishaps (train derailments, aircraft emergencies) to gas leaks and electrical failures. *Id.* at 55-59. The witnesses also note situations in which people obey orders from individuals they would not usually regard as credible: following orders given by a boss one does not respect; following the orders of ushers and parking guides, even though these may be people whose advice one would not usually seek. *Id.* at 64-66.

Finally, in addressing the general effects of credibility and belief on emergency instructions, witnesses Cordaro and Weismantle assert that failure by part of the public to believe in and obey emergency instructions would not hinder appropriate action by the rest of the public. They argue that careful examination of both overreaction and underreaction shows that those who disbelieved and disobeyed LERO's recommendations would not interfere with those who believed, nor would those who disbelieved suffer appreciably greater exposures in any but very restricted circumstances. *Id.* at 66-68.

II.B.3. Conclusion on LILCO's and LERO's General Credibility

Both Applicant's and Intervenors' surveys indicate that the public, if simply asked about the credibility of LILCO concerning things nuclear, does not give the utility very high marks. We must, however, agree with LILCO's witnesses that in an emergency, people will seek information from many sources, and will likely credit most the information and recommendations received from many sources, especially if they view the sources as relying on trained specialists. Applying the principles Dr. Mileti outlined above should provide the greatest probability that sensible recommendations sensibly made will be followed. Further, we agree with Applicant that, from an overall standpoint, once the majority of the people have been properly instructed, disbelief by a small fraction will not have serious results. We find that the public's general reluctance to believe the utility will not be a substantial bar to the working of the LILCO Plan.

We turn now to the individual subparts of Contention 15 (15.A-15.G) to consider whether some specific point there raised may be such a bar.

II.B.4. Credibility with Outside Organizations (Contention 15.A)

Intervenors' witnesses assert that individuals affiliated with schools, ambulance companies, hospitals, nursing homes, bus companies, the American Red Cross, the Department of Energy, the U.S. Coast Guard, fire and rescue organizations, and other emergency personnel will doubt directives issued by LILCO command and control personnel, and will therefore follow their own procedures rather than obeying LILCO commands. They will also spend time trying to confirm LILCO information from independent sources, thus delaying their response. Purcell *et al.*, ff. Tr. 10,727, at 48-50. The witnesses base their conclusions on the concept of "legitimacy of authority," asserting that "legitimacy" is closely related to and indeed part of "credibility." Citing general social science consensus, the witnesses say that legitimate authority is held only by virtue of public office or special skill, knowledge, or competence. They then assert that LILCO-LERO command and control personnel do not meet these standards. Such personnel hold no public office and a review of their job titles and other qualifications suggests they do not have the competence, knowledge, or skill possessed by police, firefighters, or other trained emergency personnel whose regular employment includes exercising command and control functions in an emergency. *Id.* at 50-51; Tr. 10,859-60 (Saegert).

Suffolk County's witnesses further fault LERO's selection of the people responsible for relaying command and control directions to outside organizations. The County's witnesses claim that such personnel should have experience or knowledge pertinent to the fields or concerns of the organizations with which they interact. Such people are called "boundary personnel" and have developed relationships of trust and understanding with the outside organizations. Purcell *et al.*, ff. Tr. 10,727, at 51-58. By contrast, the three LILCO employees designated to fill the LERO post of Health Facilities Coordinator are the LILCO Marketing Planning Program Coordinator, the LILCO Commercial Industrial Service Representative, and a LILCO Project Coordinator. As Health Facilities Coordinators these people will be dealing with the personnel at hospitals, nursing homes, and similar facilities, but their LILCO job titles suggest they have little to do with such facilities in their day-to-day work. Thus they will not be familiar with the needs and concerns of those with whom they deal. *Id.* at 53-55. Similarly, those assigned to fill the post of Public Schools Coordinator are a customer service representative, an engineer, and a commercial and industrial representative. They will not be familiar with public schools or able to speak authoritatively about the problems and concerns arising in connection with evacuating schools. *Id.* at 56-57. Intervenors give other examples of employees designated as liaison or coordinators with specialized groups with whose specialty they are unfamiliar. *Id.* at 57-58. This lack of familiarity with, and knowledge about, the specialized fields will exacerbate the "credibility gap," according to Suffolk County witnesses. *Id.* at 58-59. The witnesses acknowledge that successful dealing with outside authorities is possible under these circumstances, but they assert that the LILCO Plan has failed to recognize the difficulties involved and take steps to resolve them. *Id.* at 59. The witnesses believe that these "boundary difficulties" are already evident in the behavior of officials from local school districts who have stated that they think the Plan unworkable. *Id.* at 59-60. Curiously, the Suffolk County witnesses mention this concept only in connection with hospitals, nursing homes, and schools, none of which are organizations specifically mentioned in Contention 15.A.

The County witnesses do not actually apply the notion of incompatible boundary personnel to the situation which would obtain between LERO command and control and such organizations as the Coast Guard, the American Red Cross, and the Department of Energy. They content themselves with the allegation set forth above, that the objection in regard to these organizations centers around a perceived lack of legitimate authority. Furthermore, on cross-examination, these witnesses

were unable to cite specific literature suggesting that poor command and control over outside organizations would result. Tr. 10,847-50 (Saegert).

LILCO's witnesses assure us that numerous meetings have occurred between LILCO and the Red Cross, DOE, and ambulance companies. Cordaro *et al.*, ff. Tr. 10,396, at 70. Personnel from the Coast Guard and ambulance companies have already received or will receive training by LILCO. LILCO has received indications that the Red Cross, the Coast Guard, and DOE either have participated, or will participate, in the drill and exercise program. *Id.* at 72. In particular, witnesses Cordaro, Robinson, and Weismantle allege that they have letters of agreement with the Red Cross and that they work with that organization on a regular basis. The Red Cross has agreed to participate in drills and exercises. *Id.* at 72-73. The only information the Red Cross receives from LILCO is the notification that there is an emergency at Shoreham and that relocation centers may be needed. *Id.* at 71, 73. Even if the Red Cross did not believe that information, its responsible officials could be expected to begin the activation process as a matter of prudence. Further, the Red Cross need not accept any specific instructions on operating the centers, and during the emergency itself, a Red Cross representative at the EOC would be relaying information to the organization. *Id.* at 73-74.

Similarly, for DOE personnel from Brookhaven, there exists a letter of agreement by which DOE has agreed to participate in drills and exercises, and there does not seem to be any type of information flowing from LILCO or LERO to DOE which DOE could "disbelieve" to the detriment of the Plan. DOE personnel would be present in the EOC exchanging information with LILCO-LERO personnel. *Id.* at 74-75.

The Coast Guard has also signed a letter of agreement, and LILCO has provided the Coast Guard with a training program. The only information the Coast Guard need receive and believe is notification of emergency status and protective action recommendations for Long Island Sound. *Id.* at 74-75.

Applicant's witnesses note that ambulance, fire, and rescue organizations, and local law enforcement agencies have no part in the Plan (although LILCO expects them to continue their normal functions). These organizations will be kept informed and persons trained in dosimetry will be made available to them if reentry into evacuated areas is needed. Contracts with specific ambulance companies for transport of mobility-impaired populace include training for drivers, and participation in exercises. *Id.* at 78-79.

Applicant's witnesses assert that the allegation in Contention 15.A(1), (dose assessment will go unimplemented because non-LILCO

workers will not obey LILCO command and control) is based on “an unrealistic idea of how dose assessment works.” Department of Energy–Radiological Assistance Plan (DOE-RAP) teams will do the monitoring. They will follow their own procedures subject to direction by their team captain in the EOC, a part of a “cooperative venture” with LILCO. The witnesses characterize the fear embodied in the subcontention as “pure fantasy.” *Id.* at 79-80.

Nor do Applicant’s witnesses believe evacuation could not be implemented, a flaw alleged by Contention 15.A(2). They point out that even if the named outside agencies did not obey LILCO orders that would not preclude evacuation. They also note that the agencies themselves have recognized procedures which have been used in emergencies and do not require detailed orders from LILCO. *Id.* at 81-83.

II.B.5. Conclusion (Contention 15.A)

Having weighed the evidence and examined the reasoning of each group of witnesses, we conclude that distrust of LERO (or disobedience of LERO orders) does not represent a serious impediment to the functioning of outside support organizations. We agree with the Applicant’s witnesses that such organizations as the Red Cross, DOE-RAP, and the Coast Guard can, in view of their stated commitments and program participation, be expected to perform as required. That performance would be forthcoming even if the organizations or some individuals within them distrusted LERO as an arm of LILCO. The same is true of the ambulance companies contracted to aid evacuation. The fire and police organizations are not relied on in the interim plan, and even if they did not believe some statements by LERO, it would not interfere with their routine work. As to the schools and health facilities, they are not support organizations — and they are addressed in §§ XI and XII. We address the issue of schools and LILCO’s credibility in connection with Contention 15.C, *infra*.

II.B.6. Sheltering Option Precluded by Distrust of LERO (Contention 15.B)

The Intervenor’s witnesses assert that people will not follow a LERO recommendation to take shelter. Dr. Saegert states that because of their fears and suspicions people will simply not believe their homes provide adequate protection from radiation, and this will prevent them from accepting advice from LILCO. Dr. Saegert cites an article by Aaronson,

Turner, and Goldsmith in the psychological literature which, she says, indicates that when a discrepancy exists between the position of the public and that of a source of information, the public will lower its estimate of the source's credibility rather than change its position. Purcell *et al.*, ff. Tr. 10,727, at 61-62. She finds further support for this idea in work done in the area around Three Mile Island after the TMI-2 accident, and she cites the reasoning underlying the Intervenor's position on Contention 23 (Shadow Phenomenon) which we examined in § I.A, *supra*; *id.* at 62. Nonetheless, even Intervenor's witnesses noted that many people around TMI took shelter in their homes. Tr. 2868-71 (Ziegler and Johnson).

Applicant's witnesses acknowledge that surveys have indicated that many people say they would evacuate if told to shelter. Cordaro *et al.*, ff. Tr. 10,396, at 84-85. Dr. Mileti, however, suggests that the answers given by people in these surveys are simply the subjects' "guesses" about their own future behavior. He sees little to be learned from the surveys except that "almost everyone thinks it is a good idea to engage in protective actions." *Id.* at 86.

Applicant's witnesses further point out that there will always be people who do not take recommended protective actions in an emergency. That would be true regardless of what organization was implementing the Plan and recommending actions. But the possibility that some people will disregard a recommendation to shelter does not, in the view of these witnesses, mean that the Plan does not meet the regulations. *Id.* The benefits of sheltering are explained to the public in the public information brochures, transient information packages, and telephone book inserts. Emergency Broadcast System (EBS) messages will refer people to the brochure and specific information on sheltering could be included in the messages themselves. *Id.* at 90-91.

II.B.7. Conclusion (Contention 15.B)

The dispute centers on whether people would take shelter if directed to do so by LERO. We recognize that a substantial fraction of those polled in the County's survey say they would not when the question is posed in the abstract. We accord considerable weight, however, to Dr. Mileti's opinion that more would react in accord with recommendations under actual emergency circumstances. Further, we agree with Applicant's other witnesses who point out that if some fraction of the populace evacuates when told to shelter, such action would not threaten the Plan in most cases. However, we note that there exists a situation, one of presumably low probability (the case of a fast-breaking accident in which

sheltering might be recommended) wherein a failure to shelter might result in some increase in dose. Ziegler and Johnson, ff. Tr. 2789, at 25-26. This matter is discussed *supra* in dealing with Contention 23.A. To the extent that, in this rare case, people may disbelieve LERO and try to evacuate, some increase in dose may accrue to some portion of the population.

II.B.8. Distrust of LERO Will Lead to Failure of Schools to Take Protective Actions (Contention 15.C)

Suffolk County's witnesses believe that school authorities will distrust and disbelieve LERO recommendations to shelter or to dismiss their students. The witnesses cite their testimony given under 15.A, *supra*. They also offer ten resolutions or formal statements from local school boards, boards of education, parent-teacher associations and the like. Purcell *et al.*, ff. Tr. 10,727, Attach. 6. These statements are all substantially similar and set forth reasons why the adopting organizations believe that the plans to protect schoolchildren in a radiological emergency cannot be implemented. Seven of the organizations specifically mention their doubts about LILCO-LERO as a public information source and allege that those doubts are one reason (among others) why the Plan cannot be implemented. *Id.*

LILCO's witnesses point out that local schools have already accepted information from LERO in the form of an information package concerning radiological emergency plans developed for other schools. Meetings with school districts have also been held. Cordaro *et al.*, ff. Tr. 10,396, at 92. In an emergency, school officials would receive the EBS messages over the tone-alert radios provided to them by LILCO, and the LERO School Coordinator would contact them. *Id.* at 93. At most, some slight delay in action would occur as the officials sought confirmation of the situation. *Id.* at 94-97. LILCO will notify State and local officials of emergencies and will inform school officials in writing of which levels of government will have appropriate information. *Id.* at 97.

II.B.9. Conclusion (Contention 15.C)

While it is true that many school boards and similar organizations may mistrust LILCO and be apprehensive at present about the information LILCO-LERO would distribute in an emergency, it seems unlikely to us that any strong disbelief of EBS messages or telephonic communications would occur were an emergency at hand. Nor do we foresee more than minor delays as school officials seek confirmation of emergency levels

or recommendations. It seems to us most unlikely that disbelief of LILCO would interfere with the protection of students in the surrounding schools. Thus we find for LILCO on Contention 15.C.

II.B.10. People Will Not Obey Traffic Guides (Contention 15.D)

Suffolk County's witnesses believe that the public will refuse to obey LERO traffic guides for several reasons related to LILCO's low public credibility: (1) the low credibility of LILCO will be transferred to LERO employees; (2) this distrust will be exacerbated because these employees will be unable to provide helpful or meaningful information in an emergency (even if they have information, the Plan requires that all information released must be reviewed by command and control personnel); (3) they will lack three important characteristics common to public servants such as police officers. These characteristics are selection by a competitive, merit-oriented system which includes a probationary period, experience in the field, and regular feedback and self-correction. Purcell *et al.*, ff. Tr. 10,727, at 64-69. These factors will generate suspicion and distrust. Further, the guides will lack uniforms of the sort which would distinguish them as public safety personnel. Thus they will not be perceived as having the appropriate background to lead people in an emergency. Tr. 10,862-63 (Lipsky).

As to the claim that during an emergency people will view traffic guides with suspicion and hostility, LILCO's witness Mileti asserts that "[n]othing would be further from what would actually happen." Cordaro *et al.*, ff. Tr. 10,396, at 98. He reasons that traffic guides would be viewed with suspicion only if the general information about emergencies were disbelieved; hostility does not arise toward emergency workers regardless of their employers. *Id.* at 98-99. Hostility toward LILCO will arise only after the emergency ends. *Id.* at 99.

The public information brochure will make people aware that the purpose of the traffic guides is to show them the fastest and safest routes out of the EPZ. In this regard the guides will be visually confirming information already known to the public. *Id.* at 100-01.

II.B.11. Conclusion (Contention 15.D)

We again find the Applicant's evidence the more compelling. It seems reasonable to us that people, in an emergency setting, would follow the directions of those whom they perceive as trying to help them, and it seems reasonable that traffic guides and others designated for similar work would be so perceived. The notion that individuals attempting to

direct traffic and keep order in an emergency would be distrusted and disobeyed because of their employer seems less reasonable, and indeed, Dr. Mileti, who has closely studied human behavior in emergencies says that does not happen.

II.B.12. LILCO's Low Credibility and Belief in EBS Messages (Contention 15.E)

Intervenors reason that the sample EBS messages identify the source of protective action recommendations as the Director of Local Response. People will be aware that that person is a LILCO official, and the fact that the Director is said in the message to have consulted with scientists and engineers will have little influence. People will perceive the Director as being a LILCO employee and hence will not think the recommendation credible. Scientists and engineers employed by LILCO will be viewed as equally unreliable. Purcell *et al.*, ff. Tr. 10,727, at 70-72. The Applicant's witnesses view this subcontention as "subsumed" in the general contention (*supra* § II.B.2) since the EBS messages are the means for advising the public of protective action recommendations. Cordaro *et al.*, ff. Tr. 10,396, at 104-05. They also point out that the Plan assumes a low credibility for those giving the message, and it relies on an emergency information system to bolster believability. Tr. 10,401 (Robinson); Tr. 10,549-50 (Mileti).

II.B.13. Conclusion (Contention 15.E)

It seems to us that the question of overall credibility is inextricably connected with the credibility of the EBS messages. We do not see the specific assertions about the messages or their source as constituting a separate bar to proper belief and response in an emergency. Neither party directly addressed the numbered criticisms of the messages themselves which formed a part of this contention. Those numbered criticisms seem to us therefore to be bald, unsupported assertions, and we find that Intervenors have not met their burden of going forward with them.

II.B.14. LILCO's Credibility and Its Effect on Rumor Control (Contention 15.F)

Suffolk County's witnesses believe that LILCO's plan to correct misinformation by establishing a rumor control center at the Emergency

News Center (ENC) will not work. The plan assumes that people desiring accurate information will telephone the LILCO Customer Relations Offices or Customer Call Boards. These entities will refer any questions they cannot answer to the ENC. Intervenor witnesses say it is "unreasonable" to expect people even to call LILCO entities for information, and similarly unreasonable to expect the public or the news media to utilize LILCO's rumor control system as an authoritative source of information. Purcell *et al.*, ff. Tr. 10,727, at 72-74. The perception of LILCO as not trustworthy, not objective, and not credible will cause both public and media to seek information elsewhere. *Id.* at 74.

Witnesses Purcell and Saegert cite M. Rogovin *et al.*, "Three Mile Island: A Report to the Commissioners and the Public," as well as work by D. Rubin to show that, during the TMI-2 incident, journalists disbelieved the utility company involved and expressed the opinion that utility personnel could generally not be trusted to give accurate emergency information. *Id.* The Intervenor's witnesses further fault the proposed system by pointing out that the people handling rumor control do not appear from their day-to-day job descriptions to be experienced in dealing with the public or the press in an emergency. *Id.* at 75-76. Dr. Saegert specifically calls attention to what she deems internal flaws in the system: rumor control personnel will only be allowed to repeat previously released information; release of new information requires multiple approval, thus giving an air of delay and secretiveness to the process; and all attempts to control information are likely to exacerbate the impression that any data released may be self-serving. *Id.* at 76-77. She agrees, however, that some people will call LILCO "as one source of information." Tr. 10,822 (Saegert).

LILCO witnesses Cordaro, Weismantle and Robinson note that people are expected to call LILCO district offices for information, and that the proper number is on each customer's bill. Indeed, customers called these offices more than a million times in 1983. Cordaro *et al.*, ff. Tr. 10,396, at 105-06. The Plan, however, anticipates that people may well call some LILCO number other than that specifically designated. For that reason, the Plan includes placing a one-page insert in all Company phone books with instructions as to what to do if someone calls in with a question about Shoreham. All incoming calls will be referred to Customer Service and, in the event Customer Service cannot answer the questions posed, to ENC Rumor Control. *Id.* at 106-07. Emergency Operations Center (EOC) and ENC will monitor radio reports, and a log of incoming calls will be kept in order to identify any widespread or current rumors so that correct information may be given. *Id.* at 107-08.

LILCO's witnesses believe that people who call in will mostly be trying to confirm information they have received from other sources, primarily EBS messages. A coordinated effort will be made to keep the EBS messages and Rumor Control answers consistent with one another. Thus the information should conform among sources. *Id.* at 108-09. The practice of having the public utility itself coordinate rumor control in a radiological emergency is prevalent in the industry. *Id.* at 109-10.

According to LILCO, careful handling of press releases through the LERO Director and the Coordinator of Public Information will ensure accuracy in information released. If, as expected, the press seeks confirmation through DOE or NRC the witnesses expect the information they receive will conform to that given by LILCO. *Id.* at 112-15.

II.B.15. Conclusion (Contention 15.F)

The Board believes, after careful consideration of the witnesses' statements, that LILCO's rumor control plan can be effective. There may indeed be some impact on credibility because of preexisting distrust of LILCO, but a plan that assures a central coordination such as that described here, clearly conforms to the requirement of NUREG-0654, § II.G.3.c that "each organization shall establish coordinated arrangements dealing with rumors." We think it unlikely that people would, as Intervenor's witnesses suggest, be reluctant to call LILCO phone numbers in an emergency. It seems to us more likely that virtually any LILCO number may be called — an event provided for in the Plan. *Corrado et al.*, ff. Tr. 10,396, at 106. This contention does not raise serious specific difficulties based on LILCO's credibility.

II.B.16. Public Disbelief in LILCO-Issued Educational Material (Contention 15.G)

The Intervenor's witnesses state that the public tends to disregard materials from any source viewed as untrustworthy or as having an interest in denying or understating the risks involved. Dr. Saegert in particular cites studies which, she says, tend to show that people largely disregard brochures in general. *Purcell et al.*, ff. Tr. 10,727, at 78-79; Tr. 10,814-15; Tr. 10,871-72 (Saegert).

Applicant's witness Mileti admits that studies of pre-emergency educational efforts and pre-emergency brochures have been unable to show that these educational efforts make any real statistical difference in people's behavior during rare community emergencies. He suggests that

behavior in such emergencies may be “situationally determined.” However, he believes that the claim that pre-emergency education has no effect is a counterintuitive one, and that no expert would suggest dispensing with such education. Cordaro *et al.*, ff. Tr. 10,396, at 117. Witness Clawson is of the opinion that the most important function of the pre-emergency brochure is to advise people to tune in their radios when they hear sirens. *Id.* at 119. Dr. Mileti sees no reason to suspect that any alleged lack of credibility on LILCO’s part will seriously interfere with the primary function which he sees brochures and educational materials providing; that is, to foster the general idea that an emergency plan exists and that it includes sheltering or evacuation as possible actions. *Id.* at 119.

II.B.17. Conclusion (Contention 15.G)

It is evident from the testimony of the experts on both sides of this issue that pre-emergency educational materials do not strongly affect the consciousness or the behavior of people in an emergency of an infrequent sort. We do not believe, all things considered, that a general distrust of LILCO would have a strong bearing on the effectiveness of these sorts of materials. Contention 15.G does not raise an issue important to the effective implementation of the emergency plan.

II.B.18. Overall Conclusion on Contention 15 and Its Subparts

After careful consideration of the evidence and arguments presented, and after analysis of the general section of Contention 15 and each of its subsections, we cannot conclude, as Contention 15 states, that lack of credibility on LILCO’s part is such that “the LILCO Plan cannot be implemented and there can be no finding of compliance with 10 C.F.R. § 50.47.” It is probably true that LILCO lacks credibility with a substantial fraction of the public, and in some rare cases that lack may lead to an increase in dose for some portion of the public, but it seems to us that given the proper application of the principles set forth in § II.B.2, *supra*, and given an actual emergency, public response will not be substantially impaired by lack of credibility.

III. EPZ BOUNDARY (CONTENTION 22.D)

Contention 22.D asserts that the Shoreham plume emergency planning zone (EPZ) does not meet the requirements of 10 C.F.R. § 50.47(c)(2) and NUREG-0654 because it runs through and divides

the villages of Port Jefferson and Terryville and the town of Riverhead, thus failing to properly consider jurisdictional boundaries and demographic conditions. Suffolk County suggests this alleged deficiency in emergency planning may be remedied by inclusion of all of Port Jefferson and Terryville and the portion of Riverhead 1 to 2 miles east of the current EPZ, which the County argues is densely populated and contains Riverhead's business district.

III.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Charles A. Daverio, Edward B. Lieberman, and John A. Weismantle. Suffolk County presented the testimony of Philip B. Herr. FEMA presented the testimony of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip McIntire.

III.2. Regulations and Guidelines Governing Configuration of the Plume Exposure Pathway Emergency Planning Zone

Section 50.47(c)(2) of 10 C.F.R. governs determination of the size and shape of the plume exposure pathway EPZ for nuclear power plants. It provides in pertinent part:

Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

NUREG-0654 designates the plume exposure pathway EPZ as that region for which detailed planning is essential to protect the public if an accident occurs. NUREG-0654, at 10. It does not require that the entire geographic extent of all political subdivisions bisected by a 10-mile circle be included in the EPZ. Development of a plume exposure EPZ requires consideration of several factors, including the 10-mile radius, recognizable natural and man-made boundaries, jurisdictional and political boundaries, width of streets used as boundaries, and population density at the boundary. Tr. 8541 (Cordaro); Herr, ff. Tr. 8666, at 11; Tr. 8690-91 (Herr). The Board agrees with FEMA that the critical question in delineating the EPZ is whether the population at the zone boundary will recognize whether it is inside or outside of the EPZ. Tr. 12,952 (Keller). Suffolk County claims that LILCO failed to properly consider political

and jurisdictional boundaries in drawing the Shoreham EPZ. However, LILCO correctly points out that the confusing multiplicity of such boundaries on Long Island precludes their use as EPZ boundaries because the population is often unaware of the location of these boundaries. Cordaro *et al.*, ff. Tr. 8536, at 14; Tr. 8582 (Daverio). The Board finds that LILCO's use of well-recognized roadways will avoid this problem and will enable the population to readily recognize whether it is inside or outside the EPZ.

III.3. Terryville EPZ Boundary

Terryville is an unincorporated area, which was recognized as a Census-designated place in 1970. In 1980 it was included with Port Jefferson for the Census. Cordaro *et al.*, ff. Tr. 8536, at 16. The Terryville EPZ follows Jayne Boulevard, a north-south thoroughfare, and then to the south runs along Old Town Road. To include "all of" Terryville, as demanded by Contention 22.D, apparently would require shifting the EPZ boundary to Old Town Road and Nesconset Highway. Cordaro *et al.*, ff. Tr. 8536, at 15, Attach. 11-12; *id.* at 25, Attach. 11. LILCO raises the issue of permeability of the EPZ and notes that the small number of through streets intersecting Jayne Boulevard will reduce permeability. Tr. 8658 (Lieberman). However, the Board finds that permeability of the EPZ is not a significant issue because it is unlikely that a substantial number of persons would voluntarily enter the EPZ during a radiological emergency.

III.4. Exclusion of Schools from the Terryville EPZ

A high school is located adjacent to the eastern side of Jayne Boulevard and is excluded from the EPZ. Herr, ff. Tr. 8666, at 10. An elementary school, a short distance to the south and nearer to Terryville Road, is also excluded. *Id.*; ff. Tr. 8536, at 25, LILCO Attach. 11. In the event of a radiological emergency in which protective action was not recommended for areas outside the EPZ, no protective action would be recommended for these schools. Tr. 8637 (Weismantle). Suffolk County notes this creates a situation where the school superintendent may not be told to evacuate the school, since it is outside the EPZ, but residents across the street are being urged to leave for health and safety reasons. It is unlikely that parents will accept as credible the explanation that their children will be protected just by being outside the EPZ. In addition, in these circumstances, the superintendent may decide to close the school. Parents would then be faced with three possible places to look for their

children: at school, on the way home, or on the way to a relocation center. Tr. 8723-25 (Herr). In *South Carolina Electric and Gas Co.* (Virgil C. Summer Nuclear Station, Unit 1), LBP-82-57, 16 NRC 477, 486-87 (1982), *aff'd*, ALAB-710, 17 NRC 25 (1983), the Licensing Board found that two schools were located a few hundred yards outside the 10-mile radius and another school was about 1 mile outside the 10-mile radius. These schools were not included in the plume EPZ. Another school just inside the 10-mile line was included in the EPZ. The Board concluded that failure to include all of the schools was contrary to the requirements of 10 C.F.R. § 50.47(c)(2) and ordered that the schools be included in the EPZ. *Id.* at 486. The Board finds the situation at hand to be similar to that addressed in *Summer*, in that schools directly adjacent to the EPZ boundary and very near to the 10-mile radius have been excluded from the EPZ. Relocation of the EPZ boundary to Terryville Road, a short distance west of Jayne Boulevard, will alleviate the problems presented by exclusion of the schools. The fact that Terryville Road is a well-traveled major artery with approximately the same number of local access roads as Jayne Boulevard makes it a good boundary in terms of public recognition and limited permeability. Tr. 8658 (Lieberman); ff. Tr. 8536, at 25, LILCO Attach. 11.

III.5. The Riverhead EPZ Boundary

The Riverhead portion of the EPZ follows Doctor's Path Road, Middle Road, and Osborn Avenue. Cordaro *et al.*, ff. Tr. 8536, at 25, Attach. 4, 14, 16. This configuration is the result of an expansion adopted by Suffolk County planners to include approximately eighty homes within the 10-mile radius, plus a populated area containing the Suffolk County Government Center and a business district. Cordaro *et al.*, ff. Tr. 8536, at 19-20. Contention 22.D does not specify where Suffolk County believes the EPZ boundary should be drawn, though the County's witness suggested use of Cross River Drive, a four-lane thoroughfare about 12 miles from Shoreham. Herr, ff. Tr. 8666, at 10. Osborn Avenue is a two-lane road (Tr. 8625 (Daverio)) and in the event of an evacuation of the 10-mile EPZ, the west side of Osborn Avenue would be advised to evacuate, while the east side would not be so advised. Herr, ff. Tr. 8666, at 7. Suffolk County contends that this will lead to confusion and failure to comply with protective action recommendations. *Id.* at 8. LILCO responds by pointing out that there is a discontinuity of land use along Osborn Avenue which geographically separates the west side of the avenue from the more densely populated portion of

Riverhead to the east. Cordaro *et al.*, ff. Tr. 8536, at 22. Although examination of the aerial photograph reveals some residential housing in this area of geographic separation, the pond, cemetery, and school grounds comprise much of the open space separating the more densely populated area to the east. Cordaro *et al.*, ff. Tr. 8536, at 25, Attach. 14. The Board finds that use of Osborn Avenue and the open space to the east to define the EPZ complies with 10 C.F.R. § 50.47(c)(2), with the exception of the exclusion of schools as noted *infra*.

III.6. Exclusion of Schools from the Riverhead EPZ

East of Osborn Avenue and just outside the EPZ are several schools, including a junior high, a high school, and an elementary school. Tr. 8640-41 (Weismantle). When in session these schools are populated, and thus cannot be considered part of the unpopulated space separating the east and west areas of Riverhead. Although it is reasonable to expect some schools to fall within the EPZ, while others are excluded, the situation bears close scrutiny when the included and excluded schools are adjacent to the EPZ boundary. While the three schools east of Osborn Avenue are excluded from the 10-mile EPZ, the St. Isadora School is directly inside the EPZ and located relatively close to the excluded schools. Tr. 8640 (Weismantle). As in *Summer*, LBP-82-57, *supra*, 16 NRC at 486, the three schools located east of Osborn Avenue are only a few hundred yards beyond the 10-mile radius. LILCO offered no reason for excluding the schools, other than stating that the area provides a recognizable open space separating the more densely populated area of Riverhead from the 10-mile EPZ. Cordaro *et al.*, ff. Tr. 8536, at 21-22. The Board finds that the exclusion of the schools constitutes a failure to follow 10 C.F.R. § 50.47(c)(2) and to consider demographic conditions in determining the shape of the plume exposure EPZ. The Board orders that all three schools be included in the 10-mile EPZ. In all other respects the Board finds that the Riverhead segment of the boundary was drawn in compliance with § 50.47(c)(2) and NUREG-0654.

III.7. The Port Jefferson EPZ Boundary

The EPZ boundary adopted by LILCO divides Port Jefferson at the mouth of Port Jefferson harbor and follows Main Street through the village's commercial center along Route 25A. *Id.* at 22; *id.* at 25, Attach. 14, 17, 19. Moving the EPZ boundary to include the western portion of Port Jefferson, as Intervenors demand, would cut across several streets

and have the effect of including one house while excluding another house next door. *Id.* at 22. LILCO asserts that it would be poor planning to change from the readily recognizable physical boundary (the harbor and Route 25A) to a meandering, obscurely defined, political one which is not readily recognizable to the public. *Id.* at 24. Suffolk County's own witness testified that the Port Jefferson Village boundary is not an appropriate EPZ boundary. Tr. 8741 (Herr). The Board finds that defining the Shoreham EPZ at the western boundary of Port Jefferson would not comport with the Commission's regulations.

III.8. Demography of Port Jefferson

Suffolk County argues that selection of Main Street as an EPZ boundary was made without adequate consideration of the population density along Main Street. Herr, ff. Tr. 8666, at 6. LILCO responds that as the primary commercial thoroughfare Main Street is the natural place to draw the line. Cordaro *et al.*, ff. Tr. 8536, at 23. Secondly, Suffolk County asserts that Main Street is too narrow to serve as an EPZ boundary. Herr, ff. Tr. 8666, at 8. The record indicates that at some point Main Street becomes a three-lane, and later a four-lane, road and that it is four lanes for more than one-half its distance. Tr. 8634 (Daverio). Although Herr acknowledges that Main Street is one of the major streets in the area (Tr. 8698 (Herr)), Suffolk County claims that Main Street unites rather than divides Port Jefferson. Tr. 8727 (Herr). However, even if this four-lane thoroughfare does have a cohesive effect on the community, the Commission's regulations do not require inclusion of entire jurisdictions that are bisected by the 10-mile radius.

III.9. Exclusion of Schools from the Port Jefferson Area EPZ

Suffolk County's witness testified that the Port Jefferson EPZ boundary runs between two schools, leaving the high school 1000 feet outside the EPZ and the elementary school 1000 feet inside the EPZ. Herr, ff. Tr. 8666, at 10. The Board agrees with Suffolk County's allegation that this will result in confusion and reluctance of the population to acknowledge the validity of the boundaries. *Id.* The Board finds this situation to be similar to that of Terryville and Riverhead and the problem confronted in *Summer, supra*. Accordingly, the Board finds that exclusion of the high school located just 1000 feet outside the EPZ does not comply with the Commission's regulations. The Board therefore directs that the high school be included in the 10-mile EPZ.

III.10. Conclusion

The Board finds that the evidence establishes that where the EPZ boundary was not drawn to include entire political subdivisions the boundary was established at recognizable roads or highways. There is no evidentiary basis for requiring that every political subdivision bisected by a 10-mile radius from the Shoreham Nuclear Power Station be included in the EPZ. The Board finds that except for those deficiencies noted above, the plume exposure pathway EPZ was determined in compliance with the Commission's regulations and is adequate to provide reasonable assurance that public health and safety will be protected.

IV. LERO WORKERS (CONTENTIONS 26, 27, 28-34, 24.L)

IV.A. Notification (Contention 26)

Contention 26 alleges that LILCO's communication system and procedures for notifying emergency response personnel will not provide assurance that there will be prompt and reliable notification. Contention 26.A alleges that LILCO's Customer Service Office at Hicksville is inadequate as the primary notification point. Contention 26.C alleges that the plan for notification of key emergency response personnel by pager is inadequate. Contention 26.D alleges that the plan for notification of LILCO personnel by telephone after the initial notification has issued is unreliable. Contention 26.E alleges that the LILCO Plan has no procedure to ensure prompt notification of non-LILCO emergency support organizations and personnel, for example, hospitals, reception and relocation centers, bus companies, and ambulance companies. The same problems apply to contacting the Brookhaven area office, U.S. Coast Guard, and the Federal Aviation Administration (FAA).

IV.A.1. Identification of Witnesses

Testimony on the contention and its subparts was presented by LILCO, the County, the NRC Staff, and FEMA. Testimony for LILCO was given by Dr. Matthew C. Cordaro, Charles A. Daverio, Norman A. Hobbs, Jr., William F. Renz, and William G. Schiffmacher. John R. Sears testified for the NRC Staff and Dr. Thomas E. Baldwin, Joseph H. Keller, Robert B. Kowieski, and Philip H. McIntire testified for FEMA. Testimony for the County was given by Kenneth J. Regensburg, Robert A. Snow and Vincent R. Stile.

IV.A.2. Notification Requirements (Contention 26.A)

Contention 26.A was litigated in an atmosphere of confusion created by misapprehension about the requirements for prompt notification. Intervenors appear to believe that notification of emergency workers must be accomplished within the same time as initial notification of offsite officials from the Shoreham control room. I.F. 229. We therefore turn to 10 C.F.R. Part 50, Appendix E, for interpretation of the requirements for notification contained in the regulations. The regulations state, “[a] licensee shall have the capability to notify responsible State and local governmental agencies within 15 minutes after declaring an emergency.” Following that initial 15-minute notification requirement, the regulations state further, “[t]he design objective of the prompt public notification system shall be to have the capability to essentially complete the initial notification of the public within the plume exposure pathway EPZ within about 15 minutes.” 10 C.F.R. Part 50, Appendix E, § IV.D.3. The regulations therefore have two separate 15-minute notification requirements. The first requires the licensee to transmit notice of an emergency at the plant to offsite authorities within 15 minutes after the emergency is recognized. The second requires offsite authorities to make a prompt public notification decision and to have the capability to carry out that decision within 15 minutes of their receipt of a notification of emergency at the plant. Nowhere do the regulations specify time requirements for notification of emergency workers. Section 50.47(b)(5) of 10 C.F.R. provides that an offsite emergency plan must include procedures for prompt notification of State and local response organizations and of emergency personnel. That section contains no requirement for a 15-minute notification of emergency personnel or for that matter, of offsite authorities. The Board concludes from reading Appendix E and § 50.47(b)(5) together that although it is necessary to notify both offsite authorities and emergency personnel promptly in an emergency, Appendix E adds the more stringent requirement of 15-minute notification only to the notification of offsite authorities. That more stringent requirement is specifically not applied to notification of emergency workers. Intervenors’ assumption regarding notification of emergency workers is incorrect at the outset.

IV.A.3. Offsite Notification

In this unique case, State and local officials are not the offsite authorities who will receive the initial notification from the Shoreham control room, since New York State and Suffolk County are not participating in

emergency planning. Instead, LILCO plans for that notification to be received at its Customer Service Office in Hicksville, New York. LILCO Plan at 3.3-1 to 3.3-4. We do not read the contention as raising an issue concerning LILCO's ability to send the initial notification message from the Shoreham control room to the Customer Service Office at Hicksville. To the extent that this contention raises any issue at all concerning the initial notification, it questions whether the Customer Service Office at Hicksville has adequate staffing or capability for further response once it has received the initial notification. The County concedes that the initial notification message can feasibly be transmitted within 15 minutes. Tr. 4665 (Snow). The Board finds that the initial notification from the plant to the Customer Service Office at Hicksville is complete at the time that the office receives notification from the plant. Cordaro *et al.*, ff. Tr. 4014, at 30. That initial notification need not include notification of emergency workers.

IV.A.4. Public Notification

LILCO must demonstrate the capability upon initial notification to make a decision with respect to public notification and then to notify the public within 15 minutes. Once the notification of an accident has been received, the Customer Service Office will attempt to reach the Director of Local Response and other key personnel within the 15-minute time period specified in the regulation. Once contacted, the Director of Local Response will decide whether public notification should be initiated. If the Director cannot be reached, the initial public notification can be carried out within about 15 minutes by standard procedure. Tr. 4423-25 (Daverio, Renz). Neither the NRC Staff nor FEMA find fault with this plan. The Board finds that this plan is conceptually adequate to comply with regulations requiring public notification within 15 minutes. The Board's finding does not include any requirement to notify even the seven key emergency workers, though the Plan specifies that they would be notified within that time. The only time notification of these workers would not occur is if paging equipment failed. That possibility does not undermine our assurance of prompt public notification, since the LERO worker at Hicksville is required by procedure to activate public warning systems within about 15 minutes. Offsite Preparedness Implementing Procedures (OPIP) 3.3.2, at 8; Cordaro *et al.*, ff. Tr. 4014, at 31-32.

IV.A.5. Adequacy of Customer Service Office

The County challenges the adequacy of the Customer Service Office at Hicksville to respond to notification of an emergency on grounds that there are too many tasks for the operators to accomplish within 15 minutes. This contention focuses especially on the midnight to 8 a.m. shift, which has only two Customer Service operators on duty at Hicksville. The Board finds, however, that the essential tasks that the Customer Service operators must perform within the 15-minute interval are simple and limited in number, and there is no basis for believing that they could not be accomplished in 15 minutes. These tasks include the following: (1) receive and verify the initial communication from the plant that there has been an emergency (Cordaro *et al.*, ff. Tr. 4014, at 11); (2) notify by pager one or more groups of additional emergency workers (*id.* at 12); (3) verify that the notice has been sent (*id.* at 13); and (4) if necessary, activate the prompt public notification system (*id.* at 31). There is no basis for believing that these relatively simple tasks could not be accomplished even when only two people are on duty. *Id.* at 24; Sears, ff. Tr. 4709, at 5; Tr. 12,442-44 (Keller, McIntire).

IV.A.6. Backup Capabilities

There are backup personnel at other Customer Service locations who are trained and equipped to assist in worker notification if the paging system should fail. The backup personnel have training and experience in dealing with emergencies. Cordaro *et al.*, ff. Tr. 4014, at 24-28. These workers are accustomed to dealing with other kinds of emergencies and for this reason we reject the County's claim that these workers are nothing more than untrained telephone switchboard operators. *Id.*; Tr. 4614 (Regensburg).

The Board finds that there is reasonable assurance that the design basis for LILCO's Plan would permit LILCO to meet all of its time requirements for receipt of emergency messages and prompt notification of the public in the event of an emergency at Shoreham. We further find that the staffing for this purpose and the plans for contacting additional emergency workers are adequate.

IV.A.7. Adequacy of Equipment (Contention 26.C)

Suffolk County questions the adequacy of the paging system and the automatic verification system that would be employed by the Customer Service Office. Regensburg *et al.*, ff. Tr. 4442, at 16, 40-47, 49. LILCO

will rely on an existing commercial paging system to summon 142 of its emergency workers in the event of an emergency. Cordaro *et al.*, ff. Tr. 4014, Attach. 5. The operator of the system states that it can reach all of Long Island, Manhattan, and the greater metropolitan area of New York City. The individual pagers are of a standard type used at other reactors. Tr. 4720 (Sears). Suffolk County's criticism of the notification plan is grounded on the contingent possibility of failure of the pager system in any of a variety of ways. The County also asserts that even if everything works perfectly, notice to the Customer Service Office is promptly received, no verification of the notification message is needed, and even if the LILCO paging system works properly, the actions required of Customer Service operators could not be completed within a 15-minute period. This criticism is premised on the assumption that notification of large numbers of LILCO emergency response personnel within 15 minutes is required. The County asserts correctly that such notification cannot be accomplished in 15 minutes. Regensburg *et al.*, ff. Tr. 4442, at 12-13. However, we have previously found that such notification is not required by our regulations. Board Finding IV.A.2, *supra*. The Board discounts all Suffolk County testimony based on the assumed requirement for notification of all or a large part of the emergency work force within a 15-minute time interval. The remainder of the County's criticism is premised on the proposition that the equipment might fail in any of a number of ways. Regensburg *et al.*, ff. Tr. 4442, at 16. If the paging system fails, the Customer Service Office would be responsible for contacting personnel manually via commercial telephone. After being notified, some workers would call others. LILCO acknowledges that if the paging system were to fail, notification of emergency workers manually by a cascading telephone system would take longer than by the paging system. Cordaro *et al.*, ff. Tr. 4014, at 24-29. However, such a system is in use and has been approved in other radiological emergency response plans. Tr. 4722 (Sears).

The Board finds that LILCO has presented a primary means of notifying its key emergency workers promptly through pagers. It has also presented a backup telephone system for use if the pagers should fail. The design basis of LILCO's worker notification system is adequate.

IV.A.8. The Automatic Verification System

The County is also concerned about possible malfunctions in the Automatic Verification System (AVS). The AVS provides a means for workers who are paged to acknowledge by telephone that they have received an emergency message. The AVS records the confirmatory call

and provides for display of the information in a computer printout. Manual attention is not required for this system to function if the confirmatory calls are made from touch tone phones. LILCO plans to provide touch tone phones to all of its LERO workers. In normal operation the AVS will not place an unreasonable work burden on the Customer Service operators. The County's concern is that the AVS system might fail. If it did, manual recording of confirmatory calls by Customer Service Office personnel would be required. Although manual verification would increase the burden on Customer Service operators, we cannot find that that renders the Plan inadequate for several reasons. First, NUREG-0654 does not require that the details of the verification system be presented in the Plan. Second, it is excessively speculative to presume that a system that is periodically tested will fail at the precise moment of an emergency. Third, verification is a secondary operation in emergency response that need not meet any time requirements under NRC regulations. We see no threat to public health and safety arising from the possibility that Customer Service operators might be occupied with manual tabulation of verification calls because in an emergency assistants can be summoned to the Hicksville office, there are other offices that can assist, and the EOC would be mobilized to take over principal emergency response duties.

IV.A.9. Conclusion (Contention 26.C)

The Board finds Contention 26.C to be without merit. We specifically disagree with the County's proposed finding that LILCO's Plan can be characterized as a best-case planning effort and that a standard of planning should be a worst-case planning effort. LILCO's worker notification plan is designed to be consistent with the known capabilities of communication systems. It is therefore a reasonable system. A reasonable response to concerns about failure in essential systems is to provide backup systems, which LILCO has done. We think it fruitless to inquire any further into the myriad of contingent ways in which systems may fail or to design plans to cope with all possible contingencies. It is sufficient that we have before us a plan with a realistic design basis.

IV.A.10. Notification of Emergency Response Personnel by Telephone (Contention 26.D)

This contention alleges that LILCO's reliance on commercial telephones to notify emergency response personnel provides no reasonable

assurance of proper notification mobilization, even if it is assumed that the paging system itself works.

IV.A.11. Means of Notification

In the event of a general emergency, approximately 142 LERO emergency workers will be notified by pagers. Of the 142 persons paged, 87 will call an additional 823 emergency workers by telephone. Cordaro *et al.*, ff. Tr. 4014, at 37-38. Workers, such as meter readers, who are not ordinarily near telephones, will also carry pagers. *Id.* at 38. The persons who are assigned to call the remainder of LERO's emergency workers will be provided with lists of names and telephone numbers. The plan provides that no person will be required to call more than twenty-five other persons. Of the twenty-five people on the list, the plan provides that approximately fifteen would have to be reached in an emergency. *Id.* at 39-40.

IV.A.12. Time Required for Notification of Workers

Suffolk County contends that it would take 3 to 5 minutes per telephone call to notify the emergency workers. Regensburg *et al.*, ff. Tr. 4442, at 58. The Board accepts that estimate as approximately correct. With that datum it is a simple matter to calculate that the notification of rank-and-file emergency workers could be completed in from 75 to 125 minutes on the basis of a possible maximum notification of twenty-five persons for some callers. The majority of notifications would be completed sooner than this, since eighty-seven callers working in parallel and taking five minutes per call could each call twelve persons per hour. The capability to make over 1000 calls per hour therefore exists with the personnel available. The ability to contact workers promptly is not resource limited. Actual times required for such contacts are therefore a result of prioritization in LILCO's planning process. The notification process will occur in practice in the form of a distribution wherein most workers will be notified in less than 1 hour but where it takes up to 125 minutes to complete the notification. We find no fault in planning with this possibility because the emergency organization need not await the completion of notification before it begins to perform its functions. Workers who have been notified can be reporting to duty throughout the notification period. The Board cannot conclude that the effectiveness of the LERO response is somehow dependent on the time it takes for the last person in the network to be notified.

The County finds fault with a number of implementing details of the callout plan. It cites, for example, the fact that the emergency workers are not on call 24 hours per day. Tr. 4334 (Renz). It finds fault because there is no requirement for emergency workers to perform a separate verification of notification upon receipt of the telephone call. According to the County, some workers do not have transportation available to them during the day while they are in the field. Regensburg *et al.*, ff. Tr. 4442, at 56.

IV.A.13. Conclusion (Contention 26.D)

The Board finds that the County's concerns about implementing details of the callout system are without merit, even though we have no cause to doubt the truth of the assertions. It seems obvious that some difficulties of implementation will arise in an actual emergency. Some workers will not be at home; some will be temporarily stranded without automobiles; some will be sick. Nevertheless, we cannot find potential difficulties with implementing details to be a cause for rejecting the Plan because such difficulties have common sense *ad hoc* remedies and because the Plan is conceptually sound in its design basis. Resources exist for a prompt callout of LERO emergency workers. It is not necessary for every person on the callout list to be contacted or to respond initially. LERO workers with instructions to call twenty-five persons need contact only fifteen. LERO has at least 50% more people enrolled than it needs for an initial response. The Plan therefore already provides for the fact that there will be some failures in the ability of LERO to contact or mobilize its emergency workers. We therefore have reasonable assurance that an essential cadre of rank-and-file emergency workers could be promptly notified of an emergency by the cascading telephone notification system contained in the LILCO Plan. Contention 26.D is without merit.

IV.A.14. Notification of Non-LILCO Organizations (Contention 26.E)

This contention asserts that the LILCO Plan has no procedures that ensure prompt notification of non-LILCO emergency support organizations such as hospitals, reception and relocation centers, bus companies, and ambulance companies and their personnel.

IV.A.15. Means of Notification

Hospitals, reception and relocation centers, bus companies, and ambulance companies will be notified of an emergency by commercial telephone. Ambulance companies can also be contacted by radio. Responsibility has been assigned for notifying bus and ambulance companies. The respective bus coordinators and ambulance coordinators will perform such notification. Hospitals will also be notified by tone alert radio. Hospitals outside the EPZ who may be called upon to assist with an emergency response will be notified by either commercial telephone or radio communication from ambulances. Relocation centers will be notified by the American Red Cross by commercial telephone. The Health Facilities Coordinator will notify reception centers by commercial telephones. LILCO will notify FEMA, the State of Connecticut, Nassau County, New York Telephone Company, the U.S. Coast Guard, the FAA, and Brookhaven National Laboratory by telephone at the alert stage of an emergency. Other non-LILCO support organizations would not be notified at that stage since it would serve no functional purpose. *Cordaro et al.*, ff. Tr. 4014, at 41-43.

IV.A.16. Suffolk County's Concerns

The County in bewildering fashion continues to assert that no procedures for notifying these organizations exist. I.F. 257. The County further asserts that because commercial telephones will be used for notification in most cases, notification might not be completed because persons to be contacted will not be near their telephones or will be using their telephones. *Regensburg et al.*, ff. Tr. 4442, at 60-61. The County also urges that non-LILCO support organizations should be notified at the alert stage. *Id.* at 64-65. The County would also like to have the Plan include designation of individuals responsible for notifying each organization, the content of notification messages, and the name of specific individuals to be contacted. *Id.* at 60-62. The County acknowledges in its testimony that procedures for notifying non-LILCO emergency support organizations such as Brookhaven National Laboratory, the U.S. Coast Guard, the FAA, and New York Telephone Company exist. It also acknowledges that backup means of communications for emergency support organizations exist.

IV.A.17. Conclusion (Contention 26.E)

The Board finds Suffolk County's criticism of LILCO's plan to alert supporting organizations to border on the disingenuous and frivolous.

We reject outright and without further analysis the speculative proposition that people within these organizations will not be near their telephones or that they will be talking to somebody else when an emergency call is attempted. Anyone who is at all familiar with telephone communications knows that there are common sense solutions to such problems. Similarly, we see no merit in the County's unprioritized list of alternative implementing procedures since no connection to public health and safety has been shown. The notification plan is fundamentally simple; it requires nothing more than agency-to-agency telephone calls, the mechanics of which are in daily business use. There is no basis whatever for concluding that such calls cannot be made in an emergency. Contention 26.E is without merit.

IV.B. Mobilization (Contention 27)

Contention 27 alleges LERO mobilization will take at least several hours after notification, and in some cases even longer. Subparts 27.A through F allege a variety of difficulties that will prevent mobilization from being accomplished promptly. The alleged difficulties include the distance that emergency workers must travel to their emergency locations, the need for workers to travel through congested traffic, the need for workers to report first to a staging area and later to a duty post, the need for workers to travel from staging areas to other locations to obtain equipment and vehicles, and the fact that some emergency workers, such as traffic guides or bus drivers, will not be contacted or expected to report until the site or general emergency level.

IV.B.1. Definition

Mobilization is defined as the activities that take place between the determination that particular offsite emergency response personnel should be notified and the reporting of such personnel with necessary equipment to the locations where emergency functions will be performed. *See* Preamble to Contention 27.

IV.B.2. Identification of Witnesses

Witnesses for LILCO were Dr. Matthew C. Cordaro, John A. Weismantle, Edward B. Lieberman, and Ronald A. Varley. Witnesses for Suffolk County were Joseph L. Monteith, Richard C. Roberts, Philip McGuire, Michael J. Turano, Jr., Edwin J. Michel, and Philip B. Herr. The

FEMA witness panel also presented testimony on this contention. Neither New York State nor the NRC Staff presented direct testimony on this contention.

IV.B.3. Plans for Mobilization

The degree of mobilization of LERO is dependent on the classification of the emergency. At the unusual event stage, seven key members of LERO will be placed on standby and the remainder of LERO will be unaffected. At the alert stage, 212 members of LERO report to their preassigned duty stations. At the site area or general emergency stage, LERO will be fully mobilized. Cordaro *et al.*, ff. Tr. 7043, at 9-10. For all emergency classifications, seven key members of LERO are paged. This key group consists of the Director of Local Response, the Manager of Local Response, the Lead Communicator and four functional coordinators. *Id.* at 10. The EOC and staging area personnel will be activated at the alert stage. *Id.* If a site area or general emergency occurs, all LERO personnel will be notified to report to their assigned facilities.

Bus drivers, traffic guides, route spotters, and road crew personnel will be briefed at staging areas as they arrive and will be given their dosimetry equipment. Depending on the situation, these personnel either will be placed on standby at the staging area or will be dispatched immediately to their field locations to assume their duties. *Id.* at 11-12. There is no need to alert these workers at the unusual event or alert stage of an emergency. Driving bus routes and guiding traffic, for example, are evacuation specific. These activities will only be required in a general emergency in which evacuation is recommended. *Id.* at 12. Additionally, the Coast Guard, the DOE-RAP team, and the Red Cross will be initially notified at an alert level. Ambulance companies will be contacted at the site area emergency level. They will be asked to have their drivers take available ambulances and ambulettes to their respective staging areas. *Id.* at 13.

IV.B.4. Steps to Reduce LERO Workers' Travel Time

LILCO plans to minimize travel distances and travel times for emergency workers in two ways, (1) staging area assignments are based on the location of LERO workers' homes, and (2) callout lists are prioritized to permit workers living closest to a staging area to be called first. *Id.* at 14.

IV.B.5. Traffic Conflicts

LERO workers will not normally encounter unusual problems with traffic during their mobilization because they will be called to their staging areas at the site area emergency stage. Evacuation, and therefore evacuation traffic, will not normally begin until later, after a general emergency has been declared and an order to evacuate has been given. Additionally, the initial reporting location for LERO workers will be predominantly to the EOC or to one of the three staging areas which are located outside the EPZ. The possibility for traffic conflicts is low. *Id.* at 15. Workers traveling from staging areas to duty posts in the EPZ would be moving in the opposite direction to evacuation traffic, thus minimizing conflict. Distances between staging areas and duty posts have been minimized. *Id.* at 21.

IV.B.6. Required Activities at Staging Areas

Key personnel will report to the staging area at the alert stage to prepare the facility and equipment for possible use should the emergency escalate. The staging area will be prepared for an influx of LERO workers should that later become necessary. Major activities at the staging area include the briefing of LERO workers, the distribution of dosimetry equipment, the distribution of packets of information to help reduce briefing time, and the issuance of field equipment such as portable radios. Personnel performing these activities have been drilled in the procedures. *Id.* at 16-17. Mobilization times have been reduced as a result of drills and exercises. Tr. 7073-75 (Weismantle).

IV.B.7. Mobilization of Buses

Bus coordinators and their support staff will begin making verification calls to bus companies at the alert stage to identify the number of immediately available buses and their locations. Preparations will be made at that stage for distributing dosimetry equipment and instruction packets including bus route maps for the bus drivers. Bus drivers will be notified to report at the site area emergency stage. When they arrive, drivers will be issued personal dosimetry equipment and will be briefed by bus dispatchers. Bus drivers will then leave the staging area and go to their assigned bus company's storage locations. Transfer point coordinators also will leave the staging area and go to their assigned transfer points. Bus storage locations have been identified in advance of an emergency and have been matched with staging areas and transfer points. The first drivers leaving the staging areas will go to the closest bus storage location to

ensure that early scheduled bus runs are properly staffed. After drivers pick up their buses at storage locations, they will proceed to the designated transfer point and will wait for instructions from the transfer point coordinator. Cordaro *et al.*, ff. Tr. 7043, at 19-20.

IV.B.8. Mobilization of Tow Trucks and Fuel Trucks

Some tow trucks and fuel trucks belonging to LILCO are already located at the Patchogue and Riverhead staging areas. Additional vehicles will be obtained by road crews before they report to staging areas. The road crews themselves will be assigned on the basis of their proximity to vehicle storage locations. The process of obtaining fuel trucks and tow trucks by LERO road crews is less burdensome than that for buses because LILCO already owns these vehicles and has placed them at strategic locations around the EPZ. *Id.* at 20.

IV.B.9. Mobilization Time for Emergency Workers

LILCO has measured mobilization time for LERO workers during drills and exercises. The time required for EOC workers to travel from their homes or work locations to the EOC averaged approximately 30 minutes from home and 40 minutes from work. LERO workers required an average of 60 minutes to report from either home or work to their assigned staging areas. An average of 15 minutes per briefing group was required at the staging area to distribute dosimetry equipment. The briefing of bus drivers, traffic guides, or route alert drivers required about 15 minutes per group. Dispatch of LERO workers from the staging area generally required approximately 5 minutes. Dispatch of traffic guides took approximately 10 minutes, since these guides needed to pick up other necessary equipment. Travel times from staging areas to bus companies varied from 3 to 66 minutes and from bus companies to transfer points from 1 to 66 minutes. Travel times for traffic guides from staging areas to assigned control posts varied from 5 to 40 minutes, with an average time of approximately 20 minutes. *Id.* at 22-23. Buses will begin to arrive at transfer points within about 2 hours, 15 minutes after notification. Tr. 7052 (Lieberman).

IV.B.10. Likelihood of Executing the Mobilization Plan as Designed

The time needed from the initial declaration of an alert to activate the EOC and to ready staging areas is 1 hour, 30 minutes to 2 hours. Tr. 7143 (Varley). The time needed to assemble and process LERO workers

through a staging area and to be ready for dispatch is approximately 2 hours after declaration of a site area emergency. Cordaro *et al.*, ff. Tr. 7043, at 24-25. Mobilization of LERO could be as designed for accident sequences having those time intervals between emergency stages. *Id.* at 24.

Activation of the EOC and preparation of staging areas could proceed simultaneously with the early mobilization steps of LERO workers if the speed of an accident made that necessary. Therefore, the time between the declaration of an alert and the declaration of a site area emergency could be compressed to some degree without affecting implementation of the Plan. *Id.* at 25. Similarly, the time between the declaration of a site area emergency and declaration of an order to evacuate could be shortened somewhat and the Plan could still be carried out as designed. All traffic guides, for example, need not be ready to depart the staging area at the time an order to evacuate is given. Modeling work on traffic assumes that traffic guides will be in place when congestion begins to occur approximately 1 hour after the order to evacuate. In a fast-breaking emergency some time will still be available to staff LERO either before or during the evacuation. At some point, however, an accident could develop too rapidly to implement the mobilization plan in all of its aspects. *Id.* at 26.

IV.B.11. Role of Mobilization Time in Making Protective Action Recommendations

No specific arrival times are given in the Plan for ambulances, traffic guides, or tow trucks. It is assumed that the arrival of these vehicles and persons will be distributed over a period of time after notification. Tr. 7052-53 (Lieberman). The Director of Local Response does not need a precise estimate of mobilization times to make a protective action decision for the public. Tr. 7055-58 (Varley). The Director should have a general knowledge of how long the mobilization process will take, but would not base a protective action decision on that factor. In a very fast-breaking accident where a recommendation to evacuate is made simultaneously with the initial declaration of an emergency, an evacuation could be successfully completed, although not exactly according to the times listed in the LILCO Plan. Tr. 7059-60, 7069 (Weismantle). Under those conditions the Director of Local Response would use the time estimates for an uncontrolled evacuation in making protective action recommendations for the public. Tr. 7069-70, 7071 (Weismantle).

IV.B.12. Consequences of Rapidly Developing Accident

In a general emergency for which evacuation was the recommended protective action and the order to evacuate was given immediately, LILCO could not mobilize fully before an evacuation began. Traffic guides could not be deployed with sufficient speed to direct traffic during a prompt evacuation. As a result the public would take about 1 hour, 30 minutes longer to evacuate than it would during a controlled evacuation. Tr. 7315-16, 7326 (Weismantle).

IV.B.13. Suffolk County's Concern

The County is concerned that without realistic information about mobilization times for workers, command and control persons will not know whether a proposed protective action can be implemented because it will be unclear whether emergency workers will be in place to put the protective action into effect. The County believes that LILCO's mobilization time estimates are wrong because an unscheduled mobilization of a large number of individuals is difficult, time-consuming, and most often, only partially successful. The Suffolk County Police Department conducted a mobilization test of its own officers showing that it would take about 1 hour, 18 minutes to muster 54% of the off-duty officers and that a total of 66% could be mustered in about 2 hours. Monteith *et al.*, ff. Tr. 7381, at 14. The police believe that it would take about 6 hours to notify, muster, equip, brief, and deploy officers to their emergency posts if there were a mobilization of the Suffolk County Police Department. *Id.* at 15. Even in that amount of time, the department would be able to muster only 60 to 70% of off-duty personnel. The police do not believe LILCO can mobilize in any less time or any more successfully than the police could. *Id.* The police have also measured the time required for emergency workers to reach staging areas or other emergency locations. The results show that it would take about 1 hour, 20 minutes for the forty-eight traffic guides working in Hewlett to arrive at the two closest staging areas, which are Port Jefferson and Patchogue.

Suffolk County asserts that if an emergency were to occur between 3:30 p.m. and 7:00 p.m., emergency workers traveling east from their homes or work locations in Nassau County would encounter the usual heavy rush-hour traffic along major thoroughfares. Emergency workers would therefore be significantly delayed in reaching their reporting locations. *Id.* at 22. The County further speculates that traffic congestion would likely increase as the severity of the accident increased because of volunteer evacuation, even if no order to evacuate had been given. *Id.* at 23. Suffolk County is also concerned about the time needed to perform necessary activities at the staging areas after workers arrived. The

time required for these activities must be added to the time that it takes to get to the staging area. *Id.* at 25-26. The County estimates that it will take about 2 hours to conduct the tasks that must be performed at staging areas. *Id.* at 29, Attach. 7. Once they departed from the staging areas, traffic guides, route alert drivers, and ambulance drivers would be prevented from reporting promptly to duty stations because of traffic congestion caused by evacuees making evacuation and pre-evacuation trips. In addition, it would take more than 1 hour, 15 minutes for bus drivers to go to their buses and then to drive to transfer points inside the EPZ. *Id.* at 32. It would take 2 hours to 2 hours, 30 minutes for LILCO workers to obtain tow trucks and gasoline tank trucks and return to the EPZ. *Id.* at 35.

In summary, Suffolk County believes that it would take an hour or more for workers to make their initial trips to staging areas. At the staging area it would take about 2 hours to brief emergency workers and issue them equipment. Beyond that, obtaining buses, tow trucks, and fuel trucks could require an additional 2 hours to 2 hours, 30 minutes. This, the County says, is unacceptable, and shows that LILCO will not be able to mobilize its personnel and special equipment in a timely manner. In particular, the County believes that LILCO's estimate of about 2 hours for mobilization of buses and ambulances is inaccurate. Required activities at the staging area alone would take longer than that. It would therefore take several hours longer to mobilize LILCO's buses than the 2 hours LILCO appears to assume in its plans. *Id.* at 37-38.

IV.B.14. Mobilization During Fast-Breaking Accident

Although Intervenors claim to have reviewed a full spectrum of possible reactor accidents, their principal concern is for a small subset of accidents in which a release of radioactivity occurs within 1 hour or less of the time that an accident is recognized. Tr. 7394-95 (Herr). The County argues that in such accidents mobilization could not be completed before the start of evacuation and serious consequences would ensue. Traffic guides, for example, would lose control of the highways and not be able to regain control. Tr. 7400-01, 7494-95 (Monteith). Fast mobilization is unrealistic in such accidents because LERO workers are unskilled in taking the necessary actions and because they are not on call. Tr. 7412-13 (Herr). Additionally, persons responding to a radiological emergency would be under stress, which affects judgment and ability. Tr. 7417-18 (Monteith).

The County insists that in order for evacuation to be effective, the full roster of personnel required for emergency response must be at their

posts before the beginning of evacuation. Tr. 7426-27 (Herr). This cannot be achieved in fast-breaking accidents, and LILCO's assumptions about sequential mustering of resources as accident severity increases or about gradual buildup of people in time distribution are not appropriate. Tr. 7450 (Herr). Plans for mobilization are therefore inadequate for accident sequences that would provide less than an hour's notification time. Tr. 7488-89 (Herr). Suffolk County witnesses believe that LILCO's overall ability to mobilize is inadequate for accidents that could cause releases within 8 hours of the declaration of an emergency. To arrive at that conclusion, they totaled up the discrete sequential elements or tasks that must be performed for mobilization. Tr. 7499-7502 (Herr).

IV.B.15. Conclusion on Mobilization

Neither prefiled testimony of the parties nor cross-examination revealed significant factual disputes as to the length of time the various elements of mobilization would take. The dispute raises the fundamental question of whether the Plan can be approved, given that some accident sequences could occur so fast that prior mobilization could not be achieved. Even on this question there is no factual dispute. Suffolk County urges the Board to accept, and LILCO concedes, that some emergencies could occur so quickly that the full LERO emergency force could not be mobilized before a release of radiation from the plant. Suffolk County's witnesses thought that mobilization speed was a concern for as long as 8 hours into an emergency situation. However, after weighing the evidence the Board believes that this is too long. The principal tasks to be accomplished in mobilization after notification are the initial trip by emergency workers to staging areas, the briefing and issuance of equipment at staging areas, and the movement of workers to their emergency duty posts. As mobilization progresses, there will be workers in each group. It is therefore incorrect, as the County urges, to simply add the times required to fully accomplish each task. Essential operations will take place simultaneously, not sequentially. Some workers will report for duty while others who arrived earlier would be receiving their briefing, and yet others having finished their briefing would be on their way to emergency locations. Thus, the Board finds that LILCO's estimate of approximately 2 hours to substantially complete staging area activities is reasonable. Travel from staging areas to duty posts would require additional time, which might vary from 5 to 40 minutes for traffic guides. The Board finds that LILCO could substantially complete its mobilization in about 3 hours. We consider that an unbiased estimate

since no basis exists for concluding that it either overstates or understates mobilization time. Uncertainty exists since many workers will arrive at duty stations earlier and some later than estimated; however, the Board sees no basis for reducing it.

Nevertheless, there are accidents that could progress to the general emergency stage before the EOC or staging areas could be activated, and that would allow inadequate time to go through LILCO's planned mobilization process before evacuation began. The Board can find no defect in planning, however, since complete and timely mobilization under those conditions is simply impossible. The consequences of a failure to mobilize LERO before evacuation begins are relatively small because an evacuation unaided by LILCO traffic guides could still be accomplished although it would take more time than the controlled evacuation. The fast-breaking-accident scenario introduces bounded uncertainty into the evacuation time estimates for the EPZ. If the traffic posts were totally unstaffed, evacuation would require about 1 hour, 30 minutes more than if they were fully staffed. However, the testimony shows that the staffing of key posts by emergency workers would occur as a distribution in time. Workers would arrive to take up duties during the evacuation which itself would require 5 hours to 6 hours, 30 minutes. The Board concludes that this would have some interpolated effect on the overall evacuation time. The EPZ could be evacuated in some time longer than LILCO's nominal period of 5 hours with full control and in some time shorter than the 6 hours, 30 minutes LILCO has calculated for an uncontrolled evacuation. The Board is of the opinion that true evacuation times under extreme emergency circumstances are probably not predictable with more precision in any event. The predictive uncertainty raised by the possibility of fast-breaking accidents does not create a barrier to approval of the Plan.

The Board concludes that LILCO has taken practical and reasonable steps to minimize the mobilization times for LERO workers. It was helpful to establish three staging areas around the periphery of the EPZ and to distribute the responsibilities of LERO workers among the staging areas. It is reasonable to activate the EOC and the staging areas at the alert stage. It is reasonable to assign LERO workers generally to the closest staging areas and to develop callout lists in which the closest workers are called first. Drills have increased the efficiency in processing workers through staging areas. LILCO has matched special vehicles to the three staging areas to reduce travel times. The Board finds that, for a reasonable spectrum of possible accidents, LERO can mobilize its workers in a timely fashion before there is a need for evacuation.

Our analysis of the consequences of the inability to mobilize fully under some limited circumstances leads us to reject Suffolk County's concerns about the delaying effects of traffic at specific times of day and other contingent possibilities for delay. We also dismiss the County's assertion contained in Contention 27.C that the activities that are planned to take place in staging areas constitute excessive delays in the mobilization of emergency workers. Clearly, workers must be briefed and issued equipment. LILCO's estimate of 15 minutes to issue dosimetry equipment; 15 minutes more to issue job-specific briefings, and 5 to 10 minutes to dispatch workers is reasonable. The Board also finds no evidence in the record that LILCO has planned improperly with regard to special vehicles such as buses, ambulances, tow trucks, and gasoline tank trucks. These vehicles have everyday uses, and there is no requirement in NRC regulations that they be in a state of alert continuously.

The Board finds Suffolk County's assertions in Contention 27 and all of its subparts to be without merit. LERO can mobilize its workers in a timely manner for a broad spectrum of accidents. A specific subset of accident scenarios exists that could progress so rapidly that it would be *difficult or impossible to fully execute a prior mobilization*. The consequence of an inability to mobilize for some fast-breaking accidents is to lengthen the time to evacuate the EPZ somewhat. This is acceptable.

The Board's finding of acceptability for this contention warrants no implication that we would accept excessively long evacuation times under any circumstances or that we would accept a plan that did not provide for substantial assistance to the public in an evacuation. The Board holds LILCO responsible to make a reasonable effort to achieve prompt and expeditious evacuation of the EPZ under all conditions. The Board cannot require what is impossible, however, and we do not do so here. In this contention, we are satisfied that the LILCO Plan to mobilize its emergency forces over a full spectrum of possible accidents is reasonable even though longer-than-normal public evacuation times might be required for the most extreme conditions in that spectrum.

IV.C. Communications (Contentions 28-34 and 24.L)

Contentions 28-34 and 24.L contest the adequacy of LILCO's proposals for communications among emergency response personnel. Inadequacies are alleged regarding LILCO's ability to communicate with federal agencies, its assignment of personnel to communications equipment, its ability to communicate with its own emergency response personnel, the lack of direct communications between emergency response personnel in the field and the EOC, and its ability to communicate with hospi-

tals, ambulance personnel, and dispatch locations. Contention 24.L alleges that there are no agreements with dispatch locations to ensure the availability of ambulances during an emergency.

IV.C.1. Identification of Witnesses

Testimony on behalf of LILCO was given by Dr. Matthew C. Cordaro, Charles A. Daverio, Norman A. Hobbs, Jr., and William F. Renz. Testimony for Suffolk County was given by Kenneth J. Regensburg, Robert A. Snow, and Vincent R. Stile. The FEMA panel presented testimony on these contentions as well. Neither the NRC Staff nor New York State presented testimony on these contentions. Suffolk County did not present direct testimony on Contentions 33 or 24.L, which were litigated separately, although they are grouped with this category of communications contentions for resolution.

IV.C.2. Communications with Federal Agencies (Contention 28)

This contention alleges that LILCO's plan for communicating with FEMA, the Coast Guard, the FAA, and Brookhaven National Laboratory is inadequate.

LILCO's plans for communications with federal response organizations are described in the LILCO Plan (Plan at 3.4-4, Fig. 3.4.1). Commercial telephone lines will serve as the primary communications mechanism with FEMA, the FAA, and the U.S. Coast Guard. Dedicated telephone lines between the EOC and the DOE Brookhaven area office will be utilized. Commercial telephones will serve as backup means of communication for Brookhaven. Backup means of communication for federal agencies will be provided by the federal telecommunications system (FTS) line located at the Shoreham control room. This line can be used to reach the FAA, the U.S. Coast Guard, FEMA, the State of Connecticut, and the DOE Brookhaven area office. The Shoreham control room itself can be reached from the EOC by use of Centrex, commercial telephone, the radiological emergency communication system, and the ESO frequency. LILCO Plan at 3.4-1 to 3.4-7. LILCO will install a marine-band radio in the Hicksville Customer Service Office for additional communication capability with the Coast Guard. Cordaro *et al.*, ff. Tr. 5823, at 7-8.

IV.C.3. Alleged Deficiencies in the Communications System

Suffolk County faults the proposed communications system because of its reliance on commercial telephones for notification of federal agencies. The County believes that there should also be radio and dedicated telephone links to these agencies. It further believes that the FTS is inadequate as a backup system because the FTS line is located in the Shoreham control room rather than the EOC. Regensburg *et al.*, ff. Tr. 6184, at 3-5.

IV.C.4. Board Analysis

LILCO is required to establish a reliable primary and backup means of communications with local and State response organizations. This requirement includes provision for communications as needed with federal emergency response organizations. NUREG-0654, § II.F.1.c. The County concedes that LILCO has established a primary means of communication with federal agencies and a backup system. I.F. 293. It continues to fault the backup system, which is the FTS line located in the Shoreham control room. It would prefer that that line be in the EOC. However, multiple means of communication between the EOC and the Shoreham control room exist. The Board therefore sees no reason why federal agencies could not be notified promptly in the event of an emergency at Shoreham.

IV.C.5. Conclusion (Contention 28)

The Board finds that the LILCO Plan contains a primary and a backup means of communications with federal agencies as required by NRC guidance. LILCO's proposed use of an FTS line in the Shoreham control room as a backup means of communication is acceptable. This contention is without merit.

IV.C.6. Communication Personnel and Repairs (Contention 29)

This contention asserts that the LILCO Plan does not specify the number of emergency personnel who will be assigned responsibility for staffing communications equipment at the EOC staging areas, transfer points, ambulance dispatch stations, or other communications posts. Further, there is no provision in the Plan for trained repair technicians capable of keeping communications equipment operational.

IV.C.7. Number of Communicators

The LILCO Transition Plan (Rev. 3) shows that there are twelve persons designated as communicators. LILCO has committed to adding two more communicators to its Plan in subsequent revisions. Therefore there are now fourteen positions in LERO that are designated as communicators. About 195 other persons, such as traffic guides, transfer point coordinators, and staging area support personnel, will use communications equipment as part of their assignment. Cordaro *et al.*, ff. Tr. 5823, at 9-11, Attach. 1. The experience obtained from drills involving the activation of the EOC and various staging areas has confirmed that the number of personnel designated to fill the communicator roles is adequate. *Id.* at 11.

IV.C.8. Plans for Repair Technicians

The LILCO Plan does not contain a reference to communications repair technicians since no regulation or guideline requires that in an off-site plan. NRC standards simply require that adequate communications equipment be provided and maintained. *Id.* at 11-12; Tr. 12,539-40 (Keller); Tr. 12,541 (Kowieski). The Plan provides for the availability and maintenance of communications equipment. LILCO Plan at 2.1-1, 3.4-1; Fig. 4.1.2. The good working order of communications equipment is ensured by periodic testing. Malfunctioning equipment discovered during tests is repaired and maintained by qualified radio technicians from the LILCO Electric Systems Operations Department. In an emergency the lead communicator will call two communications technicians if the EOC is activated. LILCO has eight communications technicians in its Electrical Systems Operations Department who are familiar with the radio equipment used by LERO. If radios at an ambulance dispatch station or staging area were to malfunction during an emergency, they will be replaced with others rather than attempting repair. Cordaro *et al.*, ff. Tr. 5823, at 11-13, Attach. 2.

IV.C.9. Conclusion (Contention 29)

The Board finds Suffolk County's concerns about the number of assigned communicators at the EOC or staging areas without merit, as are its concerns for repair of radio equipment. LILCO has specified the communicators it will utilize in an emergency and has tested their adequacy through drills. In the face of actual experience, therefore, Suffolk County's concerns that they have not been specifically enumerated somewhere in the Plan are merely academic. LILCO has specified adequate

detail in its Plan to ensure that communications posts will be manned in an emergency. Further, LILCO has demonstrated that it has capability for maintenance and repair of radio equipment. Assurance that LILCO's radio communication system will function in an emergency is not dependent on the emergency services of repair technicians. LILCO will ensure a reliable communication system through periodic testing prior to an emergency and by the use of spare radios which it will use to replace malfunctioning units.

Nevertheless, LILCO will have two repair technicians available in the EOC during an emergency. Suffolk County's concern about their qualifications lacks merit in the face of the job description provided by LILCO that shows LILCO hires qualified technicians to repair its radio equipment. The Board finds LILCO's plan for communicators and technicians adequate.

IV.C.10. Communications, Organization, and Equipment (Contention 30)

This contention alleges that the Plan fails to provide for sufficient and adequate equipment to ensure effective communications among LERO field personnel.

IV.C.11. Equipment

The parties have no dispute concerning the facts relevant to the functioning of LILCO's emergency radio system. The system will use five radio channels; each of LILCO's three staging areas is assigned one channel primarily for use by traffic guides. The remaining two channels will be used by the Transportation Support Coordinator and the Ambulance Coordinator at the EOC to communicate with road crews, evacuation route spotters, and ambulance dispatch stations. Each traffic post will have a mobile radio mounted in an automobile. There will be approximately 160 users within the three staging areas. The three channels providing communications between the staging areas and emergency field personnel have no backup means of communication by radio. I.F. 299, 300.

IV.C.12. Design of the Communications System

Controversy during the hearing raised a fundamental challenge to the design of LILCO's communications system. LILCO has designed a

system that came to be described as an administrative system. An administrative system uses vertical pathways of communications within a management hierarchy rather than lateral communications among field personnel. Tr. 5927-30 (Renz, Cordaro). LILCO believes that this system is well adapted to implement a preplanned emergency response. Cordaro *et al.*, ff. Tr. 5823, at 15; Tr. 5929-30 (Cordaro); Tr. 5934-35, 5940-41 (Hobbs). Contrary to LILCO's view, the County asserts that the communications system must be an operational system that permits emergency personnel in the field to communicate with one another without management involvement. Regensburg *et al.*, ff. Tr. 6184, at 31; Tr. 6211-13, 6243-50 (Snow). Lateral communication among emergency workers in the field is necessary, the County says, because no plan can accurately predict all contingencies, and required traffic control activities are not predictable in advance. Workers in the field should have the means to solve problems among themselves. Accidents, for example, would require communication between a road crew and traffic guides. Under LILCO's system, workers would send messages through the staging area to the EOC where coordinators would make the needed contacts to direct road crews. This would result in tying up an entire radio network just to deal with one problem. Regensburg *et al.*, ff. Tr. 6184, at 31-32. It is also asserted that LILCO traffic guides should also be able to communicate information to other traffic guides without management involvement in order to coordinate traffic control strategy for relieving traffic jams or gridlocks. Tr. 6212-14 (Snow).

IV.C.13. LILCO's Defense of Its Design

The LILCO Plan by design does not prescribe communications among field personnel although such communication is possible on some channels. Cordaro *et al.*, ff. Tr. 5823, at 17; Tr. 5934 (Hobbs). Administrative communications under the LILCO Plan will flow either from the EOC directly to field personnel or between staging areas and field personnel. The Plan anticipates that most communications between staging areas and traffic guides will be at times during the setup or dismantling of traffic guide posts. This involves primarily a role call function. Tr. 5967-68 (Renz). If problems arise during evacuation, the traffic guides will use the mobile radio to report back to their staging area. Cordaro *et al.*, ff. Tr. 5823, at 15-16. Traffic guides need not communicate directly with each other to ensure coordinated information concerning traffic conditions because that information will be assessed at the staging area and directions from staging areas to traffic guides can be given. Personnel at staging areas, in turn, can communicate with the EOC traffic control

point coordinator who will analyze traffic conditions on a large scale and give directions to those at the staging area. *Id.* at 20; Tr. 5936-37 (Hobbs). The LILCO Plan is not designed for *ad hoc* decisionmaking in the field because the needs of a communication system designed for evacuation differ from those of day-to-day operations by a police department or a fire department. Those organizations deal with a broad range of emergencies on an *ad hoc* basis, whereas in the case of emergency planning for Shoreham, the actions that will be taken are narrow in scope and are preplanned. In the former case, person-to-person communication by field workers is appropriate. Since actions to be taken in the nuclear emergency situation are preplanned, however, the need for information to flow from the field to the control organizations and back down again is predominant over the need for workers to solve problems on their own. Additionally, the overall need for communication during the actual preplanned evacuation is limited. Tr. 5970 (Renz).

IV.C.14. County Concerns About Problems with Implementation

Suffolk County is also concerned that LILCO's radio communications system will be unworkable because of the number of users per channel, the lack of backup channels, limited broadcast range, and LILCO's use of mobile radios. Regensburg *et al.*, ff. Tr. 6180, at 13.

Suffolk County police witnesses are well qualified by virtue of training and experience to criticize the design and operation of an emergency communications system. Accordingly we set forth in detail their conceptual and technical basis for opposing LILCO's proposed operation of the communications system. Because of the complexity of the issues we resolve them in one section at the end rather than piecemeal in the following sections. The police witnesses' criticism of the LILCO communications plan is based on their experience in the design and use of communication systems for police use and on their belief that a similar system should be in place for a radiological emergency. Tr. 6216-17 (Snow). The police also ground their criticism on their experience that frequent decisions on traffic flow will be required of control personnel in the field. Tr. 6221 (Snow). The police witnesses believe that the LILCO communication system, particularly with regard to mobile radios, does not rest on methods or training or procedures that are in any way analogous in quality or performance to those used by the police. Therefore, even though mobile radios are reliable in the hands of the police they will not be reliable under the LILCO Plan. Tr. 6291-92 (Snow). Based on years of experience with radio communications the police assert that

radio system failure is a frequent event and that frequent and lengthy lateral communications are necessary to effectively control the flow of traffic. Tr. 6300, 6309 (Snow).

IV.C.15. Control of Radio Channels

The County is concerned that traffic guides in the field will communicate with lead traffic guides who are located at each of three staging areas. Each lead traffic guide would have to communicate with and coordinate fifty or more traffic guides. The traffic guides may have to communicate with each other. This, they say, would overload the radio channels. Additionally, each channel assigned to the staging areas would have to be used by a number of transfer point coordinators as well as staging area coordinators. One radio channel simply cannot accommodate that much radio traffic. Regensburg *et al.*, ff. Tr. 6180, at 16.

Radio systems can be designed with freedom of users to communicate at will, or users can be precluded from using a channel except with permission of the person in control. The County claims that as a practical matter, either way would be unworkable in this case. *Id.* at 17. If the channel remains under the control of the lead traffic guide, it would take about an hour to talk to all the field guides even if each conversation was limited to about 1 minute. Such a system, the police say, is unworkable. *Id.* at 18. However, given that there are fifty traffic guides per channel, the freedom of workers to initiate communications any time they wish would be equally unworkable because the use of a channel by one guide precludes its use by anyone else. In the experience of the police, it is realistic to expect 15 minutes or more of conversation from each traffic guide every hour. With fifty guides it would be impossible to maintain meaningful communications or control of the entire group. The County concludes that LILCO has therefore overloaded the radio channels assigned to the staging area coordinators and traffic guides, and the Plan would be a failure however the radio system is managed. *Id.* at 18-19.

IV.C.16. Nature of Traffic Control Functions

The police witnesses recommend that, for traffic control purposes, each channel should be low power and should have no more than five or six users who would in turn report to supervisors. There should also be a separate channel for use only by supervisors or coordinators. Traffic control requires a great deal of communication to coordinate flow. It may be necessary for a guide having problems to tell officers at adjacent locations to direct traffic elsewhere if traffic conditions dictate. *Id.* at 20.

The use of the system for functions unrelated to traffic control by personnel at staging areas and transfer coordinators also undercuts the effectiveness of communications and adds more users to already overloaded channels. *Id.* at 21. The single channel assigned to road crews and evacuation route spotters would also be overloaded because there will be approximately thirty-five users.

IV.C.17. Monitoring Functions

A trained radio dispatcher can control and monitor two radio channels at a time. A dispatcher is unable, however, to monitor and control three channels because the dispatcher needs to be able to hear everything being said on his or her assigned channels. However, each channel will be separately monitored by a traffic control communicator at the EOC. The Evacuation Coordinator will coordinate the information monitored by those communicators. The Evacuation Coordinator ultimately has to be aware of the communications taking place on four of LILCO's five channels that might be used by approximately 250 workers. Further, each communicator will be monitoring information reported by over fifty users per channel. The communicators would be unable to keep track of communications coming in from so many separate individuals. *Id.* at 24.

IV.C.18. Problems with Radio Use

If two or more persons key their microphones at the same time, effective communications over that radio channel would be impossible. Simultaneous transmitted messages interfere with one another. Tr. 6209-11 (Regensburg, Snow). Training will not prevent these problems from occurring; even with trained experienced police officers, radio communications are sometimes disrupted when two officers key up at the same time on the same channel. An entire channel can be rendered useless if a microphone is placed down on its key and the key remains depressed. This may happen by accident. Regensburg *et al.*, ff. Tr. 6180, at 26-27. Furthermore, even experienced and trained persons sometimes fail to observe radio discipline. People talk too much trying to report everything that is occurring, particularly if they are inexperienced. *Id.* at 27-28. All this reinforces the police view that LILCO's channels are overloaded. Even if LILCO's traffic guides were qualified and experienced, they would not be able to communicate properly with only three channels because that number of channels cannot accommodate the

volume of radio traffic to be expected from personnel performing traffic control functions. *Id.* at 28.

IV.C.19. Backup Channels

There is no backup means of communication for LILCO's proposed emergency radio system with the exception of dedicated phone lines between the EOC and the staging areas. If problems developed on one channel, communications would be impossible for all emergency personnel assigned to that channel. *Id.* at 29. The inability of emergency workers in the field to communicate with other workers on different channels is also a crucial deficiency in the proposed emergency radio system. Traffic guides in adjacent staging areas, for example, would not be able to communicate with one another. *Id.* at 31-32.

IV.C.20. Reliance on Mobile Radios

Communications by mobile radio are only possible if field personnel are in or near their vehicles. Traffic guides who must perform duties outside their vehicles will be without readily available means of communication. Guides posted at an intersection directing traffic might not hear a radio, and even if they did, they would have to leave their posts to get to it. Additionally, mobile radios operate on battery power and the vehicle must be run to keep the battery charged. Since many of the vehicles used by emergency response personnel will be personal automobiles there is no assurance that these cars will have enough fuel to keep them running while emergency workers perform their functions. *Id.* at 32-33.

IV.C.21. Limited Broadcast Range

The terrain in the Shoreham area could create a problem for communications between vehicles. *Id.* at 34. Range could also be a problem because radios will be powered using the vehicle's cigarette lighter socket, which may deliver inadequate wattage. Furthermore, antenna systems may not provide full power to mobile radios because LILCO will use gutter clips or magnetic mounts attached to painted surfaces, which create a poor ground. *Id.* at 34-35.

IV.C.22. Board Analysis

A central question posed by Contention 30 involves the propriety of LILCO's decision to design its emergency radio system as an administra-

tive rather than an operational system. I.F. 301; A.F. 203-204. An administrative system provides for vertical flow of communications in the management hierarchy between field workers and management. An operational system, while providing communications to management, has most of its communications flowing in lateral directions from one field worker to another. At the hearing both parties vigorously pointed out the merits of their preferred system and the defects of their opponents' system. However, both parties may have lost sight of the objectives of emergency planning in the heat of litigation. The Board therefore finds it useful to clarify the broad objectives that must be met before we resolve the technical aspects of the contention.

We note at the outset that we must find reasonable assurance that the public health and safety can be protected through the achievement of dose savings in an emergency. NUREG-0654, at 6. A protective measure that could result in dose savings is to accomplish a successful evacuation of all or part of the EPZ in an emergency in about the time frame that LILCO has said could be done. We judge the communications plan in the light of its effect on that overall goal and not on some independent standard that designers of communication systems might use.

Neither party has been able to show that either administrative communications systems or operational communications systems are inherently defective in concept. Rather, their suitability depends on the goal to be accomplished and the uses anticipated. It is clear to the Board, therefore, that we deal here with a question of margins and not of totalities. Neither system is likely to succeed flawlessly nor to fail totally if it is implemented during an evacuation. The question the County has posed is whether an operational system is marginally better than an administrative system for the purpose of accomplishing an evacuation of all or part of the EPZ, and if so, whether the benefits to public health and safety are significant enough to cause rejection of LILCO's preferred system as being inadequate.

The County proposes the operational system because it affords the flexibility needed for on-the-spot problem-solving without involving higher management. Police officers use such a system to talk to one another about any of a great variety of problems that they encounter and to efficiently devise solutions. The County asserts that the administrative system lacks this flexibility and that if LILCO traffic guides encountered a problem requiring assistance they would have to report it up through a hierarchy of management and receive, in turn, a management assessment and recommended disposition of the problem. The County's position is based on the unquestioned needs of a police department that must sustain a high level of performance in emergency problem-solving

on a continuing basis. There is no basis in the record to dispute the County's factual claims. The Board is convinced that the police's operational communications system is a sophisticated and flexible system. Indeed, for the uses that the County has for such a system, it is technically superior to the one LILCO has proposed. That, however, is not dispositive of the County's complaint, for the acceptability of LILCO's system depends on its adequacy to protect public health and safety in an evacuation and not on whether it is comparatively superior or inferior to another system that is designed for another purpose.

The Board finds that the uses LILCO has for a communications system in an emergency are not the same as those the police officers have in day-to-day operations. The police must stand ready on a continuous basis to deal in an *ad hoc* manner with any of a broad range of possible emergencies. Problem-solving in the field is therefore an advantage in the efficient performance of their duties. LILCO's purpose, on the other hand, is to stand ready to facilitate on a one-time basis an evacuation of all or part of the EPZ that may or may not be required sometime in the indefinite future. We found in our resolution of Contention 65 that traffic guides are only required to facilitate traffic flow at their assigned intersections and to guide traffic in preferred directions. See Board Finding IX.A.14. They have no specific assignment to alleviate traffic jams or traffic gridlock situations or to engage in *ad hoc* problem-solving. Again we refer to Contention 65 wherein we found that evacuation traffic will be congested because of capacity-constrained flow that arises when traffic demand exceeds roadway capacity. *Id.*, IX.A.7. Under those conditions it is unlikely that even skilled police could alleviate traffic jams or traffic delays because congestion arises from causes independent of management in an evacuation. Thus we do not accept that communications undertaken as the County advises would have significant bearing on the control of traffic during an evacuation. LILCO's planning shows a realistic grasp of that fact since its communications system is not intended to aid in a routine problem-solving function. The function LILCO has in mind — primarily to verify setup and dismantling of traffic posts before and after evacuation — is administrative in nature.

The Board agrees with LILCO that the traffic guides should not make decisions on their own initiative to alter traffic flow because evacuation routes are preplanned and that preplanning takes into account inevitable traffic congestion. LILCO's traffic models already yield a near optimum strategy that minimizes overall evacuation time within the EPZ. The Board concludes that traffic guides could not improve overall roadway network evacuation times by making isolated *ad hoc* decisions about

traffic flow. Thus, there should be very little need for frequent communications among guides during an actual evacuation. It is useful for the traffic guides to be in possession of radios during the evacuation simply as a matter of prudence since the kind of messages they may be required to report to management is now unforeseeable. We conclude, however, that a timely evacuation of the EPZ could be accomplished even if there were no communication whatever among traffic guides. That being the case, we find that LILCO's administrative communications system is a useful provision for emergency response, even though there can be little doubt that the broadly versatile system the police advocate is in the final analysis a superior one.

IV.C.23. Need for Communications Among Staging Areas

In view of our finding that successful traffic management is not strongly dependent on communications among field personnel, we also find that the County has not succeeded in showing why communications among field workers in different staging areas would be necessary. We see no reason why communications among staging areas should not be done either at the staging area level or through the EOC. We further reject the County's assertion that traffic guides should be issued even lower power radios than they now have and that communications should take place in hierarchical fashion with field supervisors. This would proliferate the complexity of the system to no good purpose.

IV.C.24. Overloaded Radio Channels

It is undisputed that the number of radio users for each channel will be approximately fifty per staging area. The County postulates a need for each traffic guide to communicate about 15 minutes or more every hour. If that demand level should materialize, it follows without further analysis that the system could not serve fifty users during an evacuation that itself will require 5 to 6 hours. We have already found, however, that the problems posed by evacuation are different from the problems that the police encounter in their normal duties. The evacuation is pre-planned; evacuation traffic will flow in preferential directions; traffic guides have no assignments to disentangle traffic jams. Few decisions are required of traffic guides because there is little that *ad hoc* decision-making could do to improve overall network evacuation time in saturated traffic conditions. We agree with the County that traffic guides on post will not be in a position to transmit communications easily through automobile-mounted mobile radios. That fact works counter to the

County's assertions of overloaded radio channels because the traffic guides constitute the principal user population. Given their assignments, they would have neither opportunity nor need to transmit so frequently as to overload the radio channels.

While we have no cause to doubt the factual assertions of the Suffolk County police regarding the means by which they resolve day-to-day traffic problems, we reject their criticism of LILCO's system because the normal assignments of police and those of LILCO's traffic guides differ so substantially that the police experience is not directly transferable to the evacuation situation. Furthermore, LILCO has had and will in the future have opportunity to perform drills and exercises utilizing its radio communications system and to train users in ordinary radio discipline. The Board concludes that the County concerns about overloaded radio channels are unwarranted. We see no reason why the overall goal of evacuation of all or part of the EPZ would be jeopardized by overloaded radio channels.

Suffolk County listed a host of problems associated with radio systems that could lead to operating difficulties. These include questions about the range of radios, the phenomenon of heterodyning, stuck microphones, and the possibility that vehicle batteries may go dead. There is no dispute that all these things are physically possible, although we have no testimony concerning their likelihood. The possibility seems remote that a radio system that undergoes periodic tests and drills will somehow suffer incapacitating failure from these causes at the precise moment that an emergency evacuation at Shoreham is undertaken. Simultaneous occurrence of those independent events may well pose some small finite risk to public health and safety, but we have no basis in the record for assessing it. Further, the record does not support a conclusion of severe consequences of failure. The overall risk to public health and safety from radio system malfunction is therefore likely to be small. In any event the frequency and consequences of ordinary operating problems with radios would be revealed in drills and would give LILCO an opportunity to remedy whatever defects are found. The County insistence on litigating common day-to-day difficulties with radio systems, in spite of admonition from the Board was speculative and a waste of the Board's and the parties' time. Tr. 5976-6007. Common problems with radios constitute implementing details within the meaning of *Waterford, supra*, that are not subject to litigation.

IV.C.25. Backup Channels for the Radio System (Contention 31)

Contention 31 alleges that LILCO is required by both regulation and guidance to have a backup communication system for field personnel and that the LILCO Plan lacks provisions for backup channels in its emergency radio system.

LILCO's emergency radio communications system will use single-channel radios, and LILCO does not dispute the fact that it has no backup channels. The County enumerated a number of ways in which radio systems could fail as reasons why backup channels were necessary. Weather can knock out a channel; a radio microphone can be keyed open, a radio can lock in the transmit mode; the transmitter can lose power; a repeater system can fail. Communications will become impossible if any of these things happen. I.F. 317. The County concludes without further analysis that because of the serious consequences that would ensue from loss of communication in a single-channel radio system, backup channels should be required for the LILCO system.

The record, however, does not show that serious consequences would ensue from the loss of communications with field workers. LILCO's Plan prescribes no communication among field workers and relatively little between workers and management during an evacuation. The success of public evacuation does not depend on there being communications with traffic guides. *See* Board Findings IV.C.11 through IV.C.25. Further, we find no reference to the necessity for backup communications systems in NUREG-0654, § II.F.1, the guideline on which the County relies. Reliance on that section may well be misplaced since we are unable to find a requirement even for a primary communications system to be used by rank-and-file emergency workers in the field.

The Board concludes that there is no regulatory basis for requiring backup channels for LILCO's emergency radio system. Neither is there technical basis for requiring backup as a condition of licensing, since the ultimate success of evacuation is not critically dependent on communications among emergency workers. The emergency radio system may serve to enhance the effectiveness of LILCO's response to a radiological emergency by adding flexibility to its decisionmaking capability. Its inclusion in the Plan is prudent and potentially useful but no backup system is required.

IV.C.26. Dedicated Telephone Lines

The County's challenge to LILCO's reliance on dedicated telephone lines is based on the possibility of failure. The County concedes that dedicated lines are more reliable than commercial lines because they are

not subject to overload. Regensburg *et al.*, ff. Tr. 6184, at 37. However, they assert that dedicated lines provide no redundancy to commercial lines because they have common failure modes. *Id.* at 37-38. The County burdened the record extensively with lengthy lists of ordinary failure possibilities of dedicated and commercial telephone lines. *Id.* Then, having postulated failure, they point out how long it takes the New York Telephone Company to repair telephone lines even when they have priority service agreements with customers. *Id.* at 38-39.

The Board notes that the full text of Contention 31 does not appear to place any issue related to dedicated phone lines in controversy, although the County submitted testimony on this subject and it was not stricken from the record.

We found the testimony unconvincing and speculative from both sides because we were not supplied with realistic estimates of the risk to public health and safety from failure during an evacuation. All we have before us is a raw list of ways a telephone system can fail. LILCO's answer is that it has provided for priority repair service. More fundamentally, however, the Board cannot even attempt to assess the risk to public health and safety that might exist because of the possibility of failure of dedicated telephone lines at the precise moment that an emergency occurs. Our qualitative conclusion is that public risk from this source is low because telephones and lines are used in daily commerce; those relied on for use in an emergency will be used and checked in drills and exercises; the postulated risk arises from the simultaneous occurrence of independent events. The County's concerns about dedicated telephone lines are too speculative to take seriously with the state of the record now before us.

IV.C.27. Communications Among Field Personnel (Contention 32)

Suffolk County challenges LILCO's plan for communication because it lacks provision for direct communication between field workers and the EOC.

The system as designed prescribes that field personnel will receive their instructions from one of three LILCO staging areas. The staging areas in turn will receive instructions from the EOC. The plan does not prescribe direct communication between field personnel and the EOC. This, the County says, will delay implementation of emergency response actions. The County does not dispute that direct communications between the EOC and transfer point coordinators or traffic guides are possible. They fault the fact that the Plan does not contemplate using this pathway. *Id.* at 41-42. The County's concern is that the information flow

coming from field workers will be delayed because it will have to pass through the staging area communicators before being relayed to the EOC. LILCO's response is simply that the EOC will have no need for all the detailed information that might originate from field workers. Staging areas can assimilate or deal with detail and provide for efficient communications. Cordaro *et al.*, ff. Tr. 5823, at 28-30, Attach. 5; Baldwin *et al.*, ff. Tr. 12,174, at 36.

IV.C.28. Conclusion (Contention 32)

The Plan as it stands gives no clue as to why there would be significant delay in the flow of essential information between field locations and the EOC. The County has not shown us either the magnitude or consequences of delay in the transmission of information. We do not see why the filtering and assimilation of information at the staging area is not useful or why the EOC activities would benefit from an influx of raw data. We have already found in previous contentions that not much information is planned to flow along this pathway. We can hardly find a significant impact on public health and safety during an evacuation on the basis of such speculation. This contention is speculative and without merit.

IV.C.29. DOE-RAP Teams (Contention 33)

Contention 33 asserts that there are no direct communications between the DOE-RAP monitoring teams and the EOC.

IV.C.30. Plans for Communication with DOE-RAP Teams

The facts relevant to this contention are elementary and undisputed. The DOE-RAP teams who collect field radiological data will communicate their findings to the DOE Brookhaven area office where dose assessment functions will be carried out. Communications between the DOE-RAP field teams and the Brookhaven area office will be by multi-channel radio. Tr. 13,959 (Renz). The Brookhaven area office can in turn communicate with the EOC by means of a dedicated phone line or commercial telephone. The FTS line that connects that office to the Shoreham control room provides additional redundancy. Cordaro *et al.*, ff. Tr. 13,948, at 5. Radio communications between the field teams and the dose assessment staff are the means preferred by FEMA. Tr. 14,315-18 (Keller). No major problems are associated with such radio communications in other similar systems. Tr. 14,319 (Kowieski).

IV.C.31. Suffolk County's Alternative System

Suffolk County prefers an alternative system that would require direct communications between the DOE-RAP teams and the EOC. Such a system would result in performing the dose assessment functions in the EOC in addition to or instead of the DOE Brookhaven area office. The County's reasons for this are based on the undisputed importance of the information and the possibility for unnecessary delay and error that might be introduced into the process using the communications pathway contained in the LILCO Plan. I.F. 331.

IV.C.32. Conclusion (Contention 33)

The guidance of NUREG-0654 prescribes only that there should be provision for communication to a nuclear facility from radiological monitoring teams. NUREG-0654, § II.1.D. No party in this case disputes that such provision has been made. On its face, therefore, LILCO's Plan complies with the NRC guidance, as LILCO and FEMA assert. I.F. 330. The County urges us to accept what is in its view a marginally better alternative to the one that LILCO and DOE have chosen. DOE itself has indicated its preference for conducting its operations in the Brookhaven area office rather than the EOC (I.F. 328) and no one has asserted that communications cannot be accomplished by the pathways chosen.

The Board concludes that it is not obligated to strike a fine-tuned balance among alternative plans by selecting some theoretically optimum procedure. In this case, however, Suffolk County has not demonstrated that its preference is in fact superior. Radiological data must first be gathered in the field, then digested by an assessment function, and then transmitted to the EOC. The County has given no reason for believing that the mechanics of communication would be the rate-limiting step in this overall process. Gathering data and assessing it would clearly take more time than simply transmitting it. Neither has the County given reasons why it is better to do initial dose assessment in the EOC in addition to or instead of Brookhaven's own offices other than speculation about possible delay and error in communication. Suffolk County's preference for an alternative pathway of communications is simply a different possible way of doing the same functions that LILCO proposes with no clearly superior benefit to public health and safety. Contention 33 is without merit.

IV.C.33. Medical Support Facilities (Contention 34)

This contention alleges that there will be inadequate communication among response personnel because the Plan relies upon existing communication links in hospitals, private ambulance companies, and vehicles.

IV.C.34. Plans for Communication with Medical Facilities

There exists no factual dispute among the parties regarding the pathways or means of communications between LILCO facilities and hospitals, ambulance companies, and ambulances. LILCO will communicate with hospitals by commercial telephone. I.F. 333. Ambulances will communicate with dispatch stations by radio as will the EOC. I.F. 334. Once ambulances have been dispatched by the private dispatchers they will report to one of the three staging areas. Thereafter they will be dispatched by LILCO. LILCO cannot communicate directly by radio with ambulances when they are on the road. When an ambulance completes its assigned mission, the driver must either return to the staging area for new instructions or receive instructions relayed through the private dispatcher. Tr. 6553-54 (Cordaro).

IV.C.35. Conclusion (Contention 34)

LILCO is required to demonstrate in its Plan that “a coordinated communication link for fixed and mobile medical support facilities exists.” NUREG-0654, § II.F.2. LILCO has demonstrated that it has the ability to communicate with hospitals, ambulance companies, and vehicles. Coordinated communication links will be accomplished by combining telephone and radio links between the EOC and fixed and mobile medical support facilities. The existing communication systems relied on in the LILCO Plan are used routinely on a daily basis, and there is no reason to conclude that they will not function during an emergency. FEMA testified that it was a common and accepted practice to configure a coordinated communications link in this manner. Baldwin *et al.*, ff. Tr. 12,174, at 39-40. Contention 34 is without merit.

IV.C.36. Dispatch Locations (Contention 24.L)

Intervenors allege that LILCO has no agreement with dispatch locations to relay communications between the EOC and emergency response personnel expected to drive ambulances and ambulettes during an emergency. The dispatch locations referred to are those at each of the ambulance companies who have contracted with LILCO. Cordaro *et al.*,

ff. Tr. 6457, Vol. II, at 20-21. The County does not contest that LILCO has letters of agreement with eleven ambulance companies. I.F. 334 n.200. The dispatchers covered in the contracts are employed by each ambulance company and are available 24 hours a day as provided for in the contract. Cordaro *et al.*, ff. Tr. 6457, Vol. II, Attach. 13-21.C, at 6-7; Tr. 6429, 6534-35 (Robinson). If the ambulance company does not have the communications equipment to accommodate LILCO during an emergency, the contracts show that LILCO will provide the ambulance companies with the required equipment at the contractor's designated facility. The contracts provide for dispatch operators to work under LERO's direction from the EOC.

IV.C.37. Conclusion (Contention 24.L)

There is no basis in NRC regulation or guidance for requiring letters of agreement to be executed between LILCO and particular individuals. The letters of agreement that LILCO has with ambulance companies provide adequate assurance that dispatch locations will be available in an emergency. Contention 24.L is without merit.

V. TRAINING (CONTENTIONS 24.S, 39-41, 44, AND 98-100)

Contentions 24.S, 39-41, 44, and 98-100 contest the adequacy of LILCO's training program. The contentions raise concerns regarding LILCO's provisions for training non-LILCO personnel (Contentions 24.S and 98); assert that LILCO's training program, including classroom sessions, drills, and exercises, cannot compensate for the lack of experience of LILCO's personnel (Contentions 40, 44.E, 44.F, 99 and 100) or provide proper instruction for them in the use of emergency equipment (Contentions 41 and 44.D); and question the adequacy of LILCO's proposal for dealing with attrition (Contention 39). In addition, Suffolk County cites particular problems with communications, fatigue, and stress and the lack of mandatory training for non-LILCO emergency workers.

V.1. Identification of Witnesses

LILCO presented the testimony of Dr. Harry N. Babb, Gary J. Berger, Dr. Matthew C. Cordaro, Charles A. Daverio, Dr. Dennis S. Mileti, William F. Renz, and Ronald A. Varley. Philip A. Lichtenfels testified on rebuttal for LILCO. Suffolk County presented the testimony of Peter F.

Cosgrove, John L. Fakler, and Michael Lipsky. FEMA presented the testimony of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

V.2. Definitions

Although the terms “drill” and “exercise” are frequently interchanged (Tr. 11,296 (Varley)), there is general agreement among the witnesses for all parties that a drill is a supervised instructional period or teaching session, whereas an exercise is a testing or evaluation session. Tr. 11,194 (Varley); Tr. 13,134 (Cosgrove); Tr. 14,543 (Kowieski). Likewise, the terms “controller” and “observer” are sometimes loosely defined. However, a controller is responsible for interceding in a drill or exercise, whereas an observer merely witnesses the performance of individuals or groups. Tr. 11,197 (Varley). Under the LILCO Plan, a “module” ordinarily consists of a video tape presentation and a workbook. Tr. 11,195 (Varley). A training “session” may consist of several modules. Tr. 11,196 (Varley). In a “tabletop” session, an instructor presents an accident situation, the individuals indicate what they believe to be the appropriate responsive procedures, and there is a group discussion about the procedures and how the group will work together to accomplish a particular step. Tr. 11,721 (Varley). The Board finds that Suffolk County’s attempt to draw a distinction between the terms “trainer” and “educator” (Tr. 11,148 (Babb); Tr. 11,152 (Berger); Tr. 13,097 (Fakler)), is irrelevant for resolving these training contentions.

V.3. Structure of Training

The LERO training program begins with classroom presentations through video tapes and workbook exercises. Babb *et al.*, ff. Tr. 11,140, at 13. Thereafter, drills and exercises are employed. *Id.* Finally, controllers and observers critique the performances during drills and exercises. *Id.* The first segment of the classroom training covers a broad overview of LERO and emergency response. The second segment focuses on specific individual job responsibilities. *Id.* at 12-14. Special field training beyond video tapes and workbooks is presented to bus drivers and traffic guides. Tr. 11,932 (Daverio). The culmination of the entire training program and the ultimate test to determine mastery of skills occur during the FEMA graded exercise. Tr. 11,221 (Berger).

V.4. Classroom Training

In the classroom sessions, the instructors ensure that the trainees watch the video tape, review the material and workbook, and complete the exercise at the end of the workbook. The instructor is available to answer questions and, upon the completion of the workbook exercise, to review the material. Babb *et al.*, ff. Tr. 11,140, at 16-17. If a question is asked which the instructor cannot answer, the instructor has a telephone number to call for the answer. Tr. 11,264 (Varley). During the initial training period, ten to fifteen such calls per week were received from instructors. Tr. 11,266 (Varley). Impell Corporation Project Engineer Dennis Behr determined that each instructor had reviewed the workbook, video tape, and procedures before going to the classroom, and he quizzed each about the applicable lesson plan. Tr. 11,895-96 (Varley). The primary instructional vehicle in the LERO program is the video tape presentation. Tr. 11,263 (Berger). The instructors reviewed each answer in the workbook exercises to ascertain that it was correctly answered. Tr. 11,310 (Varley). These video tapes, scripts, and workbooks were prepared and reviewed by experienced educators. Babb *et al.*, ff. Tr. 11,140, at 20, 87-90; Tr. 11,902-03 (Varley). LILCO does not dispute the County's assertion that its instructors do not have extensive expertise about the subject matter or previous classroom teaching experience. Rather, LILCO asserts that since the video tapes and workbooks are the primary instructional tools for the classroom portion of the training, such expertise about the subject matter and prior teaching experience are unnecessary. A.F. 291. On the other hand, the Suffolk County police officers assert that to teach a job effectively, an instructor must be able to draw examples of relevant job actions from personal experience. Cosgrove *et al.*, ff. Tr. 13,083, at 38-39. FEMA agrees that the Plan does not address the qualifications of training instructors, but states that the quality of instruction will be determined according to the ability of emergency response personnel to perform their jobs at a FEMA graded exercise. Baldwin *et al.*, ff. Tr. 14,151, at 109. The Board finds it most difficult to resolve the difference in methodology articulated by the opposing sides in this matter. Each side has authority and experience to support its view. The fundamental difference in training methodology between the police and LILCO is based on the fact that the Suffolk County Police Department teaches police officers broadly conceived response techniques, but the specifics must be developed at the scene (Tr. 13,090-93 (Cosgrove)) whereas LERO personnel are trained to implement a narrow, detailed, preplanned emergency response function. Although the Suffolk County Police Department view is undoubtedly preferred for the training of police officers, the Board is unable to conclude

that the video tape/workbook training program of LILCO is so defective and deficient that the Board can, in advance of any test, hold that it is an inadequate training vehicle. LERO traffic guides need not be proficient in police work or even in all aspects of traffic control; their job is to guide traffic through intersections onto the designated route. Accordingly, the Board finds that the Plan and training program appear to contain adequate information to enable personnel to carry out their emergency response functions.

V.5. Selection of LERO Workers and Job-Related Experience

Various LILCO employees volunteered to serve as emergency workers in LERO. There were no minimum qualifications for LERO personnel. Anyone could volunteer. Tr. 13,275 (Cosgrove). Less than half of LILCO's LERO workers have job skills at LILCO that match the skills required in their LERO jobs. Tr. 11,490 (Daverio). Those LILCO employees who have job-related experience perform LERO jobs such as bus driver, notification personnel, road crew, transfer point coordinator, and bus dispatcher. Tr. 11,490-91 (Daverio). Traffic guides are the principal workers who do not possess job-related experience. The Board finds that LERO workers at Shoreham have not been prescreened for their jobs and that significantly more than half of them need training in skills with which they have no prior experience.

V.6. Attrition from LERO

In early 1984, LILCO announced an austerity program that resulted in 166 workers leaving LERO between March 6 and May 23, 1984. Tr. 11,435 (Daverio). In July 1984, LILCO experienced a strike by its union workers that resulted in another 106 "apparent strike-related resignations" from LERO. LILCO's Answer to Motion of Suffolk County to Admit New Contention, of August 27, 1984, at 4, corrected by Letter to Board from LILCO counsel, Donald P. Irwin, September 7, 1984. Thus, the departure of 272 trained LERO workers out of a total of approximately 1800 LERO workers as a result of these two events has had a significant impact on LILCO's ability to implement its Plan. This is particularly true in light of the Board's finding, *supra*, that LERO workers at Shoreham require significantly more training than workers at other nuclear plants who will be performing emergency work more closely related to their experience and skills. The 15% attrition due to the austerity program and strike of 1984 is significantly higher than the 5% attrition from LERO in 1982 and 1983. Tr. 11,438 (Daverio). However, 124

new LERO personnel had been trained by July 1984. Tr. 11,436 (Daverio).

LILCO asserts that it will have an adequate number of trained personnel available to respond to any emergency situation because of the following: (1) annual retraining of LERO personnel, (2) recruitment and training of new personnel, and (3) overstaffing. Babb *et al.*, ff. Tr. 11,140, at 27. For LERO jobs that are expected to be completed during one 8-hour shift, the Plan calls for overstaffing at 150%. This means having three people trained for every two LERO jobs. Tr. 11,446, 11,449 (Daverio); Babb *et al.*, ff. Tr. 11,140, at 29-30. The Federal Emergency Management Agency-Regional Assistance Committee (FEMA-RAC) review found that the LILCO Plan adequately assured the training of appropriate individuals. Baldwin *et al.*, ff. Tr. 14,151, at 102. The Chairman of FEMA-RAC testified that the LERO attrition rate was irrelevant because what matters is that at any given time 50% more workers than required by the Plan will be trained. Tr. 14,415 (Kowieski). However, even before the attrition attributable to the strike in July, LERO had a shortfall in trained workers from the full staffing goal. Tr. 11,436 (Daverio). The Board agrees with FEMA that its ultimate concern in the training area is the implementability of the Plan, and that factor will be evaluated at the time of the FEMA exercise. Tr. 11,433 (McIntire). The Board finds that LILCO has made satisfactory progress in its efforts to replace the 166 LERO workers who left as a result of the austerity program. The record is silent on LILCO's ability to replace the workers who departed in connection with the strike. However, the Board finds that FEMA will determine whether there is an adequate number of trained LERO workers during its graded exercise.

LILCO's overstaffing at 150% of jobs that involve only the one-time evacuation of the 10-mile EPZ, and three full shifts for the 24-hour-a-day jobs, will assure an adequate number of trained LERO workers during an emergency. Babb *et al.*, ff. Tr. 11,140, at 28; Tr. 14,408-09 (Keller). With regard to non-LILCO support organizations, the Board agrees with FEMA and LILCO that the letters of agreement with organizations such as the U.S. Coast Guard and ambulance companies establish a commitment by these non-LILCO support organizations to provide adequate numbers of trained personnel. Tr. 11,471 (Daverio); Tr. 6567 (Robinson); Baldwin *et al.*, ff. Tr. 14,151, at 103; Tr. 14,447 (McIntire). The quarterly classroom training sessions assure the availability of training for replacement members of LERO. A new LERO worker will be able to complete the classroom training within 6 months. Babb *et al.*, ff. Tr. 11,140, at 31-33.

In conclusion, the Board finds that LILCO experienced a high attrition rate from LERO in 1984 and that LILCO employees who are LERO workers require a substantial amount of training to compensate for the absence of on-the-job emergency worker skills. Nevertheless, the Board finds that the FEMA graded exercise will determine whether there is an adequate number of trained LERO workers. We further find that LILCO has an adequate plan in all other respects to compensate for attrition from LERO. LILCO employees are not required to participate in LERO, and only a fraction of LILCO employees are members of LERO. *Id.* at 27. Accordingly, the Board finds no reason to compel LILCO to require successful completion of LERO training as a prerequisite to employment by LILCO.

V.7. Complexity of LERO Jobs

LILCO asserts, and FEMA agrees, that LERO workers will be able to perform their jobs because most of these duties are not complex and do not require regular practice. *Id.* at 39-40; Tr. 14,458 (Keller, McIntire). Suffolk County contends that most of the emergency response jobs assigned to LILCO personnel cannot be performed properly without extensive experience. Cosgrove *et al.*, ff. Tr. 13,083, at 17. For purposes of this discussion, the Board is excluding the top management or command and control jobs and the position of Radiation Health Coordinator. *See* Tr. 14,459 (McIntire). One of the most common LERO jobs is the traffic guide. Suffolk County Police Department Lt. Fakler testified that up to a point the training of traffic guides was "beautiful." Tr. 13,201 (Fakler). At another time he opined that the training of the traffic guides was two-thirds complete. Tr. 13,347 (Fakler). He conceded that Dr. Babb's qualifications were excellent. Tr. 13,349 (Fakler). Finally, he admitted that both traffic guides and bus drivers receive some training but said that there is not enough training and that it does not take place under realistic conditions. Tr. 13,364 (Fakler). The training program for traffic guides includes, in addition to the classroom training, 8 hours of training in the field during daylight and darkness. Tr. 11,998 (Babb). Dr. Babb believes that the training given to LILCO traffic guides renders them as prepared as police officers to direct traffic in the event of an emergency at Shoreham. Tr. 11,999 (Babb).

It is unnecessary for the Board to decide the relative qualifications of police and LERO workers. Suffice it to say that the Board finds that the preponderance of the evidence establishes that the job of traffic guide is not so complex that it cannot be learned within the time allocated in Dr.

Babb's training program. The Board finds no substantial evidence in support of the Suffolk County claim that the jobs cannot be performed properly without extensive experience. The Board finds an even stronger case for LILCO in connection with LERO bus drivers. These bus drivers must satisfactorily pass a New York State examination that includes driving a bus. Tr. 11,230 (Daverio). Moreover, these bus drivers were selected because they operate heavy equipment in their regular LILCO jobs. Tr. 12,034 (Daverio). Thus, the Board finds that the regular licensing and relicensing procedures for New York bus drivers, coupled with their experience in operating heavy equipment, establish that the LERO job of bus driver is not so complex as to require training or experience beyond that called for in the Plan. In conclusion, Intervenors have not established that any LERO jobs are so complex that they require training or experience beyond that called for in the Plan.

V.8. Fatigue and Stress

Deputy Inspector Cosgrove testified that emergency workers perform their duties under great pressure and anxiety which may lead to lower job performance or even to flight. Cosgrove, ff. Tr. 13,083, at 20. On the other hand, Dr. Mileti testified that stress would enhance job performance in an emergency. Tr. 11,603 (Mileti). Mr. Berger testified that there is no reported instance where stress has been shown to detract from job performance during an actual emergency. Tr. 11,627 (Berger). Dr. Babb testified that stress would not incapacitate LERO workers when their services were needed. Tr. 11,628 (Babb). Suffolk County made only oblique references to anxiety in its proposed findings. The Board finds that LILCO's witnesses are more qualified and persuasive on the issue of stress and fatigue than the Suffolk County witness. Accordingly, the Board agrees with LILCO that stress and fatigue will not adversely affect the LERO emergency workers' overall job performance.

V.9. Communications Training

Intervenors criticized the communications training under the LILCO Plan because of the following deficiencies: insufficient instruction and practice and failure to permit trainees to operate radios during drills and exercises. Cosgrove *et al.*, ff. Tr. 13,083, at 71-78. In the communications area, LILCO admitted the following: there have been isolated problems with radios (Tr. 11,576 (Varley)), there has been failure to use standard terminology (Tr. 11,577 (Varley)), there has been horseplay over the radio (Tr. 11,578 (Varley)), and there have been problems in drills with communications and radio equipment (Tr. 11,772 (Renz)).

Despite these comments, there was no impairment of the ability of the group to function or to accomplish its objective. Tr. 11,576-77 (Varley).

V.10. Communications Equipment

Traffic guides and other LERO workers are trained in the use of mobile radios. Babb *et al.*, ff. Tr. 11,140, at 61. To simplify the use of this equipment, LILCO has provided for communications training consisting of two classroom lectures and video tape presentations, a workbook section, questions and answers with an instructor, and drills and exercises that require the use of communications equipment. *Id.* at 59-61. All personnel who are required to operate radios are given the opportunity to practice these skills during drills. Tr. 11,397 (Berger). Radio discipline can be learned during training. Tr. 14,487 (Keller). It is not necessary to train each LERO worker who has access to a mobile radio on the range of coverage for each available frequency. Tr. 14,484 (Keller). The Board rejects as unsupported opinion, the Intervenor's testimony that LILCO's training does not provide enough use of the radio to minimize anxiety of the users. Tr. 13,406 (Cosgrove).

V.11. Communications Drills and Exercises

As noted, there has been criticism of several aspects of LILCO's communications drills and exercises. *See* § V.9, *supra*. However, LILCO has demonstrated that it has considered the criticism and taken steps to eliminate these problems. Tr. 11,961-64 (Daverio). It is the purpose of drills and exercises to identify problems and shortcomings in the Plan as well as to train the workers. In fact, LILCO has responded promptly and correctly to the deficiencies noted. The Board sees nothing in the evidence that establishes a significant defect in LILCO's communications drills and exercises.

V.12. Free Play for Decisionmaking

"Free play for decisionmaking" describes an instructional method used in an exercise where the participants collect, analyze, and diagnose accident symptoms and develop response action decisions. Babb *et al.*, ff. Tr. 11,140, at 69. Contention 44.E asserts that the Plan fails to describe how "free play for decisionmaking" will be carried out during drills and exercises. Suffolk County police officers testified that the Plan was deficient in connection with "handling surprises." Cosgrove *et al.*,

ff. Tr. 13,083 at 63-64. The police officers recounted role-playing episodes during police training. *Id.* The Plan provides for "scenario initiating events which allow for participant discretion and decisionmaking." OPIP 5.2.2. Moreover, drill participants are not informed of the time frames or accident scenario before the drill. Babb *et al.*, ff. Tr. 11,140, at 71-72. "Substitutions" present participants with additional problems or distractions of the type that are likely to occur in an actual emergency. *Id.* at 42. Free play for decisionmaking extends down to route alert drivers but is not included in nondecisionmaking jobs such as traffic guides, route spotters, and road crew members. Tr. 11,797-99 (Daverio). During the FEMA graded exercise, free play for decisionmaking is built into the scenario. Tr. 14,492 (Kowieski). The Board finds that the Plan adequately addresses the NUREG-0654, § II.N.3 requirement for free play for decisionmaking. The Board also finds that the LILCO drill and exercise scenarios allow for implementation of such free play for decisionmaking.

V.13. Drills and Exercises, Critiques

During drills and exercises, controllers and observers prepared written critiques. Babb *et al.*, ff. Tr. 11,140, at 72-73. Following the drills and exercises, Impell Corporation prepared a summary critique of the drill or exercise. SC Exhs. 63, 64, ff. Tr. 11,557. The Impell Corporation summary of critiques noted the following problems: (1) key people at the staging areas were not drilled, (2) vehicles were not available, (3) the number of available dosimeters was insufficient, (4) personnel appeared lackadaisical, and (5) many problems were not corrected from earlier exercises. Tr. 11,504-08 (Varley). Suffolk County Police Officers Cosgrove and Fakler reviewed individual critiques of the drills and submitted supplemental testimony. Cosgrove *et al.* (Supp.), ff. Tr. 13,083. On the basis of their review of these critiques, the police officers asserted that the following problems were identified: (1) insufficient and inadequate briefing, (2) poor radio and communications protocol and techniques, (3) inadequate and insufficient equipment, (4) monitoring and decontamination deficiencies, (5) inadequate checking of dosimetry equipment, and (6) inadequate briefing and staffing of observers and controllers. *Id.* at 3-19. LILCO countered this testimony by presenting oral rebuttal testimony of Mr. Lichtenfels. Tr. 13,465 (Lichtenfels). Mr. Lichtenfels testified that patterns could not be established by an analysis of the narrative comments alone and that the conclusions reached by the police officers were not supported by the methodology used in analyzing the data base. Tr. 13,478, 13,514 (Lichtenfels). The police officers

conceded that they did not attempt any quantitative statistical analysis of the critiques. Tr. 13,231 (Cosgrove). They admitted that they were not looking for positive comments but rather for things that needed fixing. Tr. 15,244 (Cosgrove). They used no numerical or quantitative system to establish what was and what was not a pattern. Tr. 13,259 (Cosgrove). Although Professor Lipsky did not personally analyze the critiques, he consulted with the police officers and advised them to find patterns consistent with their earlier tentative hypotheses. Tr. 13,427 (Lipsky). However, Officer Cosgrove later testified that he had not developed any hypotheses at the time he examined the critiques. Tr. 13,547 (Cosgrove). The Board finds that both Impell Corporation and the police officers identified problems in the drills. However, the Board finds that such identification of problems is to be expected and encouraged. We also find that LILCO has established a control system to ensure that critical comments are considered and resolved. Tr. 5686 (Weismantle). On the basis of experience at drills and exercises, LILCO determined that additional workers were needed in the following positions: lead traffic guide, staging area administrative staff, and transfer point coordinator. Tr. 11,711-12 (Daverio). Other suggestions were rejected or are being studied. *Id.* No evidence has been produced to dispute the Plan's provision for semiannual training, drills and exercises. Specifically, the Board rejects, as unsupported, the Intervenor's claims that this training should be offered quarterly. I.F. 387. Likewise, since drills and exercises may not affect the public, the Board finds no support for Intervenor's assertion that the drills and exercises pursuant to the LILCO Plan are defective because they lack realism. I.F. 367, 373. Finally, the Board agrees with LILCO that many of the deficiencies identified in the early drills have been corrected. Tr. 5687-90, 5701, 5710-12 (Weismantle); Tr. 5871-72 (Renz); Tr. 5880-82 (Daverio); Tr. 5966-67 (Daverio); Tr. 7973-75 (Varley).

V.14. Training Non-LILCO Personnel

LILCO relies on certain non-LILCO organizations to provide services in the event of an emergency at Shoreham. The personnel of these support organizations, which include ambulance companies, the U.S. Coast Guard, DOE, Impell Corporation, Island Helicopter, and American Red Cross, will receive training. Other organizations, such as schools, hospitals, nursing homes, and special facilities, which may be called on during an incident at Shoreham, are not deemed by LILCO to be support organizations but will be offered training and information sessions annually. Cosgrove, ff. Tr. 13,083 at 3; Babb *et al.*, ff. Tr. 11,140, at 4-5, 78-82;

LILCO Plan at 5.1-6. Intervenors claim that LILCO has not trained the personnel of many of the support organizations and has no plans to train the staff of schools and other special facilities. I.F. 340. Personnel from the U.S. Coast Guard, ambulance companies, and the helicopter company have received or will receive classroom training and will participate in LERO exercises. Babb *et al.*, ff. Tr. 11,140, at 26, 84-86. Ambulance companies are required to provide trained personnel under their contracts with LILCO. Tr. 6567 (Robinson). The Coast Guard's letter of agreement with LILCO provides that it will notify people on the Long Island Sound by marine-band radio and direct contact and will provide vessels for radiation monitoring. LILCO Plan, Appendix B. The Coast Guard requires no training from LILCO on its notification activities because these activities are part of its normal duties. Tr. 12,044-45 (Varley). The Coast Guard training concerning radiation is complete, and that of the ambulance companies is under way. Tr. 11,415 (Daverio). Personnel from the American Red Cross are trained by the Red Cross and are experienced in setting up relocation centers for disasters. Babb *et al.*, ff. Tr. 11,140, at 85. There is no reason to require Red Cross personnel to receive training about radiation because monitoring and decontamination facilities at Red Cross relocation centers will be staffed by other trained LERO personnel. *Id.* at 86. The Board finds nothing to support Deputy Inspector Cosgrove's opinion that the Red Cross needs training about where it fits into the LERO organization. Tr. 13,382 (Cosgrove). Since DOE teams are trained to respond to radiological accidents and to provide dose assessment during such emergencies, DOE personnel do not require Shoreham-specific training. Babb *et al.*, ff. Tr. 11,140, at 86. However, both the Red Cross and DOE-RAP teams will be invited to participate in LERO drills and will participate in the FEMA graded exercise. *Id.* at 26. In fact, DOE personnel have already participated in a tabletop exercise and observed at a drill; Red Cross personnel have been observers at a drill. Tr. 11,416-17 (Daverio). FEMA determined that the letters of agreement with non-LILCO organizations obligated such entities to maintain adequate numbers of trained personnel. Tr. 14,446 (Keller, Baldwin).

Regarding other organizations, such as schools, hospitals, and nursing homes, the Plan offers, but does not compel, training. LILCO Plan at 5.1-6. Mr. Keller testified, on behalf of FEMA, that he would be happier if the schools inside the 10-mile EPZ availed themselves of the opportunity to undergo training, but there was no mechanism available to require them to do so. Tr. 14,442 (Keller). In any event, LILCO will train key school personnel to know what to do when a protective action is ordered. Tr. 11,854 (Cordaro, Mileti). However, Mr. Keller testified that,

in his opinion, the schools could shelter students, evacuate students, and conduct an early dismissal without any training. Tr. 14,443-44 (Keller). The same reasoning applies to hospitals, nursing homes, and other special facilities; it is sufficient for LILCO to offer the training because there is no requirement for such organizations to accept such an offer. Moreover, Intervenors have failed to establish any need for such mandatory training. In conclusion, the Board finds that the Plan's provisions for training non-LILCO personnel are adequate.

V.15. FEMA Spot-Check of LILCO Training

Approximately 3 weeks before FEMA presented testimony concerning the LILCO training program, Mr. Keller conducted a spot-check of LILCO's training documents. Tr. 14,374 (Keller). He reviewed various workbooks, answer sheets, and attendance logs. Tr. 14,378 (Keller). The spot-check was conducted to fortify the FEMA testimony and to record the training materials and the degree of training accomplished. Tr. 14,379 (Keller). In no case did Mr. Keller find that a trainee who had missed a training session failed to make it up later. Tr. 14,399 (Keller). On the basis of this spot-check, FEMA concluded that the LILCO training paperwork was in order and that LILCO had done what the Plan said it would do. Tr. 14,403 (Keller).

V.16. Traffic Guides' Training

Traffic guides were given special training beyond video tapes and workbooks. Tr. 11,932 (Daverio). Dr. Babb, assisted by former Suffolk County Police Department Sergeant Noel Borden, provided each traffic guide with additional field training as follows: 5 hours in the daylight and 3 hours during darkness. Tr. 11,997-98 (Babb). Emergency conditions were simulated during this training. Tr. 12,001 (Babb). In the event a traffic guide is approached by a motorist, the guide has been trained to direct that motorist to pull over and to respond at the earliest opportunity. Tr. 11,947 (Babb). During the traffic guide training sessions, the performance of each guide is individually evaluated. Tr. 11,230 (Daverio). Dr. Babb testified that it was his opinion that a traffic guide who had completed all of the LILCO training would be as prepared as a police officer to direct traffic in the event of an emergency at Shoreham. Tr. 11,998-99 (Babb). Suffolk County Police Department Lt. Fakler testified that the LILCO training of traffic guides was insufficient, inadequate, and unrealistic. Tr. 13,347-64 (Fakler). The Board is impressed with LILCO's efforts through Dr. Babb in training its traffic

guides. We also find that the job of traffic guide is not complex. Although the training offered would not be sufficient for a police officer, the Board finds that it is adequate for the limited responsibility delegated to traffic guides.

V.17. Bus Drivers

Bus drivers were given special training beyond video tapes and workbooks. Tr. 11,932 (Daverio). As a result of criticism by bus drivers, new maps were prepared and received favorably by the drivers. Tr. 12,026 (Varley). Every bus driver must successfully complete New York State licensing through the Class 2 level. Tr. 11,230 (Daverio). Each bus driver is accompanied by a State inspector during the test. Tr. 11,231 (Daverio). Bus drivers must actually operate a bus to pass the State examination. Tr. 11,233 (Renz). Although bus drivers are not accompanied to their posts at every drill, this is unnecessary because the important functional aspects of the response are evaluated by observers. *Babb et al.*, ff. Tr. 11,140, at 104; Tr. 14,541 (Keller). The Board finds that the successful completion of New York State licensing and relicensing provides bus drivers the skills and experience necessary to drive a bus in the event of an emergency at Shoreham.

V.18. Conclusion

The Board finds that contrary to the allegations contained in Contentions 24.S, 39-41, 44 and 98-100, the LILCO Plan training program meets the regulatory standards. This conclusion is made subject to confirmation by a finding, to be made by FEMA after a graded exercise, that the Plan can be satisfactorily implemented with the training program submitted and that LILCO possesses an adequate number of trained LERO workers.

VI. NOTIFICATION AND INFORMATION TO PUBLIC (CONTENTIONS 24.T, 55-59, 20, 18, 21.C, 16.E)

These contentions allege that, for various reasons, LILCO's Plan will not provide adequate notification to the public in an emergency.

VI.A. Notification (Contentions 24.T, 55-59)

VI.A.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Norman A. Hobbs, Jr., William F. Renz, William G. Schiffmacher, and John A. Weismantle. The FEMA Panel of witnesses consisted of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip McIntire. Suffolk County's direct testimony was offered by Kenneth J. Regensburg, Robert A. Snow, and Vincent R. Stile. One of the NRC Staff's witnesses, John R. Sears, while not testifying directly on these contentions, did testify on Contention 26, which contention is incorporated by reference in Contention 55. The State of New York offered no direct testimony on these issues.

VI.A.2. Delay in Activating Sirens

Contention 55 specifically references Contention 26, stating that, for reasons enumerated in the earlier contention, there will be a delay in contacting key personnel and this will delay activation of the sirens. We have found that the delay mentioned in Contention 26 will not be appreciable. *See* Board Findings IV.A.1 through IV.A.12. Accordingly, we do not believe that delay in notification of key personnel will cause appreciable delay in activating the siren system.

At any rate, in the event of a General Emergency, the Customer Service operator will activate the public notification system (PNS) if key personnel (the Director of Local Response in this case) cannot be reached in 10 minutes. Cordaro *et al.*, ff. Tr. 4842, at 8-9; Tr. 12,684-85 (Keller); Tr. 12,687 (Kowieski); Tr. 4877-79 (Renz).

The County's witnesses declare that it is "unrealistic" to assume that the LERO Director of Local Response could be notified in time for action within 15 minutes. Regensburg *et al.*, ff. Tr. 5416, at 7-8; Tr. 5432-35 (Snow). But intervenors appear to be counting time from the origin of an emergency *at the plant*, while the 15-minute period at issue here starts at the time the LERO authorities *are notified*. *Cf.* 10 C.F.R. Part 50, Appendix E, § IV.D; Tr. 13,050 (Keller); Tr. 15,218-19 (Sears).

Intervenors envision further delay while the authorities await the preparation of an Emergency Broadcast System (EBS) message and notification to that network to begin broadcasting. I.F. 397; Regensburg, *et al.*, ff. Tr. 5416, at 9. Both Applicant's and FEMA's witnesses, however, testified that only "coordinated," not "simultaneous" activation of EBS and PNS is required. Tr. 12,689 (Keller); Tr. 4870-71 (Renz). In fact, for Sample Message A (a simple warning that an emergency message is

to follow) very little preparation time is needed. Tr. 5449-51 (Snow); Tr. 4934-35 (Renz).

VI.A.3. Conclusion (Contention 55)

We see no reason to believe that the procedures of the LILCO Plan would result in significant delay of the sounding of the PNS.

VI.A.4. Siren Backup (Contention 56)

This contention faults the method used as a backup for the sirens of the PNS. LILCO proposes to use vehicles equipped with public address systems and driven by "route alert" drivers. The contention alleges that the system cannot function in 15 minutes, that the message may not be heard, or, if heard, may not be understood, and that high radiation levels may lead the drivers to abandon their routes.

Applicant's witnesses point out that the regulations do not even require a backup system for use in the event some sirens fail. Indeed, there is not even a requirement for backup power for the sirens. Cordaro *et al.*, ff. Tr. 4842, at 12. Route alert drivers will report to their staging areas at the alert level in an emergency, and the head Traffic Guide will dispatch them to any areas where the sirens have failed. *Id.* at 13-14. The drivers are equipped with maps of their routes and these maps have been modified after drills to assure they can be easily used. Tr. 5699-5703, 5681-89 (Weismantle). The route alert vehicles will broadcast a pre-recorded message over their loudspeakers, notifying residents that there has been an accident at Shoreham and advising them to tune in their local EBS station. Cordaro *et al.*, ff. Tr. 9842, at 14.

Failed sirens will be detected primarily by review of electrical circuits and by a telephone survey. *Id.* at 13. Tr. 4959-61, 4964-65 (Schiffmacher); Tr. 4979-80 (Renz). The electrical circuit review could be accomplished by the Customer Service group quite quickly, but it might not locate certain types of malfunction, particularly of individual sirens. Tr. 4960-61 (Schiffmacher). The telephone survey is estimated to require 90 minutes to complete, that estimate having been given by the contractor who is to make the survey. Tr. 4993 (Weismantle). However, Intervenor's witnesses doubted that the survey could be completed in that time. Tr. 5461-62 (Snow).

Intervenors emphasize the possibility that a fast-breaking accident might find route alert drivers not already in their places at the staging areas. I.F. 405 n.273, *citing* Tr. 5006 (Renz). Intervenors' witnesses also

point out that after detection of failed sirens, after mobilization of drivers, and after dispatch to their routes, driving the routes could in itself involve considerable time, Regensburg *et al.*, ff. Tr. 5416, at 18 and Attach. 1. Exactly how long would be required is unclear from the test conducted by Intervenor's witnesses, since they used only one driver to cover an area approximating that of five sirens (*id.*), while Applicant's witnesses assure us that more than one driver could be assigned for each failed siren. Tr. 5039-40 (Renz); Tr. 5699-5703 (Weismantle).

VI.A.5. Conclusion (Contention 56)

All things considered, it seems likely to the Board that, were several sirens to fail, one could not guarantee that the route alert system would provide notification "within 15 minutes," a standard which Contention 56 says is "required by NUREG-0654." The process may indeed take several times that period. However, we see no such requirement in NUREG-0654. We incline, rather, to agree with the Board in *Kansas Gas & Electric Co.* (Wolf Creek Generating Station, Unit 1), LBP-84-26, 20 NRC 53 (1984). That Board, discussing backup procedures in the event of siren failure stated: "NUREG-0654 does not require that backup procedures of this nature be set forth in emergency plans." 20 NRC at 67. If no such procedures are needed, *a fortiori*, no standard time limit need be met. We do, however, find the Plan's proposal to be a worthwhile and desirable addition to the requirements, and commend the planners for taking this approach. It seems clear that, for the vast majority of accident scenarios of consequence, this system would enhance the probability of timely notification even if, as one Suffolk County witness earlier suggested (albeit without exact citation of data), the sirens experience a 5 to 20% failure rate. Tr. 3241 (Polk). Here again we would agree with a Board that dealt previously with the matter. In *Consolidated Edison Co. of New York* (Indian Point, Units 2 and 3), LBP-83-68, 18 NRC 811 (1983), the Board said: "Clearly, if the siren alerting system will not work during a power failure, a route alerting system may be necessary." 18 NRC at 939.

There is no requirement that the route alerting system function in 15 minutes. Contention 56 is without merit.

VI.A.6. Tone Alert Radios (Contention 57)

The contention faults the Plan for relying on "tone alert" radios to warn special facilities such as schools, hospitals, nursing homes, handicapped facilities, and large employers that an emergency has occurred.

Specifically, the Intervenors state that such a system does not give special facilities early warning (since the tone alert radios activate with the EBS system). Further, the contention alleges the tone alert radios can only be activated by radio station WALK and “WALK radio does not broadcast on its AM frequency 24 hours per day.”²

We know of no requirement that special facilities be alerted earlier than the general public in an emergency. The FEMA witnesses specifically state that there is no requirement that tone alert radios provide additional alerting time for special facilities. Baldwin *et al.*, ff Tr. 12,174, at 50, 51. Applicant’s witnesses also point this out. Cordaro *et al.*, ff. Tr. 4842, at 19.

The tone alert radios are, of course, in addition to the siren alerting system. Cordaro *et al.*, ff. Tr. 4842, at 12-19; Baldwin *et al.*, ff. Tr. 12,174, at 50.

VI.A.7. Conclusion (Contention 57)

Here, as with Contention 56, it may well be that the specific allegations are true. Again, the answer is of the nature of a demurrer: the system will not, in itself, give special facilities a head start (although it *could* do so if needed, Tr. 5356-66 (Cordaro)), nor will the system function if WALK-FM is unable to broadcast; but there is no requirement in regulations or guidelines that these two conditions be fulfilled. Indeed, the inclusion of the tone alert radio system in the Plan is simply a commendably prudent addition to the requirements. Contention 57 is without merit.

VI.A.8. Notification of Special Facilities (Contention 58)

This contention also deals with special facilities. It alleges that the system proposed for verifying that these facilities have been notified to evacuate is inadequate. The alleged inadequacies include delay in operation and failure to provide for unattended telephones or persons who cannot use telephones. The contention makes similar allegations concerning the handicapped at home.

We treat in detail the Plan as it applies to schools under § XII. SCHOOLS, *infra*. Here we note that, in addition to the tone alert radio system and the general PNS, the Plan provides that the Public Schools

² Curiously, the contention specifically mentions WALK-AM, but it is stated in the testimony that WALK-FM is the station which actually keys the tone alert radios. Cordaro *et al.*, ff. Tr. 4842, at 19; Plan at 3.3-4; Tr. 5067-68 (Renz). See also § VI.B, *infra*.

Coordinator, the Private Schools Coordinator, and the Health Facilities Coordinator will contact these facilities by telephone to verify that they are aware of the need to take protective action and to determine whether they need assistance. Cordaro *et al.*, ff. Tr. 5337, at 8; Tr. 5364-65, 5387 (Robinson); Regensburg *et al.*, ff. Tr. 5416, at 24. As many as fifteen administrative support personnel could assist in making these calls. Tr. 5387-88 (Robinson). LILCO estimates that all calls could be complete in 45 minutes. Cordaro *et al.*, ff. Tr. 5337, at 10-11; Tr. 5395 (Robinson). Intervenors make much of the notion that this estimate includes only the time to verify notification, that determining needed assistance would take longer. I.F. 413, *citing* Tr. 5395 (Robinson), Tr. 5481 (Snow), Tr. 5380-81 (Robinson). We note, however, that the Plan by no means relies on this method for alerting the special facilities; the method is an addition to the sirens and the tone alert radios. Handicapped persons at home will be separately notified by route alert drivers, and the FEMA witnesses assert that this type of notification and verification system complies with the criteria of NUREG-0654. Baldwin *et al.*, ff. Tr. 12,174, at 52.

VI.A.9. Conclusion (Contention 58)

We find this contention also without merit. The feature of the LILCO Plan of which it complains is, once more, an effort to exceed compliance with the strict requirements, a backup to a backup. We cannot fault it for being less immediate than the primary means of notification.

VI.A.10. Notification of Boaters (Contentions 59 and 24.T)

Contention 24.T alleges that LILCO has no letter of agreement with the U.S. Coast Guard to warn boaters on Long Island Sound in an emergency. Suffolk County's own witness, however, concedes that such a letter exists. Tr. 5523-25 (Roberts); Plan, Appendix B.

Contention 59 asserts that boaters on the Sound could not be warned by the Coast Guard in 15 minutes, alleging that such failure violates regulations and guidelines. LILCO and FEMA witnesses assert that Long Island Sound is an "extended water area" within the meaning of NUREG-0654, Appendix 3 at 3-3, and hence comes within the "special requirements exceptions." The requirement that "special requirements exceptions . . . must be documented," would have to be met. Witnesses for Suffolk County appear to concede that Long Island Sound is an "extended water area with transient boaters" as specified in NUREG-0654, Appendix 3 at 3-3; Tr. 5525-26 (Hoffman); Tr. 5526 (Roberts).

LILCO's witnesses believe the exception applies. Tr. 5071-72 (Renz). And FEMA's witnesses mention the exception in their testimony on Contention 59, although they do not specifically say it applies.

Intervenors do not, however, concede that the conditions for this exception have been properly documented. I.F. 415 n.281. They point out that LILCO's witnesses could not produce any analysis to show that the Coast Guard could alert all boaters within 45 minutes. Tr. 5091 (Weismantle). As of the date of the present testimony, the design report for the prompt notification system (which would include analyses of the Coast Guard's part in alerting boaters) was in the early stages of development. Tr. 5087 (Weismantle).

The Plan is intended to work as follows: the Coast Guard would be notified by commercial telephone or by FTS of an emergency requiring evacuation. Cordaro *et al.*, ff. Tr. 4842, at 21 and Attach. 2; Tr. 5118-20 (Renz). LILCO also intends to install a marine-band radio at the EOC as a third means to notify the Coast Guard. Cordaro *et al.*, ff. Tr. 4842, at 21; Tr. 5120 (Renz). The Coast Guard would then broadcast a warning on marine emergency frequencies. Cordaro *et al.*, ff. Tr. 4842, at 21; Tr. 5101 (Renz). The Coast Guard would also dispatch two boats, one from New Haven, Connecticut, and one from Eaton's Neck, Long Island. Roberts *et al.*, ff. Tr. 5522; Tr. 5104 (Renz). These boats will be for "marine traffic control." Tr. 5148 (Renz).

LILCO also has a letter of agreement with Island Helicopter (Cordaro *et al.*, ff. Tr. 6457, Vol. II, Attach. 35), and can supplement the Coast Guard action with notification by helicopter public address system. Tr. 4857 (Renz); Tr. 5148 (Weismantle). We note that the use of helicopters would have certain limitations: there would be restrictions in bad weather, for example (Tr. 4857, 5147-49, 5152-53 (Renz, Weismantle)) but, of course, fewer boats would be out in bad weather; and it seems that Island Helicopter might require from 1 to 4 hours notice during nonbusiness hours to ready an aircraft. Tr. 5640-43 (Weismantle).

Clearly, the detailed descriptions of these reserve notification systems are implementing details which, under *Waterford, supra*, we need not examine here.

VI.A.11. Conclusion (Contention 59)

We are confronted here again by a system which layers backup upon backup, but in which some elements of the secondary or tertiary line may be delayed or may fail. Clearly it is not required that the boaters on Long Island Sound be notified by the PNS directly. An exception is in

accord with NUREG-0654, Appendix 3, § B.2.c, at 3-3. The special arrangement which that entails is clearly marine-band radio notification by the U.S. Coast Guard. But that may fail, because radios may not be on or may be tuned to other frequencies (or indeed, some boats may not have them). Tr. 5101 (Renz); Tr. 5227 (Read, Hoffman); Tr. 5546-47 (Read). So it may be necessary to approach some boats within hailing distance (which might involve hours of delay) or to use helicopters (ordinarily quick, but at some hours also requiring extra time).

In *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-39, 15 NRC 1163 (1982), the Board was confronted with a similar plan: sirens, ineffective for boaters on a large water body, were backed up by Coast Guard marine radio calls and by helicopters. That Board found the succession adequate, and went on to suggest that more time could safely be allowed for notifying boaters than for notifying populations ashore. 15 NRC at 1269.

On appeal, the Appeal Board opined, regarding notification of boaters:

In the event of a nuclear accident, the Coast Guard in San Diego would be notified promptly and send a radio alert on marine channels to boaters. Additionally, a Coast Guard helicopter could be on the scene within about 15 to 30 minutes. Closer helicopters from Camp Pendleton and Orange County, as well as a thirty-foot rescue boat maintained by the State Parks Department at nearby Doheny Beach could also be available. The Licensing Board was plainly correct in finding that these measures collectively provide reasonable assurance that boaters in the emergency planning zone will be promptly notified and instructed in the event of a nuclear accident at San Onofre.

ALAB-717, 17 NRC 346, 376 (1983) (citations omitted).

We see the situation at bar as a near-duplicate of that at San Onofre. It may be that the helicopter service here involved would suffer a higher probability of delay than that in the *San Onofre* case, but the miniscule erosion of the multiple backup structure which that fact might suggest seems to us inconsequential. Contention 59 is without merit.

VI.B. WALK-AM (Contention 20)

VI.B.1. WALK Radio (Contention 20)

Since the Plan relies on station WALK-FM and AM to broadcast the EBS message, and since WALK-AM does not operate at night, Intervenor complain that persons without FM radios will not be able to receive the EBS messages at night.

It is true that WALK radio's current license permits AM broadcasts only from 6:00 a.m. to 6:00 p.m., while WALK-FM broadcasts 24 hours

a day. Clawson *et al.*, ff. Tr. 5254, at 5; Baldwin *et al.*, ff. Tr. 12,174, at 9. The LILCO Plan, however, includes a letter of agreement which commits WALK-AM to broadcast EBS messages at any time. Clawson *et al.*, ff. Tr. 5254, at 7 and Attach. 1. Further, FCC regulations permit daytime AM stations to use their facilities to broadcast emergency information at night. 47 C.F.R. § 73.1250(f); Clawson *et al.*, ff. Tr. 5254, at 8. This has, in fact, been done in the past during snow emergencies. Clawson *et al.*, ff. Tr. 5254, Attach. 2; Tr. 5294 (Clawson).

In addition to employing WALK to broadcast EBS messages, LILCO has obtained agreements with eleven other stations, some AM, some FM, to broadcast EBS messages at any time of day. Clawson *et al.*, ff. Tr. 5254, at 8-9; Tr. 5311 (Clawson).

The procedure for activating WALK-AM when it is normally off the air is simple: the operator presses a button to activate the AM transmitter and throws a switch for AM-FM simulcast. Clawson *et al.*, ff. Tr. 5254, at 6; Tr. 5288-89 (Clawson). If the other stations which have signed agreements are staffed, automatic equipment activated by the WALK-FM signal will cause them to broadcast the EBS message simultaneously. If they are not staffed the message will be taped for later broadcast. Tr. 5331-34 (Clawson). Equipment to accomplish these actions has been installed at WALK, and agreements call for LILCO to purchase and install the corresponding equipment at the other stations. Tr. 5269 (Clawson). WALK radio, obviously the key station, has a good reliability record and redundant features. Clawson *et al.*, ff. Tr. 5254, Attach. 1; Tr. 5280, 5286, 5323 (Clawson).

Intervenors have tried to convince us of Contention 20's merit by raising, in both cross-examination and proposed findings, such issues as the range of WALK (I.F. 427), the need for station management to approve night broadcasting (I.F. 426) and technicalities about the FCC regulations which apply (I.F. 426 n.294). The proof of the pudding is in the eating: WALK-AM has broadcast in emergencies; the range of the stations is not at issue in Contention 20.

VI.B.2. Conclusion (Contention 20)

It is clear to the Board that Contention 20 is without merit. WALK-AM, and other backup stations, are all prepared to broadcast EBS messages at any time of day.

VI.C. Zones and Routes (Contention 18)

VI.C.1. Zone and Route Notification (Contention 18)

This contention alleges that proposed LILCO posters, telephone book inserts, and EBS messages would be ineffective in providing information on zone boundaries and evacuation routes.

VI.C.2. Identification of Witnesses

LILCO presented Carol A. Clawson, Dr. Matthew C. Cordaro, and Charles A. Daverio. FEMA presented Dr. Thomas E. Baldwin, Roger B. Kowieski, Philip McIntire, and Joseph H. Keller. (The FEMA testimony actually only notes that, of the materials mentioned in Contention 18 — posters, telephone book inserts and EBS messages, FEMA reviewed only the EBS messages.) Intervenors presented no direct testimony.

VI.C.3. Information on Lanes and Routes Available to Public

The LILCO public information materials include, in addition to the public information brochure, telephone book inserts, refrigerator magnets, automobile glove box stickers, posters, and information packets for commercial establishments comprising a window display poster, emergency flyers for the public and a sticker indicating the EBS stations. Clawson *et al.*, ff. Tr. 10,035, at 9-11.

The brochures to be distributed to residents in the EPZ contain information showing the zone in which the residents live and the appropriate evacuation route. Clawson *et al.*, ff. Tr. 10,035, at 9 and Attach. 1. But, of course, the contention at bar specifically concerns itself with persons “who do . . . not have access to a brochure.” Thus we must consider the alternate means available for such persons to obtain the needed information. These are:

1. Telephone directory inserts. These will include a map of the EPZ identifying the evacuation zones and maps showing the specific zones covered by the directory and their recommended evacuation routes. Clawson *et al.*, ff. Tr. 10,035, at 10 and Attach. 2.
2. Refrigerator magnets. These will be distributed to each zone. They will identify the zone and the EBS radio stations. *Id.* at 5.
3. Stickers for auto glove boxes. These will identify the zones of the homes to which they are distributed and the EBS radio stations. *Id.* at 11 and Attach. 6.

4. The emergency packets. These will be distributed to nonresidential customers in the EPZ. They will include zone and route information for the establishment in the form of posters and flyers. *Id.* at 11 and Attach. 7-10.
5. Additional posters. These will be placed at beaches and recreational areas. *Id.* at 12.
6. Traffic guides and “trailblazer” signs. These will be posted during an evacuation. *Id.*

In addition to the materials enumerated above, the EBS messages will identify zones to be evacuated by boundary description. *Id.* at 14, Attach. 11.

Thus it appears that there is a wealth of information which would be available to persons who had no brochures or were away from home. Intervenors provided no direct evidence to the contrary; extensive cross-examination elicited no substantial reason to believe these materials would not be available. We conclude that Contention 18 is without merit.

VI.D. Hispanics (Contention 21.C)

VI.D.1. Spanish-Speaking Residents (Contention 21.C)

This contention alleges that, since the public information material and EBS messages are in English, some 1300 residents of the area who speak only Spanish will not understand the materials or the messages.

VI.D.2. Witnesses

LILCO presented Carol A. Clawson, Dr. Matthew C. Cordaro, and Charles A. Daverio. FEMA presented Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire. Intervenors presented no direct testimony.

VI.D.3. Need for Foreign Language Materials

There exists NRC/FEMA-developed guidance for the need for foreign language materials and EBS messages in emergency planning. NRC/FEMA joint Guidance Memorandum No. 20 states that public information should be translated into a foreign language if the number of foreign population of voting age exceeds 5% of the total population. Clawson *et al.*, ff. Tr. 5752, at 7-8, Attach. 3; Baldwin *et al.*, ff. Tr. 12,174, at 10; Tr. 5772 (Clawson, Cordaro); Tr. 12,978-79 (Keller, Kowieski). It also appears that in the EPZ the number of Spanish-monolingual persons

around Shoreham falls far short of the 5% mentioned. Clawson *et al.*, ff. Tr. 5752, at 6-7. Indeed, even if the figure of 1300 persons mentioned in the contention were correct, the 5% value would not be reached. *Id.* at 8. The Guidance Memorandum is, unfortunately, somewhat unclear in defining exactly what population must satisfy the 5% criterion. We note on page 2 of the memorandum that the first paragraph requires public information materials to be translated if the foreign minority population exceeds "5% of the county's" population. The next paragraph suggests efforts to be made if the minority language individuals "do not exceed 5%" in "the Plume Exposure Pathway EPZ." *Id.*, Attach. 3. Further, neither LILCO's witnesses nor those from FEMA could say for certain that the figure was less than 5% for the county. Tr. 5773-74 (Clawson, Cordaro); Tr. 12,981 (Baldwin). We shall assume that the important figure is actually that for the plume exposure EPZ, since that is the area to whose population the materials must convey their information.

We are thus led to the conclusion that the situation is one in which the Guidance Memorandum does not require materials and EBS messages in a foreign language.

Although the point was not made in Contention 21.C, the Intervenor has sought to call into question the sufficiency of the measures which LILCO has adopted as such measures compare with the efforts which Guidance Memorandum No. 20 says a plan "might include" where the foreign monolingual population does not exceed 5%. It appears that only one of these measures, the so-called "buddy system" has been encouraged by LILCO. Tr. 5757-58 (Clawson). LILCO has included a statement in Spanish in the letter and reply card sent to all residents in the EPZ. That statement offered a Spanish translation of the information on the letter and card. Clawson *et al.*, ff. Tr. 5752, at 9, Attach. 4-6. Tr. 5783-86 (Clawson, Cordaro). LILCO has contacted a Spanish-language newspaper in the area to identify additional Spanish-speaking families, Tr. 5767-68 (Clawson), has contacted local community leaders including the head of the Union Hispanica and the publisher of the Spanish-language newspaper, and will publish an article in Spanish in the newsletter "Keeping Current." Tr. 5756, 5779-80 (Clawson).

VI.D.4. Conclusion (Contention 20)

It seems to the Board that the small number of Spanish-monolingual persons in the EPZ does not, by any reasonable interpretation of Guidance Memorandum No. 20, require that public information materials and EBS messages be translated into Spanish. We also believe, in view

of the very small foreign language population in the EPZ, that the measures taken by LILCO will, in the language of the Guidance Memorandum, "afford [that population] protection similar to that provided to the general population." Contention 21.C is without merit.

VI.E. Brochure (Contention 16.E)

VI.E.1. Public Information Brochure (Contention 16.E)

This contention criticizes LILCO's public information brochure. It alleges that the brochure's discussion of the effects of radiation is limited to low-level effects and does not address the magnitude of doses that the public might receive in a severe accident.

VI.E.2. Identification of Witnesses

LILCO presented testimony on Contention 16.E by Carol A. Clawson, Dr. Matthew C. Cordaro, and Richard J. Watts. Suffolk County presented direct testimony of Dr. Edward P. Radford and Dr. Susan C. Saegert. FEMA presented testimony of Dr. Thomas E. Baldwin, Roger B. Kowieski, Philip McIntire and Joseph H. Keller.

VI.E.3. Purpose of the Brochure

Part 50, Appendix E, § IV.D.2 of 10 C.F.R. requires yearly dissemination to the public of, *inter alia*, "general information as to the nature and effects of radiation." While the exact nature of the information is not specified, it seems to this Board that the intent is to supplement other information in the brochure in such a way as to encourage the public to follow the emergency plan in an emergency. We are told by a FEMA witness that the general purpose of the brochure is to educate the public as to what should be done in an emergency. Tr. 14,173 (Kowieski).

Suffolk County's witnesses believe that a person's perception of risk will influence that person's actions during an emergency. Radford and Saegert, ff. Tr. 14,105, at 10. We are inclined to agree. And we further believe that a fair assessment of the situation during an emergency must be encouraged by supplying the public with information applicable to the radiation levels expected in the emergency.

The LILCO brochure's treatment of radiation covers only levels near background, levels that arise from everyday sources including nuclear plants in normal operation, although it does state that "radiation can be hazardous at high levels" without saying what the hazards may be. Clawson *et al.*, ff. Tr. 14,061, at 14-17, Attach. 1. LILCO's witnesses assure

us that additional information is contained in the newsletter "Keeping Current." *Id.* at 6-7, Attach. 2, at 2. They point out that, in that publication the assertion is made that "exposure to large amounts of radiation . . . can cause serious injury to cell tissues³ and even death." *Id.*

VI.E.4. Conclusion (Contention 16.E)

The brochure, as it stands, does not present any real guidance on radiation effects at the levels that might be expected in an accident. The Applicant's proffered alternative, the article in "Keeping Current," is scarcely any more quantitative. We note that the EBS messages include one announcing a General Emergency which specifically mentions millirem of expected dose. Clawson *et al.*, ff. Tr. 10,035, Attach. 11, at 4. It seems clear to the Board that it would be desirable for the public to have, readily available, some sort of information which would give a rough gauge of what those figures might mean. The material in "Keeping Current" would scarcely suffice. Nor is "Keeping Current" an appropriate medium for conveying this information. Newsletters are quickly discarded. It is the brochure which bears the legend "Save This Book" on its front page. Clawson *et al.*, ff. Tr. 14,061, Attach. 1, at 2. If any document is retained to serve as an information source in an emergency, it is likely to be the brochure, and it is therefore the brochure which should contain the information. We, like the Board in *Consumers Power Co.* (Big Rock Point Plant), LBP-82-60, 16 NRC 540, 544 (1982) are reluctant to act as censors. We do not wish to specify precise language. But we do wish to see necessary facts communicated. It is clear to us that any detailed discussion of health physics or the present state of knowledge of clinical radiation pathology would be counterproductive. We would think it sufficient that the brochure inform the public that radiation can cause injury or death. Better still, in view of the quantitative mention of projected dose in the EBS message the brochure should indicate that a few hundreds of rem could cause acute illness or death and that a few tens of rem could increase the risk of cancer and genetic effects. Radford and Saegert, ff. Tr. 14,105, at 8-9. We would not, however, attempt anything near the detail that Suffolk County's witnesses provide at the place cited.

We therefore direct, as a condition of any operating license which might be issued, that the radiation information section of the public information brochure be changed to include the information that radiation

³ The Board has some trouble with the term "cell tissues"; in the ancient days when we studied elementary biology, tissues were made of cells, not vice-versa.

can cause injury or death. We would also recommend that information be included to the effect that a few hundreds of rem⁴ can cause acute illness or death and a few tens of rem can increase the risk of cancer or genetic change. We will rely upon the NRC Staff to see that this information is both clear and succinct.

VII. SHELTERING (CONTENTION 61)

Contention 61 asserts that the LILCO Plan, which calls for sheltering as a protective action in the event of a release of radioactive material from the Shoreham plant, would not or could not be implemented. Intervenor claim that those who shelter in wooden structures without basements will still receive 90% of the radiation dose they would have received had they remained outdoors (Contention 61.A). In addition, in a severe accident those who follow a sheltering recommendation will receive doses large enough to cause adverse health effects (Contentions 61.G, 61.H, and 61.I). Finally, persons traveling in boats and the transient population will have no access to shelter, and persons in cars or other motor vehicles may not be able to reach shelter quickly enough to escape exposure to a radioactive plume (Contentions 61.B, 61.D, and 61.E).

VII.1. *Identification of Witnesses*

LILCO presented the testimony of Dr. Matthew C. Cordaro, Charles A. Daverio, Michael L. Miele, Dr. Dennis S. Mileti, and Richard J. Watts. Suffolk County presented the testimony of Dr. Fred C. Finlayson, Gregory C. Minor, and Dr. Edward P. Radford. FEMA presented the testimony of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

VII.2. *Sheltering in General*

In the event of a release of radioactive material from the Shoreham plant the population within the 10-mile plume exposure EPZ could be

⁴ We recognize that there is some dispute between Applicant and Intervenor as to whether doses should be expressed in rem or millirem. I.F. 453 n.311. Tr. 14,175-79 (Keller); LILCO Reply Finding (R.F.) 446, 455 & n.75. We note also that the EBS message cited uses millirem. Clawson *et al.*, ff. Tr. 10,035, Attach. 11, at 4. We have no particular preference (although "one thousand milli-anything" seems a clumsy circumlocution). However, we note that, whichever unit is used, it should be the *same* unit in both brochure and EBS message.

advised to take no protective action, to shelter, or to evacuate. Sheltering means remaining indoors with windows and doors closed and air conditioners or fans turned off. OPIP 3.6.1. A decision to recommend protective action is influenced by many variable factors, including the population, weather conditions, route conditions, plant conditions, evacuation times, and the expected duration of releases. Tr. 8800 (Miele); Tr. 8805 (Watts). The choice of protective action is made on the basis of the projected radiation doses that would result from a release of radioactive fission products. The factors used to calculate the dose projections include the nature of the release, the amount of time until the release is expected to occur, and the anticipated duration of the release. Tr. 8887 (Miele). In making a protective action decision, the Director of Local Response relies on information from the Radiation Health Team Coordinator, the survey team results, dose assessment, dose projections, and consultation with other LERO personnel who may have additional information pertinent to the final decision. Tr. 8804 (Watts). Once an anticipated radiation dose has been calculated, the decision whether to recommend sheltering is made by comparing the radiation dose the population might receive were it to shelter to the dose expected in an evacuation. Cordaro *et al.*, ff. Tr. 8760, at 21. The evacuation dose is calculated on the basis of evacuation time estimates. Tr. 8870 (Watts). LILCO offered three situations where sheltering might be the appropriate protective action: (1) if the projected dose is only slightly above that set forth in the Environmental Protection Agency (EPA) Protective Action Guidelines (PAGs) EPA 520/1-75-001 (September 1975), at 2.3, 2.5 or of short duration, and shelters would provide enough benefit to make evacuation unnecessary; (2) if the roads are hazardous due to weather conditions and an evacuation could not be safely accomplished; and (3) if sheltering would result in lower doses than might be received if the population evacuated. Cordaro *et al.*, ff. Tr. 8760, at 22. Suffolk County concedes that sheltering is one of the appropriate methods to employ in an attempt to reduce doses to individuals. Tr. 12,384 (Finlayson). Furthermore, the County would not recommend eliminating sheltering. *Id.* Yet the County claims the LILCO sheltering plan offers inadequate protection against adverse health effects caused by radiation. *Id.*

VII.3. Dose Savings as a Result of Sheltering

There are three types of radiation dose which could result from plume exposure: a whole-body dose from noble gases, a thyroid dose, and a whole-body dose caused by deposit of radioactive particulates. Cordaro *et al.*, ff. Tr. 8760, at 18. The overall objective of emergency response

plans is to minimize such doses by implementing protective actions for the purpose of dose reduction, or dose savings. NUREG-0654, at 6. The licensee's guidelines for determining which protective action to recommend must be consistent with the federal guidance embodied in the EPA PAGs. 10 C.F.R. § 50.47(b)(10). PAGs state the projected absorbed doses to individuals in the general population that warrant protective action following a radiation release. NUREG-0396/EPA 520/1-78-016 (December 1978), Appendix III, at 10. The doses delineated in the PAGs have been set below levels that would produce detectable short-term biological effects and at levels that would minimize long-term biological effects. *Id.* at 11.

The PAGs, which have been adopted in OPIP 3.6.1, call for sheltering if the projected shelter thyroid dose is less than 25 rem, or equal to or greater than 25 rem and the evacuation dose is equal to or greater than the shelter dose. EPA 520/1-75-001, at 2.5. Sheltering is also recommended where the projected shelter whole-body dose is less than 5 rem, or is equal to or greater than 5 rem and the evacuation dose is equal to or greater than the shelter dose. *Id.* at 2.3. According to Suffolk County's expert, Dr. Radford, the threshold for early injuries is 30 rem. People who receive 30-rem doses probably will not experience any acute effects (i.e., death or injuries occurring within 60 days after exposure), but their lifetime chances of developing cancer will increase by about 21%. Radford, ff. Tr. 12,320, at 4. The chance of developing cancer (other than skin cancer) in the general population is approximately 28%, thus a 30-rem dose would increase the risk to about 34%. Tr. 12,322 (Radford). Dr. Radford also testified that even a 50-rem whole-body dose would produce symptoms of nausea and vomiting in only about 1% of the population. Tr. 12,334-35 (Radford). LILCO's witness testified that if LILCO was projecting a dose that was a substantial fraction of that in the PAGs, or a dose that appeared to increase with time, then sheltering would be recommended for the affected zone. Tr. 8814 (Watts).

In summary, sheltering will be recommended when the projected shelter dose is below the level that would cause adverse health effects or where the evacuation dose is equal to or higher than the shelter dose because evacuation cannot be accomplished safely.

VII.4. Shielding Factors on Long Island

Suffolk County contends that a substantial number of people who might be advised to shelter will be unable to do so because many structures in the Shoreham plume EPZ are constructed of wood and lack

basements. The County's only evidence on the number of such structures was a statement by Dr. Radford that Suffolk County has a fairly typical eastern United States mix of housing, "frame house, mixed with brick and some stone, and some with basements and some without." Tr. 12,351 (Radford). Assuming that there are at least some wood structures without basements in the EPZ, the parties are in agreement on the amount of radiation dose savings to be gained from sheltering in such structures. The dose savings is calculated on the basis of the shielding factor for the particular structure in which a person shelters. A shielding factor is the ratio of the dose a person would receive in that particular shelter, to the dose he or she would receive if shelter were not taken. The shielding factor for a wood frame house without a basement is 0.9. Cordaro *et al.*, ff. Tr. 8760, at 20; Finlayson and Minor, ff. Tr. 12,320, at 3. This means that the calculated dose savings for whole-body exposure to radioactive gases is only 10%, and those who shelter in a wood structure without a basement will still receive 90% of the whole-body dose they would have received had they remained outdoors. *Id.* LILCO points out that sheltering in a wood frame building provides a 50% dose reduction for thyroid plume exposure and a 60% reduction for whole-body surface deposition of radioactive particulates. Cordaro *et al.*, ff. Tr. 8760, at 21. However, in regard to thyroid protection, the value of sheltering decreases substantially after the first hour of exposure, dropping to a 25% dose savings up to 2 hours, 17% up to 3 hours, and 8% up to 6 hours. Tr. 8855 (Watts). Suffolk County contends that homes in the EPZ other than those built of wood will only provide a 50% dose reduction and that this level of exposure will result in health-threatening doses. Finlayson and Minor, ff. Tr. 12,320, at 3. This figure is based on the dose reduction from sheltering in masonry homes with and without basements. *Id.* Finally, the County asserts that the average dose reduction of 30% for all who shelter in the EPZ provides no assurance that doses would be reduced to levels below those that are threatening to health. *Id.* LILCO responds that it would not make sense to eliminate sheltering as a protective action either for those who have no basements or for those who live in wood frame houses because any sheltering action provides some benefit. Cordaro *et al.*, ff. Tr. 8760, at 21. Furthermore, the alternative to sheltering is evacuation, and sheltering will only be recommended after shelter doses are compared to evacuation doses. The confusion that would result from basing a protective action order on the type of structure makes such a plan unworkable. *Id.* In addition, LILCO's public education program explains where the best locations are for sheltering within a particular structure, thus maximizing the benefit to be gained from sheltering in all structures. *Id.* at 23.

VII.5. Conclusion (Contentions 61.A, 61.G, 61.H, and 61.I)

The Board finds that dose savings from sheltering in many circumstances are quite small. The Board also finds that sheltering within the EPZ could result in radiation doses that are greater than those in the EPA PAGs. However, in most cases a sheltering recommendation is a last resort to be taken when no other action will result in a smaller dose. Therefore, the Board finds, as to Contentions 61.A, 61.G, 61.H, and 61.I, that the LILCO Plan complies with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10).

VII.6. Adequacy of Sheltering for Persons Traveling in Motor Vehicles and Boats and for Transients

Suffolk County claims that in the event of an emergency at the Shoreham plant, persons traveling in motor vehicles and boats within the plume EPZ at the time of a sheltering recommendation may not be able to reach shelter quickly enough to obtain any protection from a radioactive plume. Contention 61.B. The record indicates that vehicles and boats offer virtually no protection from a radioactive plume. Finlayson *et al.*, ff. Tr. 12,320, at 3. The Board finds that sirens will alert motorists. Those who reside within the plume EPZ can drive home to shelter, while others can drive out of the EPZ or seek shelter in a building within the EPZ. Each of these options could be carried out in a short period of time. Tr. 8902-04 (Daverio). The Board therefore finds that the evidence demonstrates that motorists within the 10-mile EPZ will have several courses of action available to protect themselves at the time of a sheltering recommendation.

Sirens will notify boaters of a sheltering recommendation (Cordaro *et al.*, ff. Tr. 8760, at 26) and boaters will receive radio transmissions advising them to leave the area. *Id.* The Coast Guard from New Haven, Connecticut, will restrict marine traffic within the 10-mile EPZ. *Id.* The Board finds that the LILCO Plan offers reasonable assurance that adequate protective measures can and will be taken to protect boaters in the event of a radiological emergency.

Suffolk County contends that transients on beaches and at outdoor recreation areas will have no access to shelter, and that LILCO must identify shelters for transients. Contention 61.D. LILCO asserts that upon hearing sirens the transient population will be able to mobilize rapidly to seek shelter in a building or to return home. Cordaro *et al.*, ff. Tr. 8760, at 26. Since a large transient population will only be at the beaches and recreation areas during warm weather the roads will be passable. *Id.* at 25-26. Although it is possible that some transients may not

know the meaning of the sirens, posters will be located in recreation areas to inform transients that they should tune to the EBS radio stations. Tr. 8905 (Daverio). The record indicates that the beaches in the vicinity of Shoreham are mostly town beaches and local resident beaches. Tr. 8905 (Daverio). Therefore, it is reasonable to conclude that upon hearing sirens transients could find out about the sheltering recommendations from local residents who also would be leaving the beach areas. *Id.* The Board finds LILCO's Plan is adequate to provide reasonable assurance that transients will receive notification of a sheltering recommendation.

LILCO's witnesses testified that LILCO has not identified buildings within the EPZ for transients seeking sheltering because it is unlikely that nonresidents would be able to find a particular building, and residents should be encouraged to return to their homes in order to make any subsequent evacuation easier. Cordaro *et al.*, ff. Tr. 8760, at 25. FEMA witnesses testified that NUREG-0654 does not require that such shelters be identified. Baldwin *et al.*, ff. Tr. 12,174, at 60. The Board agrees with FEMA, and further finds that upon hearing sirens the transient population will be able to move quickly to seek shelter in a nearby building, return home, or return to their local lodgings.

VIII. MAKING PROTECTIVE ACTION RECOMMENDATIONS (CONTENTIONS 60, 63, 64, 49)

VIII.A. Selective Evacuation and Selective Sheltering (Contentions 60 and 63)

These contentions allege that the LILCO Plan fails to set forth either guidelines or implementation procedures for the protective actions of selective evacuation (Contention 63) and selective sheltering (Contention 60).

VIII.A.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Charles A. Daverio, Michael L. Miele, Dr. Dennis S. Mileti, Elaine D. Robinson, Richard J. Watts, and Jay O. Yedvab. Witnesses for Suffolk County were Dr. David Harris and Dr. Martin Mayer. FEMA presented the testimony of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

VIII.A.2. Guidelines for Selective Actions

Selective sheltering or evacuation recommendations are recommendations that a selected portion of the population take these actions, the remainder of the population being advised to take other actions or to take no protective action. Selective actions may be recommended at doses below the EPA PAGs, and would normally be recommended only for radiosensitive persons such as children and pregnant women. Cordaro *et al.*, ff. Tr. 8760, at 9, 30. This strategy has been adopted from the New York State Emergency Preparedness Plan. Baldwin *et al.*, ff. Tr. 12,174, at 56; Cordaro *et al.*, ff. Tr. 8760, at 9-10, 34.

The LILCO Plan also provides that selective sheltering or evacuation would not be recommended without consultation with the New York State Commissioner of Health. Cordaro *et al.*, ff. Tr. 8760, at 9, 34. Indeed, LILCO has included a provision for such recommendations only to make the Plan accord with the New York State Plan in the event that State officials decide to take action in an emergency. *Id.* at 10-11, 34. Absent instructions from the State, LERO would recommend sheltering or evacuation for entire populations. *Id.* at 11, 34.

Suffolk County's witnesses asserted that there is insufficient guidance to permit LERO employees to make the decision to recommend selective actions. Harris and Mayer, ff. Tr. 9777, at 10-11. This may well be true, but it is evident from the preceding paragraph that LERO employees are not expected to make such a decision. LILCO's witnesses noted that there might be cases where protective action of some sort would be recommended at projected dose levels below those of the PAGs, but such recommendations would normally be for the entire population, and they would be made in the interest of keeping doses "as low as reasonably achievable" (the ALARA principle). Tr. 8787 (Cordaro); Tr. 8814 (Watts); Tr. 8778 (Daverio).

A variation of "selective" sheltering might also be recommended for hospitals in lieu of evacuation (*see* Board Finding XI.B, *infra*) but that does not involve special treatment for radiosensitive individuals.

VIII.A.3. Conclusion on Guidelines for Selective Sheltering and Evacuation

The Board finds that guidelines for these protective actions are not specifically set forth in the Plan. However, it was never really intended that they should be. Such guidelines would perforce involve many considerations in addition to simple projected doses. Tr. 8816-17 (Watts). The bare provision for selective action, keyed to instructions from the

State Commissioner of Health, was included in the Plan merely to provide for cooperation with that official in the event that New York State should decide to help in an emergency. We do not see the absence of such guidelines as a failure to meet 10 C.F.R. § 50.47(b)(10) or NUREG-0654, § II.J.9.

VIII.A.4. Sheltering for Special Facilities

In the course of testifying on Contentions 60 and 63, Suffolk County's witnesses Dr. Harris and Dr. Mayer asserted that: (1) no facility-specific plans exist under which special facilities could implement sheltering, and (2) sheltering, as a practical matter, cannot be accomplished in special facilities for a number of reasons. Harris and Mayer, ff. Tr. 9777, at 12-21.⁵

LILCO has provided assistance in the development of facility-specific plans by visiting the facilities, reviewing blueprints, and discussing sheltering suggestions with the facilities' staffs. Tr. 9040 (Weismantle). Facility-specific plans are being developed in cooperation with the staffs of these facilities. Tr. 10,053 (Miele); LILCO Exhs. 38-47. Since the facilities' directors were too busy to do detailed writing, LILCO has hired full-time consultants to draw up such plans. Tr. 10,054 (Miele). Sheltering areas at each of the facilities have been chosen by health physics specialists from LILCO and its consultants. Tr. 10,056-57 (Yedvab); 10,055-56 (Miele). Special needs for food and special equipment have been taken into account. Tr. 10,058-59 (Miele). LILCO will continue to help with revisions of the plans. Tr. 10,060 (Robinson).

LILCO has agreed to provide special equipment to some facilities, has worked to develop special procedures, and has even enlarged doorways in some places. Tr. 10,056, 10,060 (Miele). Some training has already been provided. Tr. 10,060 (Miele). Further, drills using LILCO sheltering procedures have been conducted. Tr. 10,061 (Robinson). All plans will be completed by LILCO in cooperation with the facilities. Tr. 10,112 (Robinson). The plans for each facility will be updated annually. Tr. 10,061-62 (Robinson).

⁵ LILCO objected to the admission of this testimony on the ground that it was beyond the scope of Contentions 60 and 63. The Board admitted it, but also permitted rebuttal by Michael L. Miele, Elaine D. Robinson, and Jay O. Yedvab (Tr. 9918).

VIII.A.5. Conclusion (Contentions 60 and 63)

While the Plan contains no specific guidelines for selective protective actions, none are needed and their absence does not constitute a failure to meet regulations. As to the practical implementation of sheltering, plans for such a protective action at special facilities are well along in their development, aided by a commendable effort on LILCO's part. We therefore find Contentions 60 and 63 are without merit.

VIII.B. Wind Shifts (Contention 64)

VIII.B.1. Effect of Wind Shift on Emergency Plan

This contention asserts that the wind shifts quickly on Long Island and that it will be necessary in an emergency to evacuate all zones within a 7- to 10-mile radius, lest shifting winds move the plume to an occupied area.

It is presently planned that protective actions will apply to persons located in a "keyhole" made up of a 360° area immediately around the plant, plus a downwind wedge of at least 67°. Depending on projected dose, the recommendation will comprise:

- a) a 2-mile radius without a downwind sector,
- b) a 2-mile radius plus a 5-mile downwind sector,
- c) a 5-mile radius plus a 10-mile downwind sector.

ff. Tr. 8760, at 40; Tr. 8950 (Watts); Baldwin *et al.*, ff. Tr. 12,174, at 62. Zones affected by the 5-mile recommendation actually extend to about 7 miles in all but one zone. Thus the actual evacuation in many cases would be near the 7-mile minimum the contention suggests. Cordaro *et al.*, ff. Tr. 8760, at 41. The LILCO witnesses also testified that if weather forecast information predicted a change in wind direction the protective action could be recalculated and a new action could be recommended. *Id.*

In a study of wind direction variability (*id.*, Attach. 19), a series of nine sites was compared. Shoreham is a coastal location. Coastal locations generally have less variability than inland or valley locations, and Shoreham had less variability than the other coastal locations studied. *Id.*, Attach. 19, Table 2. That study would not, however, have accounted for wind shifts occurring 5 or 6 miles from Shoreham since it used data from the Shoreham meteorological tower. Tr. 8987 (Daverio).

The possibility of wind shifts induced by the sea or by Long Island Sound was explored on cross-examination. Breezes such as these are induced at shore locations when a body of water and the adjoining land warm or cool differentially because of the different thermal characteristics of land and water. Tr. 8958-63 (Cordaro). LILCO is using data from

the Brookhaven National Laboratory meteorological tower to refine its knowledge of how such phenomena could affect wind shifts. Tr. 8963-64 (Daverio).

Board examination elicited the fact that wind shear, a variation in wind direction or wind speed at different altitudes, can occur in this part of Long Island. Tr. 8926-79 (Cordaro, Watts). Thus the direction in which a plume would travel might depend on the altitude. The principal method of correcting for this would be to select wind data appropriate to the level at which the release is occurring during an emergency. Tr. 8977-78 (Watts).

VIII.B.2. Conclusion (Contention 64)

Having considered all of the above matters, we conclude no change in the emergency plan is needed. Actual wind shifts at the Shoreham site are less frequent than for many other sites. Even if shore breezes or wind shear induced changes in plume direction some distance away, accommodation could be made at the time of the emergency. The notion that a large circular zone should always be evacuated seems to the Board to be inconsistent with the notion of the "range of protective actions" mentioned in 10 C.F.R. § 50.47(b)(10). Under any circumstances, during an actual emergency one would confirm the plume trajectory by field surveys and real-time meteorological measurements. Tr. 8964-65, 8978-79 (Watts).

We see no need to change present planning, and find Contention 64 is without merit.

VIII.C. Nomogram (Contention 49)

VIII.C.1. Identification of Witnesses

LILCO presented testimony of Dr. Matthew C. Cordaro, Charles A. Daverio, and Richard J. Watts. Dr. Thomas E. Baldwin, Roger B. Kowieski, Philip H. McIntire, and Joseph H. Keller testified on behalf of FEMA.

VIII.C.2. The Issue

Contention 49 was rewritten by the Board. The circumstances were as follows: In our Order Ruling on LILCO's Motion for Summary Disposition of Contentions 24.B, 33, 45, 46 and 49 (April 20, 1984, unpublished), we noted that we found a limited issue of fact centering around the subject nomogram, since the FEMA-RAC review had said:

[T]he nomogram which relates iodine to total fission products for the calculation of thyroid dose (OPIP 3.5.2 Attachment 11) may not be realistic in this aspect [that "even without core damage, radioiodine may be collected on the particulate filter if the iodine is in elemental form." Therefore, one cannot rule out activity on the particulate filter as not being iodine.] Furthermore, the amount of fission products collected from a core damage accident are [sic] highly dependent on a number of parameters, such as moisture in containment, filtration of release, distance from the site, etc., and are [sic] not easily amenable to the nomogram assumptions.

Cordaro *et al.*, ff. Tr. 13,909, at 7; FEMA-RAC Review at 29. The re-written contention states:

The nomogram which relates iodine to total fission products for the calculation of thyroid dose (OPIP 3.5.2, Attach. 11) is not realistic. Thus, there is no assurance that this procedure will provide reliable data for use in making protective action decisions. Accordingly, there is no compliance with 10 C.F.R. § 50.47(b)(9).

We noted that the nomogram was used only in connection with calculations done in a manual backup mode, but felt its potential lack of realism might present a safety issue.

The nomogram, fundamentally a multiple alignment chart, is a mathematical tool used for estimating projected thyroid dose from radiological measurements taken in the field. Cordaro *et al.*, ff. Tr. 13,909, at 9, Attach. 1. To make the field measurements, air in the radioactive plume engendered by the emergency is drawn through a sampling canister consisting of an absorbent medium (capable of trapping gaseous radioiodine) surrounded by a fine paper filter (capable of trapping particulate matter of various sorts, including particulate matter containing radioiodine). The radioactive materials on filter and absorber are separately measured, and the results are used, with a calculation sheet and the nomogram, to calculate the radiation dose to the thyroid that would be received by persons in the plume. *Id.* at 10-12. While the absorber collects only radioiodine, the filter collects both that and other radioactive materials. *Id.* at 11. The nomogram corrects for the ratio of radioiodine to total radioactivity on the filter. *Id.* at 8. That ratio actually depends on various release conditions. It was therefore calculated for a variety of accident sequences and a value (which is time-dependent) was selected to represent the most probable ratio. *Id.* at 13; Tr. 13,920 (Watts).

Although it may not be completely clear from the material quoted above, FEMA apparently objected not only to the possible inaccuracy involved in using an average ratio but also to a statement in OPIP 3.5.2 to the effect that the particulate activity could be ignored in calculating radioiodine dose if no core or fuel damage had occurred. Cordaro *et al.*, ff. Tr. 13,909, at 12, Attach. 4. The latter objection will be eliminated by

modifying the procedure to include the filter activity whether or not there is core or fuel damage. *Id.* at 12.

The Intervenors would have us find that the inherent inaccuracies of the method are unacceptably large. I.F. 500-502. They cite cross-examination in which LILCO's witness admits that the nomogram could introduce a 50% error. Tr. 13,926-27 (Watts).

VIII.C.3. Conclusion (Contention 49)

LILCO is correcting one of the flaws that FEMA apparently noted in the nomogram's associated procedures, *viz.*, the instruction that would ignore particulate radioiodine for undamaged core accidents. The inaccuracies inherent in such a field estimate would include those of measurement and data collection, regardless of the analytical method used. If a backup manual method of the sort involving the nomogram were to involve uncertainties of the order of 50%, the Board would not deem that excessive. We find Contention 49 is without merit.

IX. EVACUATION (CONTENTIONS 65, 23.D, 23.H, 66, 97, 24.F.2, 24.I, 67)

IX.A. Evacuation Time Estimates (Contentions 65, 23.D, 23.H)

These contentions and their subparts allege that true evacuation times will be longer than those estimated by LILCO because a number of factors, all of which would delay traffic, have not been considered during the modeling process. The subcontentions specify faulty mobilization time estimates, accidents, road construction, vehicles running out of fuel, congestion, faulty performance of traffic guides, large numbers of school buses, ambulances, and trains, stress and anxiety in drivers, needs of special facilities, and ineffective route spotters as factors that have not been considered by LILCO and that would lead to longer evacuation time estimates if taken into account. The County and State witnesses presented testimony largely consisting of assertions that these and similar factors might occur in an evacuation and that their effect would be to lengthen time estimates by some unspecified amount. The County also presented the results of alternative traffic modeling showing their estimates of likely evacuation times in the Shoreham EPZ and surrounding area under the assumption of a very large evacuation shadow arising from outside the EPZ.

IX.A.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, John A. Weismantle, and Edward B. Lieberman. Testimony on behalf of Suffolk County was given by Richard C. Roberts, Joseph L. Monteith, Philip McGuire, Michael J. Turano, Jr., and Edwin J. Michel. Additional County testimony was presented by Dr. Susan Saegert, Dr. Bruce William Pigozzi, Peter A. Polk, and Dr. Philip B. Herr. New York State's witnesses were David T. Hartgen, Richard D. Albertin, Robert G. Knighton, and Foster J. Beach, III. The NRC Staff presented testimony of Dr. Thomas Urbanik, II. FEMA presented the testimony of Philip H. McIntire.

IX.A.2. Guiding Principles

Emergency planning is guided by general principles which are listed below and which will guide the Board's evaluation of evidence. There exists no significant dispute among the parties concerning the principles, which the Board adopts from LILCO's testimony, because they are consistent with the guidance of NUREG-0654. Cordaro *et al.*, ff. Tr. 2237, at 13-15.

The purpose of emergency planning is to achieve dose savings to the general public in the event that radioactive material is accidentally released off site. There is no minimum standard of public radiation dose which must be met in emergency planning.

Absolute protection of the public against all radiation doses cannot be guaranteed and is not required for all possible accident scenarios.

The emergency response plan should not be developed for any specific preconceived accident sequence. It should instead be framed to cope with a spectrum of accident possibilities including the worst accidents.

There is no standard time required to be met for evacuation in a radiological emergency. Estimates are necessary to determine accurately the actual time required for evacuation. These estimates are needed to aid in protective action decision-making.

No massive investment of resources (stockpiling of supplies or construction of hospitals) are required for emergency planning. We will apply a practical standard of efficiency of utilization of existing resources (such as roadways and manpower) in evaluating the acceptability of the evacuation plan.

IX.A.3. Description of the Shoreham EPZ

The Shoreham Nuclear Power Station is situated on the north coast of Long Island facing Long Island Sound. Roughly half of the nominal

10-mile plume EPZ extends to the north into the open water of Long Island Sound. The 1985 projected population of the south half of the EPZ is 138,500 in winter and 160,000 in summer. The population is not evenly distributed throughout the south half of the EPZ but is more concentrated in the west and southwesterly portions than in the easterly portions. Prevailing winds are toward the offshore (northerly) direction over 30% of the time and toward the easterly direction 35% of the time. Topography on Long Island and within the EPZ is generally flat, with hills and bluffs along the north shore. The Long Island Expressway (LIE), which has three lanes plus shoulder in both directions, passes through the EPZ in an east-west direction. Several other east-west roads with smaller traffic capacity pass through the EPZ. *Id.* at 17-18.

IX.A.4. The DYNEV Traffic Model

KLD Associates (KLD) used a computer model termed DYNEV to simulate evacuation of parts or all of the Shoreham EPZ. These simulations resulted in estimates of evacuation times for twenty-one different scenarios including partial or staged evacuations, total evacuation of the 10-mile EPZ, and evacuations under adverse conditions. The results for these scenarios are given in Appendix A of the LILCO Plan. These estimates are the ones that would be relied on by decisionmakers to make protective action recommendations in the event of an emergency at Shoreham. *Id.* at 41-43, Attach. 5, 6, Table 1.

KLD examined fifteen additional scenarios in response to concerns raised in this litigation. These were examined to determine the effect on evacuation times of the shadow phenomenon, accidents, uncontrolled evacuation, noncompliance by evacuees with recommended routes, and creating an additional route. *Id.* at 44.

The Board finds that the DYNEV model is conceptually sound for the purpose of estimating evacuation times and has been subject to reasonable validation in the past at locations other than Long Island. KLD developed the model and has used conceptually similar models for other applications, and its expert, Mr. Lieberman, demonstrated impressive knowledge of its details and use at the hearing. *Id.* at 19-39. Contentions 65.A through 65.H do not attack the intrinsic validity of the DYNEV model. Rather, they challenge specific aspects of its implementation and use when applied to the case of evacuation of the Shoreham EPZ. The Board will turn to the issues of implementation in due course. At this point the Board finds that the DYNEV model is valid and reliable for the use intended. KLD is a recognized authority on traffic simulation models. Urbanik, ff. Tr. 3430, at 7; Tr. 3491-93 (Urbanik).

The LILCO methods for estimating evacuation time around Shoreham follow the guidance of NUREG-0654, Appendix 4. That guidance requires (1) consideration of an accounting of permanent, transient, and special facility populations in the plume EPZ; (2) an indication of the traffic analysis method and the method of arriving at road capacities; (3) consideration of a range of accident scenarios generally representative of a range of normal through adverse conditions of evacuation; (4) consideration of confirmation of evacuation; (5) identification of critical links and need for traffic control; and (6) use of methodology and traffic flow modeling techniques for various time estimates consistent with the guidance of NUREG-0654, Appendix 4. Urbanik, ff. Tr. 3430, at 5-6.

There is no technical necessity for revalidating the DYNEV model each time it is used in a new setting. Tr. 2518-19 (Lieberman). KLD researchers, however, performed roadway surveys and vehicle headway measurements in Suffolk County to obtain site-specific calibrating data needed to run the model. Cordaro *et al.*, ff. Tr. 3897, at 6-7; Tr. 2522-26 (Lieberman).

The DYNEV model does not contain specific provisions for modeling the concerns listed in Contention 65. There are, for example, no specific weather model, no specific aggressive driver model, and no road construction model in DYNEV. Tr. 2736-38 (Lieberman). The DYNEV model can be used to take account of the factors in contention since to the extent the County's concerns affect traffic, they do so by altering the routes chosen or more importantly the capacity of the roadway network. The mathematical quantity "capacity" is the surrogate in the model for many of Intervenors' concerns about traffic delays in the real world. The disputes framed in Contention 65 therefore focus on the technical question of whether the "capacities" for roadway links and intersections used by KLD in running the DYNEV model were correct.⁶ If they were, then the time estimates for evacuation are correct. If capacities used in modeling should have been smaller, then time estimates for evacuation would be longer than tabulated in Appendix A of the LILCO Plan. Hartgen *et al.*, ff. Tr. 3695, at 7-11. (There are variations on this theme, for example, contentions dealing with the shadow phenomenon where the population that must be accommodated is postulated to be larger than the population of the EPZ.)

⁶ The actual model formulation is more complex than represented here. The DYNEV model actually consists of three submodels dealing with traffic assignment, capacity, and traffic simulation. The dispute, however, centers principally on capacity or the likelihood of "traffic delays." Capacity is defined as maximum "vehicles/hour" that can be served by specific links and intersections in the roadway network. Capacity is influenced or affected by density of other vehicles, turning movements, traffic signals, human responses, and other factors. Cordaro *et al.*, ff. Tr. 2337, at 19, 21-22, 26-30.

KLD estimated traffic capacity in the County by surveying the EPZ road network and measuring peak (rush-hour) queue discharge headways. Cordaro *et al.*, ff. Tr. 2337, at 33-34. KLD also used data from the Suffolk County Police Department on roadway capacity. *Id.* at 33; LILCO Plan, Appendix A, III-17 to III-33a. The Board has reviewed the capacity figures tabulated in Appendix A of the LILCO Plan and has found no obvious systematic bias in KLD estimates relative to the County's, although the individual estimates frequently differ. New York State argued that capacities should have been based on formulas found in the *Highway Capacity Manual* published in 1965. Hartgen *et al.*, ff. Tr. 3695, at 7. However, the Board finds KLD's methods and results reasonable even though alternative methods exist, particularly since KLD's methods are consistent with procedures contained in a newer manual published in 1980. Cordaro *et al.*, ff. Tr. 3857, at 10-11; LILCO Exh. 11. KLD reduced its capacities by 15% wherever congestion occurred to allow for uncertainty in driver behavior and traffic direction. *Id.* at 30.

IX.A.5. Evacuation Statistics

The Board tabulates on p. 786 certain statistics concerning the evacuation to establish a perspective on the magnitude of the task and the conditions likely to prevail in an evacuation and also because we will have occasion to reference them frequently. For the purpose of illustration we use only LILCO's base case (case 12), although about thirty-six cases have been analyzed.

IX.A.6. Contention 65.A

Contention 65.A alleges that the mobilization time used in the LILCO estimates is too short because it does not allow for time to become aware of the emergency, time needed to reunite families, and time to gather provisions before evacuating, and travel within the EPZ during the mobilization period (work to home, home to school, and so forth) that will create traffic congestion which will lengthen mobilization travel.

IX.A.7. Effect of Mobilization Travel on Evacuation Time (Contention 65.B)

This contention asserts that mobilization travel will add to traffic congestion arising from evacuation travel, and this will lengthen evacuation time estimates. The Board discusses Contentions 65.A and 65.B together because of their similarity.

Statistics Describing Evacuation of Entire EPZ Under Normal Conditions

		Reference
Total trips required	52,548	KLD Tm-140, Table 2
Vehicle miles	303,928	KLD Tm-140, Table 2
Projected 1985 EPZ population (summer)	159,959	App. A, Table III
Average speed of vehicles during congested flow	6.8 mph	App. A, at V6
Average trip length	5.8 miles	KLD Tm-140, Table 2
Calculated time to evacuate EPZ ⁷ (mobilization time included)	4 hr, 55 min	App. A, Table XIV, case 12

LILCO defines mobilization time as the time from the first notice to evacuate until the first person begins an evacuation trip. The mobilization time used in the Plan is 20 minutes. After 20 minutes, evacuation trip generation begins and lasts for 2 hours. The Plan as formulated recognizes that the majority of people within the EPZ need more than 20 minutes to prepare to evacuate. Some people could take as long as 2 hours, 20 minutes, the time used by KLD in its analysis, to become informed, reunite families, and make pre-evacuation trips. The variation in preparation time is accounted for by distribution functions that describe overall population behavior. Cordaro *et al.*, ff. Tr. 2337, at 48-49. Dr. Herr proposed a different definition of mobilization time that encompassed the time from notification to the time the last car departs on an evacuation trip. The Board did not find this definition useful because it would make no substantive difference to the overall evacuation time estimates of KLD.

Dr. Herr sought to undermine KLD's mobilization time estimates by employing a detailed breakdown of the components or specific tasks that

⁷ KLD has calculated an absolute lower bound for an EPZ evacuation time of about 3 hours, 30 minutes. This estimate is based solely on consideration of existing capacity of major east-west roadways in or near the EPZ and the number of vehicles to be evacuated. No other modeling of traffic was performed in reaching this conclusion, and the Board does not rely on it. However, it does establish a point of comparison that might assist in assessing the reasonableness of other estimates. Tr. 2756-57 (Lieberman). It also establishes in the Board's view that the County roadway network does not contain any ultimate barrier to evacuation of the EPZ within the times calculated using the DYNEV model.

must be accomplished during mobilization and trip generation. Herr, ff. Tr. 2909, at 6-11. He did not, however, show how this detailed analysis would lengthen trip generation times estimated by KLD, but rested on the assertion that KLD had no factual basis for its estimate. His examples show that some people (i.e., families with children) could have longer-than-estimated mobilization times, but the Board is not told how this would affect the distribution of mobilization times for the entire population that must be evacuated. Herr, ff. Tr. 2260, at 14-18. The Board agrees, however, that LILCO's mobilization time is partly judgmental in nature, although some foundation exists from previous Suffolk County planning and from commuter surveys. Tr. 2601-02 (Lieberman).

A telephone survey of commuter travel times to and from work shows that the mean travel time is 30 minutes. Among all commuters 47.3% have work-to-home travel times of 20 minutes or less. Over 91% make the trip in under 90 minutes. KLD's assumption that the first trip occurs at 20 minutes after notification is judgmental in nature but reasonable in light of the fact that some people will already be at home and a substantial number of others could return home in 20 minutes or less. Cordaro *et al.*, ff. Tr. 2337, at 49-51, Attach. 9, Table 8.

Sensitivity analysis of mobilization times by KLD shows that overall evacuation time is insensitive to the amount of time it takes to mobilize within certain limits. When the model was run using 3 hours instead of 2 hours for trip generation, the time required to complete the evacuation of the 10-mile EPZ was 4 hours, 55 minutes in both cases. *Id.* at 53-54, Attach. 6, cases 12, 21.

The road network will function under saturated conditions for most of the period of an evacuation. Tr. 3452-54 (Urbanik). This is a situation in which traffic demand rate exceeds the capacity of the roadways to accommodate traffic and is characterized by stop-and-go traffic and cars standing or moving slowly in queue. The overall evacuation time estimates are made for saturated conditions. The insensitivity of evacuation time to mobilization time is due to the saturated conditions of the roadway network, since capacity, not mobilization time, controls evacuation time. Cordaro *et al.*, ff. Tr. 2337, at 54-56. The Board's interpretation is that the KLD model predicts that, for many evacuees, waiting and delay will be inevitable. Many of those who mobilize early will be delayed in traffic queues; those who mobilize late will be delayed at home. The overall time of evacuation is unaffected by where the waiting occurs as long as trips are started sometime within the estimated trip generation time. *Id.* at 54-57. The model has no capability to predict what human behavior will be. The Board therefore cannot know from the calculations how many people will choose not to evacuate or how many will take

longer than about 5 hours after notification to begin their evacuation. The Board notes, however, that those who evacuate late (beyond about 5 hours) in the process will enter a roadway network that will be unsaturated and therefore no longer capacity-constrained because the evacuation of others will already have occurred. Individuals who evacuate late in the process would lengthen the evacuation time by the equivalent trip generation time as asserted by Dr. Herr (Herr, ff. Tr. 2909, at 11); however, they should be able to evacuate promptly without encountering the delays that will be experienced at the peak of evacuation.⁸ Cordaro *et al.*, ff. Tr. 2337, at 55-57.

IX.A.8. Conflicts Between Pre-evacuation Traffic and Evacuation Traffic

Preparatory trips before evacuation might be undertaken to reunite family members or to obtain needed supplies. Work-to-home trips constitute the largest proportion of these trips if an emergency occurs during normal business hours. *Id.* at 58.

Roadway saturation due to evacuation traffic begins about 40 minutes after the first evacuees depart from their homes. KLD estimates that 87% of work-to-home trips are completed within 40 minutes after the start of evacuation, and PRC Voorhees (Intervenors' experts) estimates that 93% of the work-to-home trips are completed at this time. Thus, according to the modeling that has been done by both parties, the preliminary work-to-home trips should be nearly complete by the time capacity-constrained traffic flow due to evacuation begins. *Id.* at 58-59.

Work-to-home traffic will be multidirectional in the network, whereas evacuation traffic will flow in generally westerly directions. Traffic flowing in directions that are opposite to evacuating traffic will have little impact on the evacuation unless the flows merge or cross. Traffic guides would be of assistance in preventing nonevacuating traffic from turning across heavy flows of evacuating traffic. When evacuating traffic is queued and moving slowly, evacuating traffic will likely permit other traffic to make turns because under those conditions there is no impact on overall evacuation time. Urbanik, ff. Tr. 3430, at 11; Tr. 3441-43 (Urbanik).

⁸ Although no party has raised it, the Board notes that the average trip distance to evacuate is 5.8 miles. If impedance from neighbors were absent, an individual might evacuate that distance at free-flow speeds. If an individual's speed fell in the range of 30-50 mph, the average distance could be traveled in 0.19-0.12 hour (11-7 minutes).

The condition postulated by the contention contains some implicit double counting of vehicles and some shifting assumptions. KLD assumed that evacuation trips begin from home and did not explicitly model preliminary work-to-home trips. That element of realism is missing from the model, but the Board thinks the omission harmless because in the final analysis a fixed road network having known capacity must accommodate 50,000 vehicles regardless of the scenario. It is logically impermissible to retain the results that flow from the KLD scenario while adding a new assumption of work-to-home trips. This is true because people and vehicles cannot be in two places at once. If in an alternative analytical scenario a large, previously unmodeled volume of work-to-home trips is included, the evacuation traffic volume cannot be simultaneously as large as that modeled under KLD's assumption because the total number of vehicles that must be accommodated remains unchanged. Tr. 3441-45 (Urbanik). Logic alone dictates that the work-to-home traffic volume and the evacuation traffic volume at any instant must be to a significant degree inversely related, since it is largely the same population of vehicles that contributes to both volumes. Commuters are going to first drive home, pick up their families, then evacuate, according to Suffolk County's undisputed assertion. Given that scenario it is clear that work-to-home trips and evacuation trips cannot peak simultaneously but instead must occur in sequence. All parties agree that the work-to-home trips can be substantially completed within some 40 minutes of the commencement of evacuation. The Board therefore does not believe that there will be extreme conflicts between pre-evacuation traffic and evacuating traffic that could have the aggregate effect of altering the estimates significantly, and we do not accept the Suffolk County Police panel analysis on this point. Roberts *et al.*, ff. Tr. 2259, at 11. Neither do we accept Dr. Pigozzi's interpretation of work-to-home travel and evacuation travel. Figure 3 of his testimony does not show a conflict between the two sources of travel because his work-to-home curve shows the cumulative percentage of commuters arriving home (i.e., leaving the roadway network) while the evacuation curve shows cumulative percentage of evacuees departing (i.e., entering the network). Pigozzi, ff. Tr. 2909, at 13, Fig. 3. The Board also discounts New York State's assertion that a traffic surge might occur. Hartgen *et al.*, ff. Tr. 3695, at 11. The effect on the network could well be to cause earlier congestion; however, this could result in shortened evacuation times for the network as a whole. Cordaro *et al.*, ff. Tr. 3857, at 14-15.

The Board discounts Suffolk County's assertion that pre-evacuation trips to acquire supplies will have a significant impact on overall evacuation times. Although such trips could occur, the Board sees no basis in

the County testimony for postulating a traffic volume from this source so large as to change the pattern of saturated flow conditions in the roadway network. The Board agrees with LILCO that supplies will be easy to acquire outside the EPZ and that most people will recognize this fact. Cordaro *et al.*, ff. Tr. 2337, at 59. The number of such trips will therefore be minimal, and they will have no significant impact on EPZ evacuation time.

IX.A.9. Traffic Guides and Traffic Congestion (Contention 65.C)

This contention asserts that the LILCO traffic control plan using traffic guides would add to traffic congestion. This is assertedly so because screening of motorists' choice of route will impede traffic flow; drivers will react aggressively to directions from traffic guides; guides will give directions contrary to traffic signals, causing confusion; and some of LILCO's prescribed routes will be contrary to motorists' perception of the quickest way out of the EPZ.

IX.A.10. Suffolk County's Concerns

Suffolk County's concern is whether LILCO's traffic control plan can be implemented. Witnesses for the County asserted several reasons why people would deviate from the routes prescribed in the plan. People will have their own perceptions as to which is the "best" route, or they may wish to travel to a destination that cannot be reached by the prescribed route, or in an emergency situation people are likely to ignore prescribed routing information because of stress. Pigozzi, ff. Tr. 2909, at 20-22; Herr, ff. Tr. 2909, at 20, 23-24; Saegert, ff. Tr. 2259, at 3, 11; Roberts *et al.*, ff. Tr. 2260, at 30-34. The County also asserted that attempts by LILCO to "discourage" drivers from seeking alternate routes would result in delay. Roberts *et al.*, ff. Tr. 2260, at 46; Herr, ff. Tr. 2909, at 30-31. This would also result in drivers displaying aggressive behavior toward LILCO's traffic guides. Saegert, ff. Tr. 2259, at 13-14; Roberts *et al.*, ff. Tr. 2260, at 49. The County is also concerned that traffic direction in conflict with signals will cause confusion, which will in turn lead to a reduction in traffic speed and an increase in accidents. Pigozzi, ff. Tr. 2909, at 34-35; Herr, ff. Tr. 2909, at 32; Roberts *et al.*, ff. Tr. 2260, at 52.

IX.A.11. Reasons for Traffic Guides

LILCO's traffic control plan is given in detail in § IV of Appendix A of the LILCO Plan. Its purpose is to minimize evacuation time by using special traffic control tactics to limit many potential bottlenecks in evacuation traffic by using up to 138 traffic control posts manned by LILCO traffic guides. The guides will facilitate traffic flow and will attempt to ensure compliance with routes specified in the plan to the extent possible. Cordaro *et al.*, ff. Tr. 2337, at 60-61.

IX.A.12. Reasons for Route Recommendations

The Plan provides for identification of preferred routes out of the EPZ that would be marked by signs. Traffic guides would facilitate flow of traffic along these routes. Route identification is needed as a substitute for the equilibration process that normally occurs in traffic networks wherein drivers learn by experience and repetition which routes will take them to their destination most expeditiously. The evacuation scenario is different from normal traffic flow because of the need to travel away from the nuclear plant and because the Plan contemplates a general flow toward destinations west of the EPZ. The general population is unfamiliar with this flow pattern and will obviously have no collective opportunity to rehearse it. There is little chance for a natural equilibrium flow to be established in an evacuation. The computer simulations of route selection substitute for this natural process. Tr. 2436-38 (Lieberman); Tr. 2479-80; LILCO Plan, Appendix A, III-4. The Board does not rely on Dr. Pigozzi's criticism of LILCO's equilibrium flow modeling because the foregoing shows that LILCO has not made the assumptions of normal conditions he attributes to them concerning equilibrium models. Pigozzi, ff. Tr. 2909, at 32-33.

It is reasonable to recommend specific routes to the public during an evacuation based on traffic modeling because natural equilibrium conditions will not prevail in an evacuation. The guidelines of NUREG-0654 recommend implementing traffic control strategies to try to reduce evacuation time. This is particularly significant where, as at Shoreham, there is a capacity-constrained road network. The routes recommended to the public in Appendix A, Revision 3, of the Plan are reasonable. Tr. 3435-36 (Urbanik).

IX.A.13. Effect of Noncompliance with Model Results

The results from KLD studies show that if the traffic control plans work as expected, then evacuation of the Shoreham EPZ can be accom-

plished in about 4 hours, 55 minutes. (The Board prefers not to overstate the precision with which this might be done. It is more realistic to think of this estimate as being approximately 5 hours with the understanding that KLD believes on a subjective basis that a real evacuation might be accomplished within about 30 minutes either way of that nominal estimate.) Cordaro *et al.*, ff. Tr. 2337, at 62; Tr. 2749-51 (Lieberman). If the evacuation had to be done under uncontrolled conditions without traffic guides (but with route compliance), the evacuation time would increase to 6 hours, 30 minutes under normal roadway conditions and to 7 hours, 55 minutes (about 8 hours) under adverse winter weather conditions. Cordaro *et al.*, ff. Tr. 2337, at 62, Attach. 6, cases 24, 25. Evacuation time for the entire EPZ is relatively insensitive to the assumption that evacuees will comply with the evacuation routes prescribed in the Plan. *Id.* at 66-73, Attach. 12. If 25% of the population failed to follow recommended evacuation routes while traffic guides were in place, there would be no effect on evacuation times. If 50% of the population deviated from recommended routes with traffic guides in place, the time to evacuate would increase by about 30 minutes (from 4 hours, 55 minutes to 5 hours, 30 minutes). *Id.* at 69, Attach. 6, cases 12, 31, 32. In cases where either 25% or 50% noncompliance with prescribed routes was postulated and no traffic guides were present (noncompliance — uncontrolled cases), the evacuation time did not increase relative to the uncontrolled case. Evacuation could still be accomplished in either 6 hours, 30 minutes under normal roadway conditions or about 8 hours under adverse winter conditions. *Id.* at 69, Attach. 6, cases 24, 33, 34.

In view of the quantitative results describing the comparatively low sensitivity of evacuation time to route compliance and traffic control, the Board finds Dr. Herr's discussions of subzone routing for different classes of individuals or conditions or lack of compliance with traffic guides unpersuasive. Herr, ff. Tr. 2909, at 19-27. Similarly, since there will be no screening of traffic by traffic guides, the Board places no reliance on his analysis of screening. *Id.* at 28-31.

Overall evacuation time is not sensitive to deviations in route compliance by drivers because tradeoffs occur with regard to alternative routes and destinations. Although details of traffic flow change with the scenarios analyzed, the tradeoffs on routes and destinations tend to cancel one another albeit not with perfect symmetry. Cordaro *et al.*, ff. Tr. 2337, at 69-70. Secondly, but possibly more importantly, the overall evacuation time for the EPZ is controlled by one segment in the northwest portion of the EPZ that is most densely populated. That segment sets the pace

for the overall evacuation effort, and nowhere else in the EPZ does deviation from recommended routes produce evacuation times longer than required to evacuate the critical segment. The impact of noncompliance for residents of the critical area west of the plant is minimal because the routes recommended in Appendix A are already the shortest path out of the EPZ, and the majority of the population has few viable alternative routes from which to choose. *Id.* at 71-72.

IX.A.14. Control of Traffic Flow in the EPZ

LILCO traffic guides will deploy traffic cones in the roadways and will use hand and arm signals to facilitate traffic flow. They will use these means to discourage traffic entry into the EPZ and to discourage traffic flow in nonprescribed directions. They will not screen traffic. No one will be denied the opportunity to travel in a nonprescribed direction if they choose. The Board finds that the planned function of the traffic guides is to facilitate voluntary compliance with the evacuation plan and to facilitate traffic flow through traffic bottlenecks that will develop in an evacuation. The guides are not instructed to exercise any authority to force evacuees to take any action against their will. *Id.* at 62, 76.

The Suffolk County Police panel identified a group of traffic posts where Appendix A does not properly describe the needed traffic control strategy. Roberts *et al.*, ff. Tr. 2260, at 18-19; Tr. 2679-87 (Lieberman). LILCO will correct all of the inaccurate descriptions. Tr. 2686-87 (Lieberman); A.F. 448. Review of compliance is delegated to the NRC Staff.

IX.A.15. Motorists' Response to Traffic Guides

Most motorists will follow traffic guides' directions that are contrary to traffic signals. Urbanik, ff. Tr. 3430, at 12. There are no data that would support a hypothesis of extreme confusion on the part of significant numbers of drivers in this situation. To the extent that traffic guides would be disregarded, however, the overall evacuation time would tend toward the estimate for the uncontrolled scenario, which is about 6 hours, 30 minutes instead of 5 hours. Cordaro *et al.*, ff. Tr. 2337, at 77-78.

IX.A.16. Aggressive Drivers

Driver aggressiveness toward traffic guides would have a small impact on evacuation time estimates. In order to affect evacuation time estimates that apply to the entire network of roads, the behavior must occur

with some substantial frequency, since time estimates apply to a large complex network of routes and destinations. Traffic guides will permit aggressive drivers to take any route they prefer if drivers insist, and therefore a possible cause of aggression will be absent. Furthermore, there is no factual basis for hypothesizing high frequency of aggressive behavior on the part of motorists, and the suggestion remains nothing more than speculation. In community emergencies people become more helpful to one another, not more aggressive. Cordaro *et al.*, ff. Tr. 1470, at 128-29. New York State's testimony about aggressive behavior at the Olympic Games demonstrates that the behavior is possible, but that it was limited in extent. There is no evidence that this factor affected the overall Olympic traffic system. Hartgen *et al.*, ff. Tr. 3695, at 15.

IX.A.17. Conclusion

The Board accepts Suffolk County's and the State's views that some instances of behavior cited in the contention are possible. However, that is not enough to conclude that the Plan will be unacceptably degraded or will fail, because we do not deal with an all-or-nothing problem in these contentions. We require quantitative assistance, which neither the County nor the State has supplied. There is simply no evidence or basis for accepting that the frequency of occurrence and consequences to roadway capacity of adverse behavior are quantitatively large enough to significantly alter overall evacuation time estimates beyond the bounds already presented by LILCO. The County and State witnesses did not fully confront the quantitative problem, but instead attempted to circumvent it by repeatedly postulating that successful execution of the evacuation plan depends on rigid and undeviating compliance by all persons. See I.F. 520. LILCO's evidence, however, shows that the evacuation plan is not as brittle as fine crystal but is in fact resilient and tolerant of reasonably foreseeable deviations from compliance.

The Board concludes that LILCO has employed a reasonable planning basis for its traffic control strategies and route recommendations. It is reasonable to plan to implement these strategies and recommendations in an evacuation, even though it is likely that full compliance by evacuees will not be achieved. Suffolk County and the State have proved that scientific uncertainty exists in the evacuation time estimates. LILCO has reasonably estimated the magnitude of uncertainty. The Board finds, therefore, that LILCO should incorporate a reasonable summary of the results of its sensitivity analyses contained in KLD Tm-140 into Appendix A of the Plan. The results should be accompanied by brief text that

alerts decisionmakers to the fact of uncertainty and the bounds of uncertainty in time estimates for a range of realistic accident scenarios. This requirement constitutes in our view an incremental improvement to the Plan, but does not involve any ultimate issue of its success or failure. The Board therefore delegates to the NRC Staff the responsibility for review and approval of this requirement.

IX.A.18. Time Estimates (Contention 65.D)

This contention asserts that LILCO has underestimated evacuation times and the estimates should be longer because factors such as traffic accidents, automobile breakdowns (including running out of fuel), absence of shoulders on some roadways, road construction or repair, and abandonment of vehicles have not been taken into account in traffic modeling.

Data from past evacuations do not support the proposition that traffic accidents will be so numerous as to lengthen evacuation times. A study of evacuations over a period of 13 years and involving 1.1 million people shows that accident rates during evacuations are lower than those given by the "National Motor Vehicle Accident Death and Injury Rates" apparently because of low vehicle speed and enhanced traffic control during evacuations. Cordaro *et al.*, ff. Tr. 2337, at 79-80.

IX.A.19. Projected Accident Rate

The parties dispute how many vehicle accidents are likely to occur during evacuation. LILCO predicts 4 accidents based on data drawn from the *Transportation and Traffic Engineering Handbook*, while Suffolk County predicts 141 accidents based on interpretation of the same source. *Id.* at 81; Polk, ff. Tr. 2909, at 11.

The difference arises because the County interprets the handbook data to show a functional relationship between actual vehicle speed and accident rate. That relationship appears to show accident rate increasing with decreasing vehicle speed. The County therefore believes that if the low average vehicle speed during an evacuation (as opposed to normal free-flow speeds) were taken into account, its calculation of 141 accidents is correct. LILCO responded that the County has misinterpreted the data and that the data really chart accident rate as a function of deviations from mean speed. The more a driver deviates from the speed of surrounding traffic, the more likely the driver will be involved in an accident. The graphs and accompanying text in the original manual support LILCO's interpretation, and the Board rejects the County's assertion

that a large number of accidents will occur. Cordaro *et al.*, ff. Tr. 2337 (Supp.), at 24-28, Attach. 4; Tr. 3452-54 (Urbanik). In an evacuation where all traffic moves at a speed of about 6.5 mph and there is no deviation from that speed by individual vehicles, the County's own methodology would show that the total would be about three accidents. Cordaro *et al.*, ff. Tr. 2337 (Supp.), at 26-27.

Evacuation from hurricane Carla in eastern Texas involved 300,000 persons evacuating a two-county area during a period of 6 hours. Two traffic accidents, neither of which caused injury or death, occurred. *Id.* at 80-81. National highway statistics show an accident frequency of one in 77,000 vehicle miles. Evacuation of the entire Shoreham EPZ would result in about 304,000 vehicle miles. At the national accident rate, four accidents would occur in an evacuation of the entire EPZ. Accident statistics from the State of New York and Suffolk County show accident rates close to the national average. *Id.* at 81.

Suffolk County's assertion that there are 10,000 incidents per year on the County portion of the Long Island Expressway (LIE) cannot be accurately assessed because the County did not supply the Board with vehicle miles traveled, a statistic that is needed to calculate accident rate. *Id.* at 82. In any event the Board knows from U.S. Department of Transportation highway statistics that the accident rate in the County does not differ significantly from the national average. *Id.* at 81. The County's raw incident totals on the LIE are not probative.

Suffolk County's citation of accident totals on the 1983 Fourth of July weekend is not helpful because the Board is not told the population or vehicle miles involved and therefore no reliable accident rate can be calculated. Herr, ff. Tr. 2909, at 41. The same problem occurs with the police data on accident totals in Suffolk County. Roberts *et al.*, ff. Tr. 2260, at 57-58.

Modeling runs performed by KLD simulating four simultaneous accidents at random locations show no significant impact on overall evacuation time estimates. Cordaro *et al.*, ff. Tr. 2337, at 85, Attach. 6, cases 12, 29, 30. The insensitivity is due to the fact that traffic impedance from heavy congestion is dominant over impedance from accidents. Cordaro *et al.*, ff. Tr. 2337, at 26, Attach. 11. Accidents, however, could happen at specific critical locations that have not been modeled. For example, an accident on the LIE at the western boundary of the EPZ could adversely affect evacuation times. Herr, ff. Tr. 2909, at 37. The time to clear such accidents would be about 15 minutes. Urbanik, ff. Tr. 3430, at 13.

IX.A.20. Vehicles Out of Fuel

Suffolk County alleges that roads will also be blocked because cars will run out of gas during the evacuation. Their estimate suggests that some 277 vehicles will be affected. Polk, ff. Tr. 2909, at 12-16. LILCO calculates that about ninety-six cars will run out of fuel. Cordaro *et al.*, ff. Tr. 2337 (Supp.), at 29-31. There is no need for us to resolve a purely academic dispute as to how this estimate was arrived at or how it might be in error, because there are common sense remedies for cars out of gas. By the County's own assertion some people will buy fuel before they evacuate. LILCO will post fuel trucks at seven locations to service cars out of fuel. *Id.* at 31. Tow trucks will be on the road to clear blockages. Urbanik, ff. Tr. 3430, at 13. Stalled cars can be pushed off the road. Cordaro *et al.*, ff. Tr. 2337, at 86-87. Drivers can coast off the road when they run out of gas. The Board therefore regards the dispute over these estimates as speculative and not in need of resolution. It is sufficient that the number of vehicles involved in actual road blockage would be modest relative to the total evacuating traffic and that reasonable means of mitigation exist.

IX.A.21. Adequacy of Shoulders

A physical survey of the roadway network established that in general all but one two-way/two-lane road in the network are sufficiently wide to permit traffic to flow in both directions with a disabled vehicle on the shoulder. A downward adjustment of capacity by 50% was made in studies of two-lane roads to allow for reduced rate of service caused by disabled vehicles. In studies of multilane highways, it was assumed that disabled vehicles caused the loss of one lane of service. This is conservative (i.e., predicts more delay than will actually occur) because in reality disabled vehicles would be pushed off the road and a full lane of service would not be lost. *Id.* at 85-86.

The Board accepts Suffolk County's assertions that there are specific sites along roadways where shoulders are inadequate. Roberts *et al.*, ff. Tr. 2260, at 60. We fail, however, to see the significance and will decline to speculate on the possible occurrence of blockage at specific sites of bridge abutments, lightposts, or other obstacles on road shoulders.

IX.A.22. Consideration of Road Construction

KLD did not include road construction and abandonment of vehicles on the roadway in its modeling studies. In KLD's view the location and effects of future road construction or repair are speculative. The effects

of abandoned vehicles should be negligible because the vehicles can be pushed off the road. *Id.* at 87.

The Board finds it reasonable not to speculate at this time on the possible effects of road construction on traffic in the future. Decision-makers at the time of an accident at Shoreham can take into account road construction and repair as part of their decisionmaking process. LILCO has committed to do this. Cordaro *et al.*, ff. Tr. 3857 (Supp. II), at 28. It is also reasonable to conclude that abandoned vehicles will not have an effect on the overall network evacuation times based on our analysis of accidents and cars out of fuel.

IX.A.23. Conclusion

The Board concludes that incidents of road blockage during an evacuation could occur from accidents or stalled vehicles. LILCO has established that the number of incidents are few, that the evacuation time is insensitive to a modest frequency of incidents and that means of mitigation are reasonably available. Contention 65.D has no merit.

IX.A.24. Contentions 65.E and 65.G

Contention 65.E asserts that LILCO's evacuation time estimates do not take into account added congestion due to evacuation of schools and special facilities. If the impact of these special evacuations is taken into account, the time estimates for evacuation of the EPZ would increase substantially. Contention 65.G asserts that the Plan does not contain evacuation time estimates for schools and special facilities. We consider these contentions together.

IX.A.25. School Dismissal Plans

Dismissal of schools within the EPZ is considered in the Plan in Appendix A, IV-167 to IV-172. Schools will be dismissed at the alert stage of an emergency instead of the general emergency stage. Public evacuation will not be ordered at the alert stage. There is therefore no realistic concern about the time it would take to reunite children with families or about the possible impact of school buses based on traffic congestion in any but the fastest breaking accidents. There is obviously no special provision needed for schoolchildren in accidents that happen outside the normal hours of school sessions or transportation (transportation and school sessions run from about 7:30 a.m. to 3:30 p.m. on weekdays). Cordaro *et al.*, ff. Tr. 2337, at 87-91. Children are transported to school

between the hours of 7:30 and 9:30 a.m. If an alert or higher level emergency should occur during that time, buses would be available to return children to their homes promptly. Similarly, for an incident occurring between 1:30 and 3:30 p.m., buses would normally be present to take children home during that period. The period from 9:30 a.m. to 1:30 p.m. is one in which buses are not present at schools and bus drivers are not with the buses. If an emergency occurred during this time, it could take up to 3 hours to mobilize bus drivers and return children home. In such cases the joint distribution of mobilization times for families with schoolchildren and for families without children produces an overall trip generation of the auto-owning public that is consistent with previous calculations and that therefore does not alter evacuation time estimates. *Id.* at 89-90, Attach. 10, Figs. 1, 2, and 3. The Board interprets these results to mean that families who must wait up to 3 hours for the return of children would indeed begin to evacuate later than they otherwise might. However, we have previously found that system evacuation time is insensitive to mobilization time. In a system where traffic demand exceeds road capacity, one family's delay translates into another's opportunity, with the net result that system capacity continues to be fully utilized and time to evacuate the system is not significantly affected. Only the order of departure among individuals is affected, a matter of no concern in emergency planning.

Even in the fastest breaking accident during which school buses could interact with evacuation traffic, the buses would have no significant effect on overall system evacuation time because their numbers are less than 1% of the total number of vehicles involved, and they would frequently travel along residential streets that are not evacuation routes. *Id.* at 91. The Board finds that the impact of school buses on traffic volume would be negligible.

The impact on traffic volume of ambulances, ambulettes, and buses needed to evacuate special facilities would be negligible because the total number of vehicles required is less than 1% of the total traffic volume. The impact of trains on evacuation traffic would also be negligible because there are separated grade crossings throughout the EPZ at all but one location. The Long Island Railroad could easily stop train traffic through the EPZ. *Id.* at 91-92.

Estimates of evacuation times for the four groups mentioned in Contention 65.G appear in the revised Plan in Tables XV and XVI of Appendix A. When schoolchildren evacuate with families their time to evacuate is the same as that of the general population. People dependent on buses will be evacuated in 4 hours, 30 minutes to 5 hours, 30 minutes under normal conditions. People in special facilities and the handicapped

at home can be evacuated in less than 8 hours under normal conditions and about 9 hours, 30 minutes under adverse conditions, following the notice to evacuate. *Id.* at 93-95, Attach. 13. We conclude that Contentions 65.E and 65.G are without merit.

IX.A.26. Driver Stress and Anxiety (Contention 65.F)

This contention alleges that stress and anxiety on the part of drivers will diminish driving skills and awareness and affect drivers' ability to make proper decisions. This, together with a "closed-in" feeling stemming from the geography of Long Island, will cause confusion, congestion, and accidents which would increase estimated evacuation time.

The population experiencing an emergency will be subject to elevated stress and anxiety. Saegert, ff. Tr. 2259, at 5-6. To the extent that there are behavioral consequences important to an evacuation, it is not clear whether stress and anxiety improve or degrade driver response. Cordaro *et al.*, ff. Tr. 2337, at 130-31.

It is beyond doubt that the evacuation traffic will be characterized by congested conditions. Drivers will encounter long queues of cars in a stop-and-go situation with forward speeds averaging about 6.8 mph. This will be stressful, particularly if there is a threat of radiation in the environment. Saegert, ff. Tr. 2259, at 6. However, given that LILCO's estimates predict high levels of congestion and very low travel speeds with only peripheral regard to stress, Suffolk County needs to do more than simply establish the existence of stress and anxiety. The County has not estimated the frequency of stressed drivers with diminished skills and has not demonstrated the consequences of such to roadway capacities. The Board does not regard it as intuitively clear that the consequences of stress or anxiety could be so great as to significantly increase the congestion in traffic already under congested and saturated flow conditions. We find Dr. Saegert's analysis of possible consequences speculative considering the likely traffic conditions. We are similarly unpersuaded that people's information-processing capability will be highly taxed under these conditions, since there seem to be few decisional options available to individual drivers who are caught in slow-moving traffic streams.⁹

Data from the literature on disaster research do not support the hypothesis that stress and anxiety during an evacuation have overall ad-

⁹ The Board notes, although no party has raised it, that the average speed of evacuation would be 6.8 mph and the average trip distance 5.8 miles. The average evacuee would therefore require under 1 hour to reach the boundary of the EPZ even though the system time for evacuation is 5 hours or more. We understand that some would take more and others less time. Nevertheless individuals will be required to tolerate traffic stress for a short time relative to the overall time required to evacuate the EPZ.

verse effects on the evacuation effort. In past public disasters, evacuations from hurricanes, floods, or even the accident at Three Mile Island were orderly and there was no increase in accident frequency. Although the Board agrees with Suffolk County that evacuating populations will be under stress and anxiety, we find no evidence of behavioral consequences of sufficient frequency and intensity to affect time estimates. Further, LILCO has produced research results showing that there has been essentially no behavioral impact on evacuation traceable to stress and anxiety in previous disasters. The evidence establishes further that populations will not panic in an emergency and that the "closed-in" hypothesis of the County is without foundation. Cordaro *et al.*, ff. Tr. 1470, at 130-35; Attach. 14, 15.

IX.A.27. Contention 65.H

Contention 65.H alleges that two route spotters will be ineffective because the number is not adequate and the spotters will not be able to move expeditiously in congested traffic.

The LILCO Plan calls for six (instead of two) route spotters in vehicles to monitor traffic flow and to report disabling accidents along major evacuation routes. If conditions permit, this function will also be performed from helicopters. However, the expected number of accidents is small, and those that occur can be reported and mitigated by other means. Therefore, while successful performance of route spotters would enhance the evacuation effort incrementally, that function is not critical to the success of the Plan. *Id.* at 95-96. The Board finds that there is neither technical imperative nor regulatory requirement for route spotters. It is clear to us that route spotters will neither perform ideally nor fail totally. We shall not apply a speculative gauge to measure their possible success at some future time.

IX.A.28. Numbers of Evacuees (Contention 23.D)

This contention asserts that excess evacuation will involve greater numbers of evacuees than assumed by LILCO in its time estimates. LILCO's estimates are therefore inaccurate and would increase substantially if voluntary evacuation were taken into account.

LILCO has estimated the impact of shadow evacuations on evacuation time. The results of the KLD study are contained in a report to LILCO labeled KLD Tm-77. Cordaro *et al.*, ff. Tr. 2337 (Contentions 23.C, 23.D, 23.H), at 13, Attach. 11. The KLD study examined five scenarios that involved 25 or 50% excess evacuation within 20 miles of Shoreham.

The scenarios postulated controlled evacuations at the 25% and 50% levels of excess; uncontrolled evacuations at the 25% and 50% levels; and evacuations at the 50% level under adverse weather conditions. *Id.* at 14-15. The study included consideration of the road networks both east and west of the EPZ as well as the EPZ network. All evacuees were assumed to travel west; however, evacuees from the east were assumed to skirt the EPZ instead of traveling through it. Tr. 2559-60 (Lieberman). The mobilization time for excess evacuees to the east and west of the EPZ was assumed to be 4 hours instead of 2 hours, which was assumed for the EPZ. *Id.* at 15-16; Tr. 2571-77 (Lieberman). The Board finds the assumptions reasonable for the purpose of estimation of the effect of excess evacuation.

The results of these analyses are given in detail in Attachment 11 and in tabular form in Attachment 15 (cases 22-28). Cordaro *et al.*, ff. Tr. 2337. The results show generally that for 25% overresponse arising from the 10- to 20-mile annulus around the plant, evacuation time of the EPZ would increase by 30 minutes or less in all scenarios. For 50% overresponse the results show an increase of 1 hour, 40 minutes or less. The case of 50% overresponse during winter inclement weather shows an increase of 2 hours, 10 minutes. *Id.* at 17-18.

These estimates establish that a postulated shadow phenomenon of reasonable dimension arising from regions outside the EPZ does not pose a barrier to evacuation of the EPZ. However, the lengthened estimates raise the possibility that in some cases a protective action recommendation (i.e., whether to evacuate or shelter) could be affected depending on whether and to what degree the shadow effect might occur during an accident. *Id.* at 18. We note that all estimates were made for evacuation of the entire EPZ and that the impact on time to evacuate would be less for partial (sector) evacuations. *Id.* at 19.

Suffolk County results from its own model showed that overall evacuation could take as long as 17 hours in summer and 11 hours in winter. Polk, ff. Tr. 2909, at 5; SC Exh. 6, 7. The very long clearance times are due to an assumption of excess evacuation from the entire east end of Long Island and a 20-mile EPZ radius elsewhere. Cordaro *et al.*, ff. Tr. 2337 (Supp.), at 3. The large traffic volume originates from outside the EPZ, however, and instead of entering it travels principally on Sunrise Highway to the south of the EPZ or on Horseblock Road to the west. *Id.* at 5, 15. In the County model all traffic that originates from within the EPZ reaches its boundary within 7 hours, 30 minutes. KLD's result for similar circumstances is 7 hours, 35 minutes. Thus, the models tend to confirm one another where similar assumptions are made. *Id.* at 23; *see*

also *Cordaro et al.*, ff. Tr. 2337, Attach. 10, Figs. 1, 3, 4. The Board concludes that the differences in modeling evacuation of traffic between the County and KLD do not arise from differences intrinsic to the models but from different assumptions of modelers.¹⁰ The County in its model has assumed a 20-mile evacuation radius except for evacuation of the east end arising from even further away,¹¹ and urges the Board to accept that Sunrise Highway should be included within the EPZ, although under the Plan it forms part of the southern border of the EPZ. Polk, ff. Tr. 2909, at 46; Herr, ff. Tr. 2909, at 53; *Cordaro et al.*, ff. Tr. 2337 (Supp.), at 12-17.

The Board rejects Suffolk County's modeling approach, not because we think its model intrinsically invalid, but because the County by choice of adverse underlying assumptions regarding route choices and numbers of motorists, has used it as a seemingly objective confirmation for these assumptions. Some of these assumptions are separately in controversy in this proceeding. Whether the so-called shadow phenomenon will occur is a matter in controversy that cannot be resolved by modeling, yet the County analysis is premised on an assumption of large excess evacuation from the entire east end of Long Island and of population elsewhere out to a radius of 20 miles. Since the Board accepts the basic validity of the County model, we also accept that if those conditions were fulfilled the time estimates would be reasonable. The running of the model, however, does not demonstrate that evacuation times will be as long as the model output indicates under more realistic conditions of route selection and number of motorists. Moreover, the Board rejects the proposition that Sunrise Highway, where long delays would occur, should be part of the EPZ. This would cause a gross distortion of evacuation time estimates which could not adequately ensure protection of the health and safety of persons within the EPZ.

We of course scrutinize LILCO's underlying assumptions by the same standards; however, we think that the KLD modeling exercise passes muster in this regard. The analyses by KLD were done not to prove various assumptions but to test their impact on overall evacuation times. The resultant sensitivity analyses yield estimates of evacuation times

¹⁰ The actual County assumptions of numbers of evacuees were 80% within the EPZ, 54-63% from 10 to 20 miles; and 48% from more than 20 miles east of the plant. *Cordaro et al.*, ff. Tr. 2337 (Supp.), at 13.

¹¹ We analyze the likelihood of shadow evacuation under Contentions 23.A, 23.B, and 23.C. The possible occurrence of a shadow evacuation presents fundamentally a human behavioral issue and not a highway engineering problem. We conclude in our analysis that some excess evacuation is possible, but we accept as reasonable that the excess response can be contained within acceptable bounds because the public is rational and will respond predominantly in accordance with information disseminated at the time of the emergency. (See § I.A, *supra*).

under various conditions that are in principle useful to future decision-makers because they place bounds on uncertainty as to how future events might progress. By contrast the Suffolk County results give us a single data point derived from extreme assumptions about human behavior, but they yield no useful perspective concerning the full range of possible outcomes of an evacuation. The County exercise provides an outlying data point on the continuum of sensitivity analyses performed by LILCO.

The Board concludes that LILCO has given reasonable consideration to the possible impacts of shadow evacuation on evacuation traffic arising from within the EPZ. The Suffolk County assertion that excess evacuation from outside the EPZ will increase time to evacuate is correct. LILCO's analyses give the magnitude of increase. The results show that excess evacuation poses no barrier to evacuation of all or part of the EPZ. We regard LILCO's sensitivity analyses as useful exercises that place bounds on our predictive uncertainty as to how evacuation might actually unfold. Thus, we do not adopt the longer estimates as anymore predictive than the base estimates. We simply accept that an increment of uncertainty on evacuation time exists.

IX.A.29. EPZ Perimeter Access Control (Contention 23.H)

This contention asserts that the LILCO Plan fails to provide adequate measures at the EPZ perimeter to control access to evacuated areas. Voluntary evacuees from the east end might travel into contaminated areas and receive health-threatening doses and would add to congestion within the EPZ.

LILCO will assign traffic guides at all major entrances to the EPZ whose assignment will be to discourage but not prohibit or screen entry to the EPZ. Cordaro *et al.*, ff. Tr. 2337 (Contentions 23.C, 23.D, 23.H), at 21. Some entrances will not be staffed; however, LILCO will rely on signs to discourage entry to the EPZ. This plan was developed to permit commuters who work outside the EPZ to reenter to reunite with families in an emergency. LILCO assumed that anyone who encounters traffic control devices in the roadway will be aware of an accident and will not seek to enter the EPZ if there is no reason to do so. Those who have no real need to enter the EPZ will be routed to the south to go around the EPZ. *Id.* at 22-23. The Board agrees with LILCO's witnesses that those who evacuate unnecessarily because of fear of radiation would also have strong motivation not to enter the EPZ from the east and that they would willingly comply with recommendations to take a safer route that skirts the EPZ to the south. Tr. 2558-64 (Lieberman).

The Board finds the LILCO plans for EPZ perimeter control reasonable. We cannot accept that citizens are so contrary in behavior that they will first evacuate a safe place against public instruction and then clamor in large numbers to enter an unsafe place again in conflict with public information. The problem posed in Contention 23.H is speculative and without foundation.

IX.A.30. Conclusion on Traffic Issues

The Board has carefully considered the testimony of LILCO and Suffolk County on traffic issues. The testimony contrasts the practical traffic experience of the police against the theoretical mathematical analyses of traffic modelers. The police have the greatest practical experience with traffic problems of any witnesses in the hearing. Their views on traffic problems could be of substantial weight and assistance in resolving the traffic issues before the Board.

The police testimony is focused on the proposition that rigid adherence to route compliance and the directions of traffic guides as modeled by LILCO is necessary to the successful implementation of the Plan. The Plan will fail, they say, because the necessary compliance cannot be achieved. The County presented a litany of ways in which noncompliance could happen. Roberts *et al.*, ff. Tr. 2260, at 12-13. In the opinion of the police, people will have their own views on the best route out of the EPZ and motorists will attempt to take nonprescribed shortcuts to avoid congestion which will result in lengthened evacuation times. *Id.* at 14-16. Traffic guides will be ineffective because there are an insufficient number of them; some intersections are not staffed; traffic channelization at specific intersections is poorly conceived; and traffic guides would not be obeyed. *Id.* at 16-28. This would lengthen evacuation times because actual behavior of motorists would cause a deviation from the optimal conditions that were modeled. *Id.* at 29. The police cite numerous examples based on their experience of possible conflicting traffic flows at specific locations (*id.* at 30-35), some of which LILCO acknowledges are correct. A.F. 448. They cite difficulties of controlling traffic even by police officers in uniform (Roberts *et al.*, ff. Tr. 2260, at 35-36), problems with upset drivers (*id.* at 37), problems with closed lanes (*id.* at 38), lack of route compliance on the part of drivers (*id.* at 37-38), and lack of experience of guides (*id.* at 39-44). The police panel believes that traffic guides would actually hinder evacuation because motorists might stop to talk, or argue with, or even assault the guides. *Id.* at 45-47. Aggressive behavior by motorists is likely, they believe, even though guides will not give orders or screen traffic. *Id.* at 49-51.

Other problems will crop up because of the likelihood of accidents (*id.* at 57-59), lack of shoulders on some roads (*id.* at 60), road construction (*id.* at 61), and abandoned vehicles (*id.* at 62-63).

We accept that instances of the type described by the County could occur in a real evacuation and we have no cause to reject the police experience on these matters. Clearly, the police have encountered many situations in their extensive careers. Our skepticism of their conclusions arises first from the implicit suggestion that the range of contingencies observed over lengthy careers will somehow systematically and malevolently converge to plague an unknown and unknowable 5- or 6-hour evacuation period. Second, they have not fully considered LILCO's mathematical analysis that shows the overriding effect of capacity-constrained flow or the sensitivity analyses performed by LILCO showing that rigid adherence to the conditions modeled is not necessary for a workable evacuation. LILCO's analyses confirm the police's subjective conclusion that evacuation times will be lengthened if traffic guides are disobeyed or if motorists do not conform to preselected routes. The mathematical analysis, however, tells how big the effect is likely to be. The police panel has proved that uncertainty exists in predicting future traffic flow but LILCO has estimated the magnitude of uncertainty. Neither party has explained how uncertainty can be reduced; nothing in the record tells which assumptions and contingencies would actually come to pass in a real emergency, and the Board rejects the notion of a malevolent convergence of all of them.

Dr. Pigozzi, a qualified expert in mathematical modeling, also asserted that evacuation time estimates should be longer than found by LILCO for basically the same reasons cited by the police. Dr. Pigozzi cites the likely occurrence of pre-evacuation trips (Pigozzi, ff. Tr. 2909, at 9-16); poor foundation for LILCO's 20-minute mobilization time (*id.* at 17-19); noncompliance with prescribed routes (*id.* at 19-25); arbitrarily assigned trip distributions (*id.* at 26-29); faulty use of an equilibrium model (*id.* at 30-33); unworkable traffic control systems (*id.* at 34-37); breakdown of traffic control (*id.* 37-38); impact of accidents and vehicles out of fuel and inadequate roadway shoulders (*id.* at 39-41); impact of buses and ambulances (*id.* at 43); reduced driving skills (*id.* at 43-44); and failure to account properly for shadow evacuation (*id.* at 44-49).

Dr. Pigozzi's testimony reinforces the Board's conclusion that traffic modeling has uncertainties if the goal is literal prediction of future scenarios. Beyond that it was of little assistance to the Board in resolving the issues before us. The Board was not aided in the assessment of LILCO's quantitative estimates by repeated qualitative assertions that each factor will lengthen evacuation times by some unspecified amount.

It is not credible to assert that LILCO assumed a rigorous undeviating conformance of actual traffic to the conditions utilized in the model in the face of numerous sensitivity analyses demonstrating the opposite. *Id.* at 19, 20, 21, 22, 28. It is not credible to adopt the numerous assumptions taken from other witnesses about adverse human behavior in a purportedly scientific critique of a mathematical model. *Id.* at 22, 23, 24, 25, 27, 29, 34, 35, 36, 38, 43, 44, 45. The Board hoped to learn from an expert in mathematical modeling, in objective fashion what, if any, errors actually reside in LILCO's time estimates, but the testimony in large part was not helpful beyond tabulating possible sources of predictive uncertainty.

The contrast between individual human imperatives and traffic engineering imperatives therefore remains unresolved by the testimony. Both views glimpse an aspect of the truth, but the Board concludes that LILCO has used the more powerful analytical tools. The police, who are experts in the practical problems of the streets, but not in traffic engineering, emphasize the individual's imperative to seek his or her own evacuation and the problems he or she might encounter. The Board agrees with the police that late mobilization, blocked roads, and congested intersections will indeed delay individual progress relative to the normal traffic flow that constitutes the bulk of their experience, or in fact relative to other evacuees who do not have such troubles. The mathematical analysis with which they are not expert, however, is different; it does not focus on the individual. Its simple imperative is that system capacity not go unused. Its finding is that capacity-constrained flow sets the time requirements. It is indifferent to the problems of individuals. In the engineering perspective if one road is blocked temporarily by an accident, others flow normally and the average system capacity is not materially affected even though the effect is substantial at the site of the blockage. The individual misfortune of someone delayed in mobilization becomes the good fortune of someone else at another location who finds his or her queue moving earlier than it otherwise would. Delays of individuals from accidents are not significant to the overall result because the capacity-constrained queue supplies the rate-limiting impedance and the queue moves only a little in the time it takes to clear accidents from roadways. Therefore, while the contingencies asserted by the County could occur, they simply do not have the asserted effects on the overall network.

The Board concludes that LILCO's estimates of evacuation times are reasonable in the sense that they have not been systematically over- or underestimated. The analysis shows that the roadway network has

system stability; the time estimates are not disturbed greatly by reasonably foreseeable contingency or deviation from analytical assumptions. Therefore, rigid adherence by an evacuating population to assumptions made for the purpose of modeling is not necessary for implementation of an evacuation within the approximate time limits stated.

LILCO's evacuation time estimates over their full spectrum of scenarios are reasonable statements of capability and not literal predictions of how a future evacuation might play out. LILCO's estimates are in some cases premised on near optimal distribution of traffic in the network and full performance of traffic guides. Evacuation time estimates are not highly sensitive to moderate deviations from optimal performance; however, the possibility of deviations realistically introduces uncertainty about evacuation time which is unlikely to be reduced by further analysis. The bounds of uncertainty have been estimated, however, and these should be considered by decisionmakers. Different possible time estimates could influence protective action recommendations, yet it cannot be predicted which of the various estimates will turn out to be correct in an actual evacuation. The Board therefore finds that interval estimates in addition to point estimates would be helpful for conveying to decisionmakers realistic evacuation times and their associated uncertainty. The Board has considerably more confidence, for example, in the asserted capability for a general evacuation of the full EPZ in about 5 hours to 6 hours, 30 minutes than it does in a point estimate of 4 hours, 55 minutes. We conclude, therefore, that the plans should contain bounded estimates of uncertainty in evacuation times. These can be obtained from the sensitivity analyses already performed by LILCO.

The Board has reasonable assurance that LILCO's evacuation time estimates are reliable within the limits of uncertainty identified in the sensitivity analyses. The inherent uncertainties would not seriously degrade the capability to make decisions about protective actions in most emergencies although decisional dilemmas could arise in special cases where the projected time scale for serious releases of radiation was about the same as the time scale for evacuation.¹² This is a problem that could arise no matter what the time estimates for evacuation were.

The Board finds that LILCO has met its burden of proof on the matter of evacuation time estimates. It has reasonable assurance that all or parts of the Shoreham EPZ could be evacuated successfully within the approximate time limits found by LILCO. The existence of uncertainty

¹² NUREG-0654 (at 17) suggests that accidental releases could develop over a time interval ranging from 30 minutes to 1 day. To the extent that the projected time of release in a real emergency was shorter or longer than the evacuation time estimate, the decision called for would be clear and not disturbed by the uncertainty of the estimates.

in those estimates does not detract from our findings. However, the Board orders that LILCO incorporate into Appendix A of the LILCO Plan descriptions that alert decisionmakers to the fact and magnitude of uncertainty of evacuation time estimates as previously outlined in this Decision.

We further order that LILCO incorporate into Appendix A of the Plan corrections of traffic control strategies that were identified by the Suffolk County Police.

We delegate to the NRC Staff responsibility for review and approval of these changes, since they involve only incremental improvements and do not involve any ultimate issue of adequacy of LILCO's Plan.

IX.B. Road Obstacles and Cars Without Fuel (Contention 66)

Contention 66 asserts that the plan for removal of roadway obstacles and dispensing of fuel to motorists will not be adequate in a Shoreham emergency. The subparts of this contention concern the number of tow trucks needed to remove blockages on evacuation routes; the capability of tow trucks to remove obstructions expeditiously in heavy traffic; planning for motorists with disabled cars; adequacy of snow removal services; and adequacy of LILCO's fuel distribution system.

IX.B.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, John A. Weismantle, and Edward B. Lieberman. FEMA's testimony was sponsored by Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire. Suffolk County's testimony was sponsored by Joseph L. Monteith, Richard C. Roberts, Philip McGuire, Michael J. Turano, Jr., and Edwin J. Michel. New York presented Thomas D. Gibbons.

IX.B.2. Number of Road Crews (Contention 66.A)

This contention concerns whether the number of road crews assigned to remove obstructions from roadways is adequate.

IX.B.3. LILCO Planning Basis

The LILCO 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.*, ff. Tr. 6685, at 6. The County asserts that twelve crews is too few and that the number should be far larger. Tr. 6879-80 (McGuire *et al.*); Tr. 6916-17 (Michel).

Road crews will be assigned LILCO-owned vehicles for removing obstacles from roadways. In selecting the 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.*, 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).

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.*, 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. Not all of these accidents/breakdowns would result in a disabled vehicle and the need for road crew response. *Id.* at 7-9. Response to accidents/breakdowns will be rapid because road crews will be assigned to intersections of major east-west and north-south evacuation routes. *Id.* at 9.

LILCO owns additional alternate trucks. There are sixty-four vehicles such as dump trucks or four-wheel-drive pickup trucks at Riverhead and thirty-eight additional alternate vehicles at Patchogue. Tr. 6862 (Weismantle).

IX.B.4. FEMA Finding

FEMA found the provisions in the Plan for removal of disabled vehicles adequate. Baldwin *et al.*, ff. Tr. 12,174, at 63; Tr. 12,802 (Baldwin). FEMA's finding is based on the fact that such provisions are in the Plan rather than on assessment of the number of tow trucks specified. NUREG-0654 provides no specific guidelines for judging whether a specific number of tow trucks is adequate. Baldwin *et al.*, ff. Tr. 12,174, at 63; Tr. 12,815 (Kowieski).

IX.B.5. The County Concerns

Suffolk County witnesses stated that twelve road crews would not be sufficient, because of the area to be covered (160 square miles) and the number of accidents and breakdowns likely to occur. Monteith *et al.*, 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). The witnesses noted that they had eight trucks available on a previous occasion for a demonstration involving 20,000 people. Tr. 6930-34, 6941 (Michel *et al.*)

IX.B.6. Conclusion

We find that LILCO's plans for twelve road crews to clear disabled vehicles from the roadway are reasonable. We accept LILCO's testimony that the number of accidents or breakdowns during an evacuation is likely to be modest and that not every mishap will require assistance because many accidents or breakdowns will not result in a vehicle inevitably left on the road or in a totally disabled vehicle. The County, however, is correct that evacuation scenarios wherein more than twelve trucks are required can be postulated. It is sufficient for us to know that future decisionmakers will have the resources and capability to respond flexibly to contingencies as they arise. In this case LILCO has many additional vehicles it could use to clear roads if need be and there is no reasonable basis for thinking that road clearing during an emergency would be hampered by lack of resources with which to respond. We therefore dismiss Contention 66.A.

IX.B.7. Time Needed to Remove Obstacles (Contention 66.B)

This contention questions the ability of LILCO's tow trucks to respond in a timely manner.

IX.B.8. LILCO's Planning Basis

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 encountered in reaching that obstruction. Cordaro *et al.*, ff. Tr. 6685, at 10. LILCO has taken steps to minimize these factors. Road crews will be located on evacuation routes with the largest traffic flow at spacing intervals of 2 to 4 miles. *Id.*; Tr. 6734-35 (Lieberman). The crews have been placed predominantly to the south and west of the plant at radial distances of 5 to 10 miles. Cordaro *et al.*, ff. Tr. 6685, at 10. Therefore, to reach an obstruction the road crews in most cases will travel in a counterflow direction to evacuating traffic. Tr. 6726 (Lieberman).

IX.B.9. *The County's Concerns*

Suffolk County witnesses present us with a list of contingencies that, if they occurred, would tend to delay tow trucks on their trip to the site of an obstruction. The County claims that trucks will be slowed because in some cases they will be required to travel with evacuating traffic instead of in a counterflow direction. Tr. 6931-32 (Michel); Tr. 6781-83 (Lieberman). The public will not yield right-of-way to LILCO vehicles. Monteith *et al.*, ff. Tr. 6868, at 12-13. The trucks will be caught in congested traffic. *Id.* at 12. Shoulders of roads will be inadequate, congested, or blocked and therefore not available to tow trucks. *Id.* at 12-13.

IX.B.10. *Conclusion (Contention 66.B)*

LILCO's planning basis for deployment of tow trucks takes account of possible delays in reaching obstructions in a reasonable time. Trucks will travel short distances and relatively few blockages requiring assistance will occur. Some of the trucks might be required to travel with evacuation flow for short distances and would thereby be delayed relative to normal traffic conditions. However, the County has not convinced us that this would seriously affect network evacuation time in a capacity-constrained network (*see* Board Finding IX.A). LILCO's plans for deployment of road crews in an evacuation are adequate. Contention 66.B is without merit.

IX.B.11. *Evacuation of Persons Whose Cars Become Disabled (Contention 66.C)*

This contention expresses the County's concern that there is no planning provision for evacuating people whose cars become disabled during evacuation.

IX.B.12. *LILCO's Planning Basis*

The LILCO Plan does not provide for the evacuation of persons whose cars become inoperable because of breakdowns or accidents. Cordaro *et al.*, ff. Tr. 6685, at 11; Tr. 6794 (Weismantle). Such planning is not required. People whose automobiles become disabled will undoubtedly be offered rides by fellow evacuees. Cordaro *et al.*, ff. Tr. 6685, at 12. In addition, people could catch a ride on one of the numerous buses transporting people from the EPZ, or could ride with a road crew. *Id.* at 11.

Suffolk County asserts that evacuees will not pick up stranded people (Monteith *et al.*, ff. Tr. 6868, at 14-15; Tr. 6920-22 (Monteith)) and that buses do not travel all routes where people might be stranded. Tr. 6921 (Monteith).

IX.B.13. Conclusion

No specific planning is required to alleviate this concern. Sufficient *ad hoc* capability exists to give reasonable assurance that stranded people could be evacuated. Contention 66.C is dismissed.

IX.B.14. Snow Removal (Contention 66.D)

This contention asserts that the LILCO Plan does not provide for snow removal and LILCO has no agreements with other entities to provide snow removal services during an emergency.

IX.B.15. LILCO Planning Basis

LILCO has no agreements with local organizations for snow removal services. Tr. 6801 (Weismantle); Cordaro *et al.*, ff. Tr. 6685, at 13. However, LILCO asserts that local governments have a continuing responsibility to perform their normal responsibilities including snow removal and that they will perform them during an emergency. Cordaro *et al.*, ff. Tr. 6685, at 13; Tr. 6804 (Weismantle); Tr. 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).

In higher-level emergencies requiring offsite protective action, LILCO would act according to one of two scenarios for adverse weather conditions that could exist when the siren system was sounded and snow removal crews were assumed to stop plowing. Cordaro *et al.*, ff. Tr. 6685, at 13-14. In the first, if light-to-moderate snow were falling, an evacuation order would be based on the adverse winter weather evacuation time estimates contained in the Plan. OPIP 3.6.1. 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 scenario, if a heavy snowfall or blizzard condition were assumed, and roads became literally or nearly impassable, the protective action recommendation would be based on a default evacuation time of 24 hours, which would produce a shelter recommendation. Cordaro *et*

al., ff. Tr. 6685, at 14. Continued plowing of major roadways within the EPZ would not change that recommendation. *Id.*; Tr. 6899 (Turano, Monteith) (impassability of roads along north shore). All parties were in agreement that should an evacuation be ordered, continued plowing would be counterproductive since snow removal equipment was likely to impede, rather than aid, traffic flow. Tr. 6815 (Lieberman); Tr. 6898 (Monteith); Tr. 7008-09 (Gibbons).

IX.B.16. FEMA Finding

FEMA found the Plan inadequate regarding snow removal because it lacked administrative and operating procedures and letters of agreement with snow removal organizations to plow evacuation routes. Baldwin *et al.*, ff. Tr. 12,174, at 64-65; Tr. 12,819-20 (Kowieski, Baldwin). We understand from FEMA's response at Tr. 12,820 that FEMA is satisfied with LILCO's planning basis as far as LILCO has carried it, but is requiring additional agreements and procedures to ensure snow removal during an emergency. The Board notes that there appears to be a factual disagreement between FEMA and experts of other parties who testified that snow plowing during an evacuation would be counterproductive. We find that testimony reasonable and FEMA's testimony cryptic. The record as it now stands, however, is adequate in other respects to resolve this contention, and we will do so without reliance on FEMA's testimony.

IX.B.17. New York State Position

The New York Department of Transportation does not and cannot commit that its personnel would operate snow removal equipment during a radiological emergency. Gibbons; ff. Tr. 7005, at 2. All snow removal operations on State highways in the EPZ would cease upon receipt of an evacuation recommendation because State employees would be directed to evacuate. Tr. 7011-13, 7021, 7034 (Gibbons). It is likely that the same would occur with other local jurisdictions and entities. Tr. 7017-18 (Gibbons). For unplowed roads that can still be traversed, State data show road capacity reduction of 50%. Tr. 7026 (Gibbons).

IX.B.18. The County's Concerns

The County's evidence collectively shows that snowfall slows traffic and would make evacuation more difficult than under normal conditions. The County cites the special difficulties of traffic on roads having

steep hills and sharp turns, reduced speeds, increased accident frequency, abandoned vehicles during major snowstorms, and a substantial effect on traffic flow from even light snowfall. Monteith *et al.*, ff. Tr. 6868, at 17.

IX.B.19. LILCO's Response

LILCO does not dispute that snowfall would cause difficulties in evacuation traffic flow. Sheltering would be recommended in the event of an accident during a blizzard which made roads impassable. LILCO contends, however, that for snowfall up to about 4 inches, roads would be passable without plowing (Tr. 6814-15 (Weismantle)), although capacity would be reduced by 30%. Tr. 6815-17 (Lieberman). For light-to-moderate snowfall, the protective action decision would take account of the longer evacuation time estimates for adverse winter weather that were calculated by KLD. LILCO Plan, Appendix A, Table XIV, scenario 19. Cordaro *et al.*, ff. Tr. 6685, at 13-14.

IX.B.20. Conclusion (Contention 66.D)

Once again we are called on to predictively resolve an issue generated by the postulated simultaneous occurrence of independent events: in this case, snowstorms of varying intensity occurring simultaneously with a serious radiological emergency at Shoreham. No law of nature prevents the occurrence; the record is silent on its probability (although we think it remote) and no basis exists to make any useful predictions that could be used to fashion specific responses. We conclude that formulating general response plans is all that is reasonably required under such circumstances. LILCO has done this. If roads are impassable LILCO will recommend sheltering. If not, LILCO will consider longer-than-normal evacuation times before making a recommendation. We need not speculate further on contingent future events.

We also do not see any genuine benefit to public health and safety of written agreements with various entities to plow snow in an emergency because it is now adequately known what will take place. Normal plowing will occur up to the time an order to evacuate is given. Plowing will cease thereafter, and LILCO will recommend sheltering if the highways are impassable. LILCO's plans are adequate without letters of agreement and we do not require anything further. Contention 66.D is without merit.

IX.B.21. Fuel Disbursement (Contention 66.F)

Contention 66.F asserts that LILCO will be unable to provide fuel for evacuees and that its fuel distribution scheme will cause congestion and delays in evacuation.

The LILCO Plan provides for fuel to be dispensed to vehicles at seven sites within or near the Shoreham 10-mile EPZ. These fuel allocation sites will be located along the major east-west and north-south evacuation routes. Cordaro *et al.*, ff. Tr. 6685, at 14-15. A fuel truck with a capacity of at least 1200 gallons (assuming a limit of 3 gallons per evacuating vehicle, the ability to service 400 vehicles) will be located at each site. *Id.* at 15. Exact locations (as distinguished from general areas) have not been chosen for these fuel allocation sites (Tr. 6837, 6842-43 (Lieberman)), but the considerations that LILCO will use in selecting these locations are adequate. These considerations include placing allocation sites in areas adjoining evacuation roadways, providing sufficient space to hold multiple vehicles, and clearly indicating a limit of 3 gallons per car. Cordaro *et al.*, ff. Tr. 6685, at 14-16; Tr. 6838 (Lieberman).

According to FEMA this provision in the Plan is an "extra." There is no specific requirement for supplying gas along evacuation routes. Tr. 12,817-18 (Keller).

IX.B.22. Conclusion

LILCO's plan for distribution of fuel is reasonable even though not required by any regulation or guideline. If implemented it could provide incremental enhancement of an evacuation. We discount as fruitless speculation all of the County's testimony on how fuel allocation plans might fail or snarl traffic. Contention 66.F is dismissed.

IX.C. Weather (Contention 97)

This contention asserts that the LILCO Plan does not take account of the possible simultaneous occurrence of an accident at Shoreham and a severe snowstorm. LERO personnel would be unable to mobilize the EOC or any other planned emergency function in a severe storm, and the public would not be able to evacuate.

IX.C.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Michael L. Miele, and John A. Weismantle. Thomas D. Gibbons testified on

behalf of New York State. FEMA's witnesses were Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

IX.C.2. Sheltering in Event of Heavy Snowfall

LILCO's plan is to recommend sheltering in the event of heavy snowfall during an accident. (See Board Findings IX.B.14 to IX.B.20.) A recommendation to shelter can be made by the LERO Director from any location even if the EOC cannot be staffed. Cordaro *et al.*, ff. Tr. 6950, at 8; Tr. 6982-91 (Cordaro, Weismantle).

Suffolk County is in error in asserting that Contention 97.B raises issues of implementation of a sheltering recommendation or correct determination of the condition of the County roads. The concerns of the State about variability of weather on Long Island (Tr. 7029-31 (Gibbons); Gibbons, ff. Tr. 7005, at 6) are excessively speculative and have no merit. Key decisions can be made even if the EOC cannot be staffed because of heavy snow. S.F. 555, 556. The Board finds that Contention 97.B has no merit.

IX.D. Buses for the Public (Contentions 67, 24.I and 24.F.2)

The contentions concerning buses for the public raise a number of issues about LILCO's plans for a bus transportation system and the evacuation of EPZ residents who do not have access to automobiles. The issues include the number of potential evacuees who will require bus transportation, the number of buses and bus trips needed to serve this group, the time needed to complete bus routes, and the adequacy of the sheltering provisions at eleven transfer points.

IX.D.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, John A. Weismantle, and Edward B. Lieberman on Contention 67. Dr. Matthew C. Cordaro, Edward B. Lieberman, Michael L. Miele, Elaine D. Robinson, and John A. Weismantle testified on Contention 24.F.2.

Testimony for Suffolk County on Contention 67 was given by Philip B. Herr and Edwin J. Michel. Testimony for New York State was given by Richard D. Albertin, William J. Acquario and Robert G. Knighton. Testimony for FEMA was given by Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski and Philip H. McIntire. Charles V. Failla testified for the State on Contention 24.F.2.

IX.D.2. LILCO's Planning Basis

The bus transportation system will use eleven transfer points, which will act as depots, rather than a system of direct evacuation between neighborhoods and relocation centers. 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 assigned routes picking up passengers, and then return with them to the transfer points. *Id.* at 12-13. Route buses will be able to make more than one run along their assigned routes. Transfer buses will make only one trip from the transfer point to an assigned relocation center and will carry passengers that have been transferred from route buses. *Id.* at 13. Upon arrival at the transfer points, passengers on route buses will either transfer to awaiting transfer buses or will remain on the route buses and proceed directly to the assigned relocation center. LILCO's planning basis assumes that 11,097 persons will need bus transportation during evacuation. *Id.*

IX.D.3. Contention 67.A

LILCO and the County presented conflicting evidence as to the number of persons who might need bus transportation during an evacuation. LILCO calculated that the need might be approximately 6,500 persons but used 11,097 as a conservative planning basis, whereas the County argued that the need might be 13,000 to 22,000 persons. *Id.* at 7, 11; Tr. 8081-83 (Cordaro, Weismantle); Herr and Michel, ff. Tr. 8150, at 9-21; Tr. 8485 (Herr). However, in its Proposed Findings of Fact the County accepted LILCO's estimation of 11,097 persons as the number of people who might need bus transportation during an evacuation. I.F. 608. The Board therefore considers the estimate of the number of persons who might need transportation as settled, and it accepts the value of 11,097 persons as appropriate for the planning basis.

IX.D.4. Number of Buses Needed

The remaining dispute under this contention centers on the number of buses needed to transfer the agreed-upon number of persons. In making this calculation, LILCO assumed that it would have forty-passenger buses available, and it further assumed a 75% load factor. Therefore, each bus would carry an average of thirty passengers. Tr. 8076 (Lieberman); Cordaro *et al.*, ff. Tr. 7980, at 14. On the basis of a 75% load factor, LILCO calculated that it would need 333 buses making 474 trips. Cordaro *et al.*, ff. Tr. 7980, at 15.

IX.D.5. New York State Estimates of Number of Buses Needed

The State argued that the number of buses needed to evacuate the transit-dependent population should have been larger than that estimated by LILCO for two reasons. First, the buses should be limited to a single run, and second, LILCO should have used a bus loading of 22.5 passengers rather than 30 passengers. Acquario *et al.*, ff. Tr. 8289, at 7-9. The State witnesses believe that limiting the route buses to a single run would improve the flexibility of the transit plan and would also lower the risk of driver exposure to radiation. *Id.* at 7-8. LILCO witnesses responded that bus schedules 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 any changes in supply or demand. Tr. 8082-84 (Lieberman, Weismantle). Additionally, all drivers will be given dosimetry equipment; they will be instructed to check this equipment regularly and to take appropriate action if necessary. Tr. 8297 (Albertin, Knighton). The Board concludes that no compelling case for limiting buses to a single run has been made for reasons either of flexibility or dose to bus drivers.

New York State witnesses arrived at their estimate of 22.5 persons per bus by a two-stage reasoning process. First, they reasoned that the actual practical carrying capacity of the bus is limited to thirty because passengers will be carrying luggage and personal possessions that will take passenger space. Second, they used the same 75% load factor that LILCO used to estimate demand; however, they applied that factor to their own maximum load estimate of 30 passengers to arrive at an actual loading of 22.5 passengers, while LILCO used the same percentage to discount from 40 to 30. Tr. 8311-12, 8315-16, 8336 (Knighton); Acquario *et al.*, ff. Tr. 8289, at 8. Using its load factor the State calculated that 503 route trips and 130 transfer trips would be required. *Id.*; Tr. 8507, 8509, 8513 (Herr).

LILCO witnesses testified that thirty passengers per bus is not an absolute limit to the practical carrying capacity for passengers with luggage. This is so first because luggage can be stored under seats, in the aisle, or on people's laps. Tr. 8079-80 (Lieberman, Weismantle). Second, bus passengers will consist of a combination of adults and children, which make a nominal capacity of forty persons (and practical capacity of thirty) based solely on adults conservative, since children can sit on adult laps. Finally, LILCO assumes that, during an evacuation, a number of bus passengers are likely to be willing to stand. Tr. 12,868 (Keller); Cordaro *et al.* (Contention 67), ff. Tr. 7980, at 14.

IX.D.6. Conclusion (Contention 67.A)

The Board finds that the State calculations of bus loading were excessively conservative. LILCO's reduction of nominal bus capacities was an exercise of ordinary prudence and did not constitute an actual prediction of what the bus-loading factors would be. Discounting a forty-passenger bus capacity to thirty to account for variations in supply and demand as well as variations in luggage carried by passengers seems to us to have been reasonable. The Board agrees with LILCO that thirty passengers does not constitute an absolute upper limit of capacity even when passengers are carrying luggage. Indeed, it seems likely that passengers would be willing to endure a considerable amount of inconvenience, such as standing or enduring crowded conditions, in a radiological emergency. Also applying the 75% demand factor to an already reduced capacity of buses as urged by the State is not logical, since the likely demand for space on buses is independent of the buses' assumed capacity.

The Board sees no merit in treating estimates calculated for the purpose of planning as if they constitute a literal prediction as to how events might unfold during an emergency. Clearly that is a fruitless exercise. The record convinces us that the passenger loading of buses has been neither overestimated nor underestimated. Deviations from LILCO's estimates in an actual emergency could be larger as well as smaller than the calculated value. The Board concludes that there is reasonable assurance that persons without automobiles who need bus transportation can be evacuated under LILCO's Plan. Contention 67.A is without merit.

IX.D.7. Evacuation Time Estimates for Buses (Contention 67.C)

Suffolk County asserts that evacuation times by bus will be longer than those presented in the LILCO Plan. The 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.

The Board has previously found that LILCO's plans for mobilization of LERO demonstrate a realistic capability for mobilization in a timely manner. See Board Finding IV.B. LILCO, however, performed a detailed analysis of three extreme accident scenarios to determine how mobilization would affect the bus schedules contained in the LILCO Plan. Tr. 8133-36 (Lieberman). With the exception of the extreme case of an immediate general emergency requiring an evacuation of the

entire EPZ during a school day, bus schedules in the Plan could generally be met and the last portion of each schedule could be met exactly. Tr. 8136 (Lieberman). According to the Plan, buses would not begin to service their routes until 2 hours, 15 minutes after the declaration of an emergency. This is a reasonable allowance of time for mobilization.

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 evacuation of the automobile-owning public would also be delayed because of the time necessary to position traffic guides. Tr. 8116-18 (Weismantle; Lieberman). The time estimates for an uncontrolled evacuation would apply in that case, and protective action recommendations using those estimates would be used. *Id.*

LILCO considered the congestion that would occur from evacuating traffic when it calculated the time required for buses to complete their routes. Each bus route has three legs. The first is the trip from the transfer point to the area where the passenger pickup begins, the second is the trip through the area picking up passengers, and the third is the return trip to the transfer point. Travel times for the incoming and outgoing legs were calculated by referring to the computer printout for case 12, which is the base case evacuation of the entire EPZ. The DYNEV output provides detailed data for each link on the roadway network. Therefore, it was possible to trace the route of each bus and to obtain actual travel times along each specific link. The travel time was defined as the longer of two possibilities: (1) the time as computed by the DYNEV model or (2) the travel time associated with a specific maximum speed. Maximum speeds assumed for each bus were 20 mph for the trip from the transfer point to the pickup area, 7 mph within the pickup area, and 20 mph for the return trip. The last transfer buses to leave transfer points within the EPZ do so within a maximum of 5 hours, 30 minutes after the order to evacuate is given. Thus the last buses will leave after the last car has departed the EPZ and will not be impeded by evacuating traffic. The travel speed for these buses was assumed to be 20 mph. The longest distances any of these buses will travel to reach the EPZ boundary is 5 miles. Therefore, the assumed travel time of 15 minutes for these buses to depart the EPZ is reasonable. Cordaro *et al.*, ff. Tr. 7980, at 18.

The Board finds that LILCO's estimated travel times for buses are based on results from the DYNEV traffic model, that mobilization and evacuation traffic have been considered, and that the times are realistic given the congested conditions caused by evacuation traffic.

The New York State witnesses testified that LILCO's predicted 7-mph speed during pickup is not realistic because the literature on the average speed of buses performing normal pickup and dropoff functions relied on by LILCO does not reflect the conditions that will be present during an evacuation. Acquario *et al.*, ff. Tr. 8289, at 10-11. However, the Board agrees with LILCO that the 7-mph speed during the passenger pickup phase is realistic and already accounts for the fact that buses must stop to pick up passengers. Buses will travel at substantially higher speeds between stops. Tr. 8110-11 (Lieberman). Picking up passengers during an emergency will not differ substantially from conditions under which the literature values depended on by LILCO were derived, since packages or luggage carried by passengers boarding buses does not have a pronounced effect on boarding time and, in any event, literature values include passengers carrying packages or small children. Tr. 8111 (Lieberman).

IX.D.8. Conclusion (Contention 67.C)

The Board concludes that LILCO has adequately considered the effects of traffic congestion in its bus evacuation time estimates. The conditions considered by LILCO are reasonable, and the estimates of bus travel times are reasonable.

IX.D.9. Transfer Points (Contention 67.D)

This contention alleges that the LILCO Plan is inadequate because people are likely to be kept waiting at transfer points where they will be unprotected from weather or radiation.

IX.D.10. FEMA Testimony

The FEMA witnesses testified that the Plan has no procedures describing how evacuees at transfer points would be protected. However, they gave no indication as to whether such was required by any regulation or guideline. Baldwin *et al.*, ff. Tr. 12,174, at 67. Later, FEMA hinted at the possibility that it might be prudent to have transfer points outside the EPZ so evacuees would not be at risk. Tr. 12,885-86 (Baldwin). This testimony, however, was admittedly inconclusive, and the Board does not rely on it.

IX.D.11. LILCO's Plan for Transfer Points

LILCO has identified eleven bus transfer points, four of which are within the EPZ at distances of 6.5 to 7 miles from the plant. Cordaro *et al.*, ff. Tr. 7980, at 20. Transfer points will be under the control of designated transfer point coordinators. LILCO has planned its operations at transfer points so that no evacuee will be required to wait more than 10 minutes to transfer to a bus that will take him or her to a relocation center. Cordaro *et al.*, ff. Tr. 7980, at 21-23. Evacuees will not be exposed to inclement weather because route buses will not discharge passengers unless a transfer bus is waiting. Tr. 8115-16 (Lieberman). There is no need to provide radiation shelters at transfer points because there will be no special hazard at transfer points. Persons who evacuate by bus will receive the same radiation doses as persons who evacuate by private automobile. Tr. 7998-99 (Weismantle). There is no need to plan specifically for crowd control because crowds will not gather at transfer points.

IX.D.12. Reason for Transfer Points

LILCO adopted the transfer plan to make best use of the available buses. The purpose of the transfer points is to minimize the first and third legs of the bus journey so that the productivity of the buses could be maximized for picking up people in the neighborhoods. Placing the transfer points further away from the EPZ would increase the round-trip distance for the first and third legs and would not result in a speedier evacuation of the transit-dependent population from within the EPZ. Tr. 8113-14 (Lieberman). Transfer points do not create undue potential for congestion or hazard because many passengers will simply depart the transfer point on the same bus on which they arrived. Others will board transfer buses if their route bus is to make another run. There will not be long lines of buses or passengers waiting for buses. Tr. 8114-15 (Lieberman). The bus transfer system is not rigidly dependent on meeting exact schedules. Although time lags are possible in running bus routes or for buses arriving at transfer points, such time lags will not produce longer waiting times at transfer points because bus delays would affect both transfer buses and route buses. Tr. 8115-16 (Lieberman, Weismantle). Unpredictable time lags would not produce a barrier to the successful evacuation of the transit-dependent population.

IX.D.13. Conclusion (Contention 67.D)

The Board concludes that Contention 67.D is without merit. We find no need for LILCO to provide shelters at transfer points simply because shelters would not add any significant margin of safety to evacuees. Traffic delays do not raise a significant question for planning. The contingencies raised are speculative. The Board has no way of knowing *a priori* what contingencies would actually take place during an evacuation. We find that LILCO has planned prudently and that the possibility of traffic delays during an evacuation does not pose a special hazard to the health and safety of evacuees.

IX.D.14. Letters of Agreement, Transfer Points (Contention 24.I)

Suffolk County alleges that the LILCO Plan does not include agreements with the owners of designated transfer points not owned by LILCO, and thus there is no assurance that LILCO would be permitted to use the areas relied on in the Plan as transfer points.

LILCO, however, has obtained written agreements with owners of the properties relied on in the Plan and not owned by LILCO. These agreements allow LILCO to use these properties as transfer points. Cordaro *et al.*, ff. Tr. 6457, Vol. II, at 15-18, Attach. 22.A to 22.G; ff. Tr. 6467, Attach. 22.H. These agreements were obtained after completion of Revision 3 of the Plan and are not included in it. Tr. 6504, 6505, 6511, 6513-14 (Robinson). LILCO has committed to include these agreements in future revisions of the Plan.

IX.D.15. Suffolk County Position

Suffolk County concedes that letters of agreement have been obtained. However, the County challenges whether the agreements are adequate. It cites as inadequacies the limited terms of some of the agreements and the need for further approval of one of the agreements. Cordaro *et al.*, ff. Tr. 6457, Vol. II, Attach. A, B, D, F, G, and H. One of the letters grants permission to use the site for drills until the property is sold. I.F. 621.

IX.D.16. Conclusion (Contention 24.I)

LILCO has obtained letters of agreement for use of transfer points during an evacuation. It is true, as Intervenor state, that the letters are for limited terms and that new agreements must be negotiated as the

terms of old ones expire. The Board cannot find, however, that this renders the letters of agreement inadequate. We expect that LILCO will be required to renew expired agreements throughout the life of the plant. There is nothing in this that reflects inadequate planning. The Board therefore concludes that Contention 24.I is without merit.

IX.D.17. Letters of Agreement for Buses (Contention 24.F.2)

This Contention asserts that if an emergency occurred when school was in session, LILCO would not have access to buses to evacuate persons without access to an automobile (including the homebound, nursing and adult home residents, nursery school students, and hospital patients) because LILCO's agreements with school bus companies are subject to the preexisting commitments those companies have to school districts.

IX.D.18. LILCO's Agreements

LILCO has 1236 buses contractually committed to its use for a radiological emergency. Approximately 938 of these buses are subject to prior commitments to schools both within and outside the EPZ. Less than half of the buses subject to prior commitment are committed to school districts within the EPZ. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 58-59; Tr. 9307-08 (Weismantle). If all 938 buses with prior commitments were unavailable for immediate use in an emergency, LILCO would have to rely on 298 buses that were not committed to prior uses to transport people out of the EPZ. The available buses would be required to make multiple runs, which in turn would take more time than specified in the Plan. Tr. 9299-9301 (Weismantle).

It is reasonable to conclude, however, that LILCO would not have to rely solely on the 298 buses without prior commitment because as buses became available after making their school runs, they would be used for evacuation of the general public. In an emergency, school districts outside the EPZ would be asked to release some buses from their normal runs. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 57-59. The bus companies have not committed their full fleet of buses to LILCO but have retained some buses for other uses. Some of these buses could be available to bus companies to meet their commitments to schools. *Id.*

IX.D.19. FEMA Review

FEMA reviewed letters of intent from bus companies to LILCO that predated the actual completion of formal contracts with companies for buses. On the basis of its review of the letters of intent, FEMA concluded that approximately 1500 buses were available and that this number was more than adequate to evacuate the transit-dependent population within the EPZ. FEMA found the letters of intent were an inadequate commitment of resources. The FEMA witnesses were unclear as to whether they would approve bus contracts specifying a prior commitment of the buses to schools before they were available to LILCO. Tr. 12,222-28 (Kowieski, Baldwin, McIntire).

IX.D.20. New York State Testimony

The State attempted to show that State records on buses in service indicate that if a radiological accident were to occur during school sessions the bus companies could in fact provide LILCO with only about 10% of the number of buses under contract to LILCO. Failla, ff. Tr. 9948, at 2-3. The State reached this conclusion by matching the number of buses committed by contract with the New York State records of the buses owned by the contracting company. Tr. 9953-54, 9959-60 (Failla). This conclusion did not account for buses owned by subsidiaries or associated companies that were nevertheless available to the contracting company. Tr. 9988-91, 10,006-07 (Robinson). Had the buses operated by subsidiary or associated companies been included, the number of available buses would have matched or exceeded those committed under the letters of agreement. Tr. 9989 (Robinson); Failla, ff. Tr. 9948, at 2. Buses are commonly owned by a single individual or entity under various corporate names in New York. Tr. 9975-76 (Failla).

IX.D.21. Conclusion (Contention 24.F.2)

The Board finds that LILCO's contracts with bus companies to supply buses in the event of an emergency constitute letters of agreement for buses. There is no basis in the record for believing that the number of buses specified by contract is false, nor is there any basis to assume that the bus companies will breach the contracts. The Board finds that the New York State testimony on this matter that there were fewer buses available than stated in the contracts was based on an excessively narrow analytical perspective. We would expect a person having the position and experience of Mr. Failla to be aware of subsidiary or associated

companies of the contracting company and to have included in his tabulation all buses reasonably available to the contracting company.

Further, LILCO has 298 buses not constrained by prior commitments that would be almost immediately available. The testimony indicates that LILCO has planned for a possible need for 333 buses to evacuate the transit-dependent population. The Board is not disturbed by the fact that many of the buses under contract have prior commitments to schools because (1) these buses would become available after making their school rounds, (2) large numbers of buses under contract exist outside the EPZ that could be released to LILCO's use by school administrators, and (3) the bus companies themselves have additional buses that could be requested on an *ad hoc* basis. The question of prior commitment of buses to schools arises only under a very limited scenario, that is, a fast-breaking or immediate general emergency during school hours. Emergencies that occurred at night, during weekends, or at times not involving school hours would not raise such questions. Similarly, emergencies that developed more slowly even during school hours would not raise an issue of bus adequacy, since under those circumstances children would be sent home at the alert stage before there was a need to evacuate the general public. After considering all these factors, the Board concludes that LILCO has planned adequately for evacuation of the non-automobile-owning public and has an adequate number of buses committed to it by contract to accomplish such an evacuation. Contention 24.F.2 is without merit.

X. RELOCATION CENTERS (CONTENTIONS 24.O, 24.P, 74, 75, 77)

The Board does not address the contentions concerning relocation centers in this Partial Initial Decision. When the record is completed on the matter of the relocation center, the unresolved contentions will be reviewed and will become part of the Final Initial Decision to be issued.

XI. THE HANDICAPPED, HOSPITALS, AND NURSING HOMES (CONTENTIONS 24.G, 24.J, 24.K, 24.N, 58, 72, 73.A, 73.B)

This cluster of contentions challenges many aspects of LILCO's provisions for emergency vehicles to evacuate various members of the public, its provisions for evacuation of hospitals and nursing homes, its registration of the handicapped who may need assistance during an evacuation,

and its plans for notification and evacuation of handicapped people at home.

XI.1. Identification of Witnesses

LILCO testimony on one or more of the contentions in this group was given by Dr. Matthew C. Cordaro, David Glaser, Michael L. Miele, Elaine D. Robinson, John A. Weismantle, Jay O. Yedvab, Edward B. Lieberman, and Carol A. Clawson. Testimony for Suffolk County was given by Dr. David Harris, Dr. Martin Mayer, Dr. Susan C. Saegert, Philip B. Herr, Edwin J. Michel, Peter F. Cosgrove, and John L. Fakler. Testimony for New York State presented William J. Acquario, Richard D. Albertin, and Robert G. Knighton. The FEMA panel of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip McIntire also testified. The NRC Staff did not present testimony on this group of contentions.

XI.A. Ambulances (Contentions 24.G, 24.K)

These contentions assert that LILCO has no agreement with ambulance companies to provide the ambulances and ambulettes relied upon in the LILCO Plan and that LILCO has no agreement with ambulance companies to provide necessary drivers, medical and paramedical support services in the vehicles to be used in evacuating special facilities for the handicapped.

XI.A.1. Availability and Adequacy of Transportation Arrangements for the Handicapped

LILCO has agreements with ambulance companies for a total of 63 ambulances and 130 ambulettes that would be used during an evacuation of the 10-mile EPZ at Shoreham. Cordaro *et al.*, ff. Tr. 6457, Vol. II, at 7-10. (An ambulette is a van that has been modified to accommodate handicapped people in wheelchairs. *Id.* at 6.) The contracts with ambulance companies provide that vehicles will be available in an emergency at Shoreham on a priority basis. These vehicles will be used for evacuating nursing homes, adult homes, and the handicapped homebound if an emergency occurs at Shoreham. Not all residents of these facilities require ambulances or ambulettes for evacuation; some people will be evacuated by bus. *Id.* at 11. The 63 ambulances and the 130 ambulettes contracted to LILCO would be sufficient to evacuate all the handicapped in need of special transportation within the 10-mile EPZ if each vehicle

makes no more than two trips. This estimate for ambulettes is conservative since the Plan assumes that four patients will travel in these vehicles while in fact they hold on average seven persons, four in wheelchairs and three in seats. *Id.* at 11-12. Ambulances and ambulettes under contract from private companies are not normally used for emergency purposes. Most privately owned ambulances are used for prearranged transportation. If a radiological emergency occurs while vehicles are on a prearranged run, the contracts specify that vehicles will complete that run before responding to LILCO's emergency call. Upon completion of current runs the ambulance dispatchers will promptly assign ambulances and ambulettes to LILCO under the terms of the contract. *Id.* at 10.

There are three hospitals in the vicinity of the plant; two just inside the EPZ boundary and one just outside it. All are over 9 miles from the plant. LILCO does not plan for evacuation of the three hospitals at the same time as the rest of the EPZ, even assuming an evacuation of the entire EPZ. Instead, LILCO recommends that the hospitals shelter their patients as a first choice of protective action. This recommendation is based on the distance of the hospitals from the plant, the sheltering benefits offered by the hospital buildings, and the potential health risk in moving hospital patients. If the hospitals themselves decide to evacuate, LILCO will use ambulances and ambulettes under contract to assist. This would be done after these vehicles had first evacuated the homebound and the special facilities patients closer to Shoreham. *Id.* at 13. The hospitals would require transportation for about 630 additional patients if all three were evacuated. The number of vehicles available provides the physical capability to evacuate all three hospitals with one additional run per vehicle beyond that required to evacuate the nursing homes and adult homes. We observe that the hospital outside the EPZ boundary would ordinarily not be evacuated on a preplanned basis. Evacuation of that hospital would occur only on an *ad hoc* basis. This is acceptable under NRC's emergency planning regulations. NUREG-0654, at 10-11. There are a total of sixty-one additional ambulances belonging to towns and volunteer fire districts within 20 miles of Shoreham that could be called on in an emergency. LILCO does not rely on these community ambulances since it has an adequate number of private ambulances under contract for emergency purposes. Nevertheless, these ambulances could be called by special facilities or individuals if needed. *Id.* at 13.

XI.A.2. Suffolk County's Objections

The County claims that LILCO has substantially underestimated the number of trips necessary to implement a timely evacuation because it

has not planned for evacuation of the three hospitals near the EPZ simultaneously with the evacuation of nursing homes and adult homes. I.F. 652. The County concedes that LILCO has a plan for evacuating the hospitals but finds fault with the fact that it would use the same vehicles for hospital evacuation that it would use for adult and nursing home evacuation. Hospital patients would have to wait until evacuation of homebound persons and nursing and adult homes was completed. The County is also concerned that the actual number of ambulances available to LILCO would be fewer than those specified in the contracts because the agreements provide that those vehicles not responding to a public or individual emergency will be immediately available to LILCO. Additionally, some ambulance companies operate from locations outside the EPZ and therefore they could not be promptly available to LILCO. One company has its storage yard for ambulances in Long Island City, approximately 50 miles from the EPZ. Tr. 6608-09, 7787 (Robinson, Cordaro). The County argues that two ambulance agreements are ineffective and that their eight ambulances and eight ambulettes could not be counted on since they are based in Nassau County and under the terms of their ambulance service certificates, these companies are limited to serving areas in Nassau County. I.F. 653. Finally, the County claims that LILCO has overestimated the capacities of ambulettes. LILCO assumes that four people in wheelchairs can travel in ambulettes. However, the County submitted evidence that at least some ambulettes have capacity for only one or two wheelchairs. SC Exh. 36; Tr. 7786-87 (Robinson).

XI.A.3. Conclusion (Contentions 24.G, 24.K)

The Board finds that LILCO has adequate ambulances and ambulettes under contract to conduct an evacuation of special facilities and the handicapped at home within the 10-mile EPZ in the event of an emergency at Shoreham. LILCO's estimates of the average capacity of both ambulances and ambulettes are reasonable and conservative. The Board understands that some ambulettes have wheelchair capacities less than four in some cases. Although LILCO has assumed an average capacity of four persons in wheelchairs for the purpose of planning, its ability to evacuate the handicapped would not be impaired even if the average were somewhat less than four because persons who can sit in a wheelchair could as well sit in a vehicle seat. The number of vehicles under contract provides adequate flexibility to accommodate handicapped people at the time of an evacuation without further planning, because the overall passenger capacity is greater than four for ambulettes, and

the physical capacity for transporting patients exists. The physical capability for evacuating hospital patients also exists if needed; however, hospitals must await the prior evacuation of other facilities before they themselves are evacuated.

The contractual terms under which commercial ambulances and ambulettes are to be provided to LILCO present no significant issue of public health and safety arising from the fact that they will complete the runs they are on before they are available to LILCO in an emergency. No party has presented any evidence in this case showing how many vehicles are normally out on runs at any given moment and no one has specified how much time they might take to complete the runs. We are again confronted, as has happened so often in these proceedings, with evidence from the County that a particular occurrence is physically possible but with no estimate as to its likelihood. We reject that approach because it requires too much speculation. LILCO has signed contracts for an adequate number of emergency vehicles for use during an emergency at Shoreham. We have no basis for thinking the contracts were signed falsely or that the services could not be provided. This applies equally well to contracts for ambulances that are based in Nassau County. It is fruitless for us to speculate without data on the possible time delays of individual vehicles arising from the possibility that some will complete an existing run before becoming available to LILCO. It would be even more speculative for us to reach any conclusions as to what effect such possible delays might have on the health and safety of any citizen.

The Board concludes that LILCO's contracts with ambulance companies to supply 63 ambulances and 130 ambulettes for use in an emergency at Shoreham are adequate and provide reasonable assurance that the handicapped at home, and in nursing homes and adult homes could be evacuated in the event of an emergency.

XI.A.4. Agreements for Staffing (Contention 24.K)

This contention alleges that the Plan is inadequate because LILCO has no agreements with personnel to provide medical support services on buses, ambulances and ambulettes during an evacuation.

Personnel to staff ambulances and ambulettes are specified in the contracts between LILCO and the ambulance companies. The contracts show that the ambulances and ambulettes will be staffed by drivers and medical technicians where appropriate. Cordaro *et al.*, ff. Tr. 6457, Vol. II, Attach. 13-21.C, at 1-2; Tr. 6533-34 (Cordaro, Robinson). The contracts provide additionally that the drivers should be licensed and that

they shall have received emergency preparedness training prior to vehicle operation.

The County has no quarrel with these provisions. I.F. 656. It still maintains, however, that staffing of emergency vehicles will be inadequate (1) because individuals who are expected to staff such vehicles will suffer role conflict, and (2) because no qualified medical technicians will be assigned to buses.

XI.A.5. Conclusion (Contention 24.K)

We reject at the outset the County's claim that role conflict will be a significant factor in reducing the number of drivers during an emergency. We have dealt at great length with the question of role conflict elsewhere in this Decision (*see* Board Findings I.B.1 to I.B.19). We found that role conflict is possible in individual instances, and that some individuals might not perform their emergency roles. Nevertheless, we found no evidence to support the hypothesis that there would be wholesale defections of emergency workers stemming from this cause. We find the same here. The County's assertions of role conflict affecting drivers of emergency vehicles is speculative and without merit. Further, there is nothing in NRC regulations that requires contracts or letters of agreement between individual drivers and LILCO. The contracts that exist between the ambulance companies and LILCO provide adequate assurance that personnel relied upon by LILCO will be provided.

The County is concerned that there will be no emergency medical technicians or any medical personnel to accompany evacuees on buses. I.F. 658. The County thinks this is a serious deficiency because there is no assurance that evacuation of patients in buses will be safe or that persons in charge of caring for patients in special facilities would release their patients to bus drivers or persons without health care training. Tr. 9883-84 (Mayer). The Board finds that there is nothing in NRC regulations which requires medical assistance on evacuation buses. Further, LILCO has identified the number of ambulatory and nonambulatory patients likely to need evacuation from the special facilities. Ambulatory patients will be evacuated on buses. The nonambulatory patients will be evacuated in ambulances or ambulettes. Cordaro *et al.*, ff. Tr. 6457, Vol. II, Attach. 23. The Board finds no evidence that a bus ride is hazardous to ambulatory persons or that their evacuation requires the services of emergency technicians. We rule in favor of LILCO on this contention.

XI.B. Hospitals and Nursing Homes (Contentions 24.J, 24.N, 72)

Intervenors assert that the LILCO Plan must contain agreements with nursing and adult homes, nursery schools, hospitals, and other special facilities in the EPZ because these facilities are support organizations having an emergency response role within the meaning of NUREG-0654 § II.A.3 and also because without such agreements there is no assurance of the willingness of these special facilities to implement an evacuation as proposed in the LILCO Plan.

XI.B.1. Letters of Agreement with Special Facilities (Contention 24.J)

LILCO argues that special facilities, rather than providing help during an emergency, would be seeking help from LERO. Therefore, these facilities are not support organizations within the meaning of NRC regulations. LILCO has not obtained letters of agreement with special facilities and does not intend to obtain them. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 7; Tr. 9031 (Robinson). Agreements with these facilities to implement protective actions as recommended by LERO are therefore no more necessary than agreements of that sort from households within the EPZ. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 7-8; Tr. 6563, 9032-33 (Robinson).

LILCO has conducted emergency planning with the special facilities in the Shoreham EPZ. It has visited each special facility in the EPZ and has provided tone alert radios to each facility (one nursery school has refused to accept a radio). LILCO states that it is working with the facilities to develop their plans for an effective response during an emergency, including developing facility-specific plans and procedures for sheltering and evacuation. It is offering training to the employees of such facilities and is prepared to offer additional help to any facility within the EPZ that requests assistance. In addition, LILCO has contracted for vehicles to transport residents of these facilities out of the EPZ should that become necessary. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 8-9.

XI.B.2. FEMA's Views

FEMA asserts that letters of agreement are required from support organizations that are assigned emergency response roles. Baldwin *et al.*, ff. Tr. 12,174, at 12. FEMA's review of the Plan shows that the special facilities referenced in Contention 24.J are not identified as support organizations having an emergency response role. *Id.* at 17. FEMA concludes that letters of agreement from these facilities are not necessary. *Id.*; Tr. 12,250 (McIntire).

XI.B.3. Need for Letter of Agreement with Central Suffolk Hospital

FEMA found Central Suffolk Hospital to be an exception to the foregoing conclusions. The Board agrees with FEMA and finds that facility is a support organization having an emergency response role. Baldwin *et al.*, ff. Tr. 12,174, at 17. FEMA found the Plan deficient because a letter of agreement between LILCO and Central Suffolk Hospital could not be found. *Id.* The Board finds that LILCO should obtain a letter of agreement with Central Suffolk Hospital to provide support services in accordance with the Transition Plan prior to plant operation at full power. No party in this case has brought to our attention any potential barriers to obtaining such a letter. We therefore delegate to the Staff the responsibility for verifying that such a letter exists prior to issuance of any operating license for full-power operation at the Shoreham facility.

XI.B.4. Suffolk County's Objections

Suffolk County witnesses expressed doubt that the special facilities within the EPZ could be expected to comply with protective action recommendations from LILCO if there were no agreements between LILCO and the special facilities. Tr. 9892 (Harris, Mayer). The County argues in its proposed findings that the LILCO Plan assumes that handicapped facilities will provide most of the transportation necessary for an evacuation and that the actions they must take in an evacuation are more than just seeking help from LILCO. I.F. 661. The County doubts that the facilities will agree to LILCO's proposed evacuation methods and procedures; that they will properly and adequately prepare their patients or students for such procedures; and that they will identify and make arrangements for appropriate reception facilities or relocation centers. *Id.* The County further argues that there is no evidence that any of the facilities have agreed to either perform the tasks assigned to them by the Plan or to implement LILCO's evacuation proposals as set forth in the Plan. Without such agreements, they argue, this Board cannot find that the Plan could and would be implemented.

XI.B.5. Conclusion

The Board agrees with LILCO and FEMA that nursery schools, adult homes, nursing homes and other special facilities within the EPZ are not support organizations within the meaning of NUREG-0654 § II.A.3. These facilities have no assigned role to support the overall emergency response effort. The only actions expected of these organizations is to

act in their own interest to protect themselves from radiation by either sheltering or evacuation. They require assistance from LILCO in determining whether to shelter or evacuate, and if evacuation is ordered, for the necessary transportation. LILCO has provided for transportation for these facilities. Furthermore, it has conducted discussions with these facilities to inform them about the options of sheltering or evacuation and it has provided adequately for notification of these facilities.

We see no value in a letter of agreement in providing incentive, assumed to be otherwise absent, for people to protect themselves in an emergency. There is no evidence, and we are not prepared to assume, that the Staff or residents of special facilities would not act appropriately to protect themselves in an emergency simply because no letter of agreement exists. LILCO's responsibility in this matter is to provide assistance and advice which would enable people with ordinary incentives for self-protection to take appropriate actions.

We do not agree with the County that the provisions LILCO has taken are in any sense an *ad hoc* or unplanned or uncoordinated response to an emergency. The protective actions of sheltering or evacuation are conceptually simple and capable of being understood by anyone. All that is needed from LILCO is to make provisions for implementation. This has been done. We find no requirement, with the exception noted, for letters of agreement with special facilities.

We agree with FEMA that a letter of agreement with Central Suffolk Hospital should be obtained prior to plant operations and it is so ordered as previously outlined in this Decision.

***XI.B.6. Evacuation Time Estimates for Special Facilities
(Contention 72.A)***

This contention alleges that LILCO's planned evacuation of special facilities will take too long to provide adequate protection against health-threatening doses of radiation. Intervenors claim this is so because: (1) large numbers of trips are necessary to transport persons to relocation centers; (2) vehicles will encounter traffic congestion from evacuating traffic; and (3) it will take time to load and unload passengers from ambulances.

XI.B.7. LILCO's Plans

LILCO has calculated detailed evacuation time estimates for the special facilities in the EPZ. Cordaro *et al.*, ff. Tr. 9101, at 5-6, 10, Attach.

2. The estimates were calculated by adding the time required to complete a series of steps: (1) the time for evacuation vehicles to arrive at staging areas; (2) time needed to travel from the staging area to the special facility; (3) time required to load passengers; (4) time needed to reach the EPZ boundary, and for multiple run cases, the time to travel to and from reception centers. *Id.* at 6-7. The loading and unloading time assumed by LILCO in calculating its estimate was based on estimates from an ambulance company. Tr. 9104, 9123-24 (Lieberman). Evacuation time estimates for vehicles evacuating special facilities assumed a speed that specifically accounts for congested traffic conditions. Cordaro *et al.*, ff. Tr. 9101, at 8; Tr. 9128 (Lieberman). Most ambulances and ambulettes will make one run per vehicle to evacuate the special facilities. However, the Suffolk County Infirmery will be serviced by a second wave of ambulances and ambulettes. Tr. 9119, 9128 (Lieberman). Nine ambulettes would be used in the second wave; three for the Suffolk County Infirmery and six for the Woodhaven Nursing Home.

Time estimates for second-wave vehicles include the time to travel from the special facility to a reception center and return to another special facility. The reception centers used in this calculation must now be treated as hypothetical since they are no longer a valid part of LILCO's Plan. Thus, evacuation times which depend on second-wave ambulettes are to some extent unquantified.

The number of ambulances so affected is not given explicitly anywhere in the testimony. The Board concludes, however, that the number would be substantial since there are sixty-three ambulances under contract and LILCO's testimony shows that there will be 113 ambulance trips required for full evacuation of special facilities. Assuming all sixty-three ambulances under contract engage in a first-wave evacuation, we calculate that some fifty would be used in a second wave. LILCO's testimony shows that sixty-five ambulances are required to evacuate the Suffolk County Infirmery. The Board concludes that only fifteen ambulance trips could be made to the Suffolk County Infirmery on the first wave and that the remaining fifty would be second-wave evacuations for which the timing is uncertain because of the unresolved matter of relocation centers. Cordaro *et al.*, ff. Tr. 9101, Attach. 1.

LILCO acknowledges that while evacuation time estimates for people in special facilities show that the residents can be evacuated before the last car leaves the EPZ, this is not so for the patients in the Suffolk County Infirmery who need ambulance transportation. Estimates show that for the Suffolk County Infirmery some 8 hours, 50 minutes would be required to evacuate those needing an ambulance. *Id.* at 10, Attach. 2. LILCO argues in defense of this plan that it is preferable for residents

of the Suffolk County Infirmary to shelter instead of evacuating. This is so because the Suffolk County Infirmary is located at the outer edge of the EPZ boundary and its masonry construction provides a high level of radiation shielding. Furthermore, a number of its patients would be exposed to the possibility of trauma should they be moved. *Id.* at 10.

The uncertainty in ambulance evacuation times for the Infirmary can be resolved with relative ease once the principal controversy over relocation centers is resolved. The uncertainty is not a primary deficiency in the Plan at this stage, since it stems in contingent manner from the uncertainty in the relocation centers. However, we order LILCO to recalculate evacuation times in a more realistic manner for the Suffolk County Infirmary when and if the relocation center controversy is resolved. Since this is a secondary matter which depends on resolution of another controversy and which presents no other barriers to its fulfillment, we delegate to the Staff the responsibility for ensuring that the calculations are made in realistic manner.

We find that LILCO's calculations of evacuation times for special facilities that rely on ambulances and ambulettes are based on realistic assumptions and are consistent with calculations of evacuation times for the entire EPZ. The County's concern for large numbers of vehicle trips does not raise a realistic concern for health and safety of the residents of special facilities because there will be only one trip per vehicle, with the exception of the Suffolk Infirmary, which probably would not be evacuated, and a few ambulette trips previously noted. Likewise, the County's concern for traffic congestion is unfounded because the calculation of evacuation times takes account of the fact that traffic will be congested during the overall EPZ evacuation. The County's concerns about the time required to load and unload passengers is not well-founded. LILCO has obtained from an ambulance company a reasonable estimate of the time required to perform these tasks and we have no reasonable basis for challenging that estimate.

The County also complains that evacuation time estimates have not been made for three hospitals near the boundaries of the EPZ. LILCO concedes this is so but argues that it has made sheltering plans for these hospitals and that evacuation would be unnecessary in practically all cases. LILCO's plans for assistance to hospitals if evacuation does become necessary relies on vehicles that would first be used to evacuate other facilities. We conclude therefore that evacuation times for at least some patients in these hospitals would be lengthy, and in many respects comparable to those required for ambulance evacuation of the Suffolk County Infirmary. The need for evacuation time estimates for hospitals

is contingent on the acceptability of LILCO's sheltering plans, the adequacy of which we decide in dealing with Contention 72.E.

XI.B.8. *Relocation Centers for Special Facilities (Contentions 24.N, 72.C, 72.D)*

These contentions allege that LILCO's evacuation proposals would not and could not be implemented because LILCO has not identified or obtained agreements with facilities to serve as relocation centers for patients in hospitals, handicapped persons, or residents of any special facilities other than the United Cerebral Palsy of Greater Suffolk, Inc.

XI.B.9. *Current Status of Reception Centers for Special Facilities*

LILCO is working with special facilities to assist them in identifying reception centers. It does not, however, intend to enter into letters of agreement with reception centers when they are identified. At the close of the record, reception centers for special facilities had not yet been identified. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 11; Tr. 9087 (Robinson); Tr. 9088-89 (Yedvab). LILCO claims that it is the responsibility of facilities themselves to arrange for suitable reception centers for their particular groups. Tr. 9087-88 (Robinson). LILCO argues that it is not aware of any other emergency plans that include agreements between either the utility or the locality and reception centers for special facilities. Tr. 9089 (Weismantle). However, Suffolk County cites in its proposed findings the *Wolf Creek* case in which the Board required letters of agreement with reception centers for special facilities. *Kansas Gas & Electric Co.* (Wolf Creek Generating Station, Unit 1), LBP-84-26, 20 NRC 53, 71 (1984).

XI.B.10. *FEMA Testimony*

FEMA testified that to the extent that residents of special facilities are going to be sent to relocation centers that are different from the general public relocation centers, the LILCO Plan must have a final listing of such centers that is supported by letters of agreement. Baldwin *et al.*, ff. Tr. 12,174, at 19; Tr. 12,266-67 (Kowieski). In FEMA's view, the absence of the identification of relocation centers in the Plan is a deficiency. Tr. 12,266-67 (Kowieski). The County witnesses agreed. Harrison, Mayer, ff. Tr. 9777, at 7.

XI.B.11. Attempts to Identify Relocation Centers

LILCO has contacted hospitals outside the EPZ to determine whether they would accept patients from the three hospitals in and near the EPZ if necessary. The hospitals have indicated a willingness to accept as many patients as possible during an emergency, but they do not commit to exact numbers in advance because of the daily flux in hospital patient population. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 15. LILCO therefore intends to include in its Plan a list of hospitals that could serve as reception centers. However, these hospitals will not be paired with hospitals in the EPZ to serve as specific reception hospitals. *Id.* at 16. Past disaster experience indicates that hospitals do everything in their power to respond to patient and community needs during emergencies. *Id.* at 15-17. The Plan includes lists of hospitals in the Long Island area and their telephone numbers. The Plan provides for contacting these hospitals and assigns staff the task of calling the hospitals in an emergency. *Id.* at 16.

Reception centers for nursing and adult homes have not yet been identified. *Id.* at 17. LILCO's representative has met with the majority of nursing homes in the EPZ and except for the Suffolk Infirmary and one other nursing home they have cooperated in discussions on planning for an incident at Shoreham. Tr. 9083 (Glaser). LILCO has also been working with a Nassau/Suffolk hospital council and the Suffolk County health facilities associations and hospitals outside of the EPZ to assist the nursing and adult homes within the EPZ in finding appropriate reception centers. *Id.* at 19. LILCO commits to revise its Plan to reflect inclusion of the reception centers when they are finally chosen. *Id.* at 20. The Board notes that hospitals and nursing homes are required by the New York State hospital code to have written emergency and disaster preparedness plans rehearsed and updated at least twice a year. These include the reception and treatment of patients in emergencies or disasters that might occur either within or outside the hospitals. *Id.* at 16-17; Tr. 9074 (Glaser); Tr. 9088 (Yedvab).

Some progress has been made and two of the special health care facilities mentioned in Contention 72.C have identified reception centers for their facilities. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 22, Attach. 43; Tr. 9087-88 (Robinson). Work is continuing to obtain reception centers for the remaining facilities and LILCO commits to revise its Plan to reflect relocation centers when they are chosen. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 22, Attach. 17, 41, 42, 44, 46.

XI.B.12. Conclusion

LILCO has done all that could be reasonably expected in its attempt to find relocation centers for hospitals that might be evacuated. Hospitals in Suffolk County have been contacted and they have agreed to accept as many patients as possible in the event of an emergency. They decline to specify in advance the numbers of patients that they would accept in an emergency because they cannot foresee what space or facilities they would have available. The reception hospitals' decision not to commit to specific numbers results from a realistic assessment of what they can and cannot commit to regarding their future actions. Letters of agreement could not alter that situation. Therefore, we do not find the Plan deficient as regards identification of reception hospitals or letters of agreement with them. Furthermore, we note that evacuation of hospitals is not the principal protective action that would be taken in an emergency. Evacuation of the three hospitals in or near the EPZ is a backup protective action. We therefore find that no additional benefit to public health and safety could be obtained by requiring letters of agreement between EPZ hospitals and potential receiving hospitals. These hospitals are on notice that they could be called upon for assistance and the Board accepts that they will do all they can to assist.

The situation is different in the case of nursing and adult homes within the EPZ. As the Plan now stands, only a few relocation centers for special health care facilities have even been identified. FEMA and the NRC Staff (Staff Finding (S.F.) 631) agree with Suffolk County that the Plan is deficient because reception centers for special health care facilities have not been identified and no supporting agreements exist. The Board agrees. It will be necessary for LILCO to identify reception centers for special facilities that could be evacuated in an emergency at Shoreham and to support this identification with letters of agreement prior to operation of Shoreham at full power. We agree with Staff that agreements do not necessarily have to be between LILCO and reception centers. Agreements between health care facilities and reception centers themselves would provide the requisite assurance that health and safety of residents will be protected. However, at this time relocation centers have not been designated and this constitutes a deficiency in the Plan.

XI.B.13. Determination of Evacuation for Hospitals (Contention 72.D)

This contention asserts that the LILCO Plan does not specify adequately the circumstances requiring an evacuation of hospitals in the EPZ and does not include adequate procedures for making protective action recommendations to determine whether evacuation is needed.

XI.B.14. LILCO's Plans for Hospital Protective Actions

LILCO has decided to recommend that the three hospitals on or near the EPZ boundary shelter instead of evacuate patients unless circumstances during a radiological emergency show that evacuation would be prudent. Tr. 8778, 8780 (Daverio). LILCO relies on EPA's manual of protective action guides and protective actions for nuclear incidents for this decision. The EPA manual specifies that in some circumstances different criteria than the normal protective action guides apply to special groups including bedridden and critically ill patients. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 24-25, Attach. 68. LILCO has engaged in emergency planning with the three hospitals on implementation of protective actions during a radiological emergency at Shoreham. *Id.* at 26, Attach. 69-98.

XI.B.15. Methods for Dose Calculation

LILCO has specified a method of calculating the dose to the hospital population in its Transition Plan. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 24, Attach. 67; § 5.3.2 of OPIP 3.6.1. The procedures enable LILCO to calculate a dose to a population under the alternatives of either sheltering or evacuation. It will recommend either sheltering or evacuation depending on which results in the overall greatest dose savings. In the special case of hospitals, LILCO will calculate the sheltered dose for hospitals based on the whole-body and thyroid dose reduction factors contained in OPIP 3.6.1. Tr. 8871 (Watts). It will compare that dose with the evacuation dose for the zone where the hospital is located. Tr. 8873 (Miele). When a dose has been calculated LERO personnel will discuss recommendations for protective action with hospital administrators in order to select an appropriate action. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 24-25, Attach. 67; Tr. 8878 (Cordaro). LILCO has adapted this plan of action because hospitals require a number of special considerations in making a protective action decision. Discussions with hospital administrators will include such factors as the release duration, the probable time needed for evacuating portions of the hospital patients including the specially radiosensitive and the likely impact on patients who require intensive care treatment. The intent is to make an individualized judgment as to whether hospitals should shelter or evacuate. This procedure is consistent with the EPA guidance which states that hospitals may fall under different criteria for evacuation and sheltering. Tr. 8875 (Miele); Tr. 8876-77 (Watts). An underlying assumption in the LILCO Plan for hospitals is that the likelihood of excessive dose to hospital patients when they are sheltered is exceedingly remote because

the hospitals are located at the outer edge of the EPZ. Tr. 8878 (Cordaro). While sheltering is LILCO's first line of defense, it is prepared to discuss the situation at the time of an accident to consider whether the dose to hospital patients under a sheltering recommendation might be excessive. Discussions with hospital personnel could lead to a decision to evacuate if the dose under sheltering would be excessive. Tr. 8881 (Cordaro). This could also result in evacuation of radiosensitive patients at doses below EPA guidelines. Tr. 8884 (Watts). Actual dose measurements made with equipment at the hospitals will be used to provide data on the dose to patients. Tr. 8881 (Miele). In defining what an excessive dose is, LILCO would be guided by the exposure levels prescribed in the EPA guidelines. Tr. 8884 (Watts). LILCO intends to use the EPA PAGs as guidelines and not as triggering thresholds for evacuation. Tr. 8884 (Miele, Watts). The decision whether to evacuate hospitals would be based on judgments made at the time of an accident rather than on predetermined criteria. Tr. 8884-85 (Watts). LILCO considers this adequate because the likelihood of doses to hospital patients exceeding the EPA PAG upper limit of 5 rem whole body is remote. LILCO cites the fact that hospital buildings have a shielding factor of 0.2. Using that factor they calculate that a dose of 25 rem in the environment at 10 miles from the plant would have to exist for the PAG limit of 5 rem whole body to be exceeded inside the hospital. This is an extremely low probability event. Tr. 8885 (Miele).

XI.B.16. Suffolk County's Objections

The County did not brief Contention 72.D directly, but relied on its proposed findings on Contentions 60 and 63. I.F. 676. Those findings addressed other issues as well as the ones addressed by Contention 72.D. We conclude that the County's objections specifically relating to Contention 72.D are contained in its Proposed Findings 486 through 488. In those proposed findings the County argues that LILCO does not intend to apply the standard of recommending the protective action which would result in the lowest dose for hospitals, even though this is its intent for the general public. It argues that LILCO witnesses conceded that the determination to recommend sheltering would not be based on a comparison of an evacuation dose and a sheltering dose. Such a comparison would, in the County's view, be impossible because the Plan has no evacuation time estimates or evacuation plans for hospital residents. I.F. 486. The County criticizes the fact that excessive dose is nowhere defined in the Plan and that LILCO's witness who would be expected to act during an emergency could not define or describe what constitutes

an excessive dose. This they find to be an *ad hoc* approach to protective action decisions that is unacceptable and contrary to NRC emergency planning requirements.

XI.B.17. Conclusion on Protective Actions for Hospitals

LILCO's plan for protective actions for hospitals differs from its plan for the general population. Recommendations for the general population will be based on comparison of the shelter dose to the evacuation dose for the conditions prevailing at the time of an accident and for the zone of interest. Protective action will be selected depending on whether sheltering or evacuation results in the lowest dose. By contrast, the plans for hospitals designate in advance a preferred protective action, that of sheltering. LILCO says that it will recommend evacuation only if the likely dose to hospital populations is excessive. It is reluctant to state in advance that it will use the EPA PAGs as threshold criteria for recommending hospital evacuation as it would for the general population. This reluctance stems from a number of special factors that are present with regard to hospital populations that are not present with regard to the general population. These include the location of the hospitals on the EPZ boundary, the sheltering value of hospital buildings and the possible health effects of evacuating hospital patients. By reserving its option of deferring judgment on evacuation until an emergency actually occurs it has a chance to discuss the matter with hospital personnel. Because of special needs of hospitals LILCO has made a calculated choice not to specify *a priori* precisely what conditions will precipitate an evacuation of hospitals in a radiological emergency. This is what the County calls *ad hoc* planning. It objects to a plan that calls for discretionary decisionmaking at the time of an accident rather than determining in advance what actions are needed and what criteria would influence those actions.

The Board concludes that LILCO has planned thoughtfully for the difficult problem of protective actions for hospitals. This is not an *ad hoc* plan since LILCO knows what it will do regarding hospitals in the case of a radiological emergency at Shoreham. It will recommend sheltering. Further, it will discuss with hospital administrators whether any further action such as evacuation might be needed. LILCO's witnesses are familiar with the criteria and the factors that would have to be considered at the time that an evacuation decision was being made. They would be guided and influenced by the EPA protective action guides and they are well aware that protective action guides call for a mandatory evacuation when doses exceed 5 rems whole body or 25 rems to the thyroid. Even at those levels, however, LILCO does not make a firm commitment to

recommend evacuation because there are matters of health and safety regarding hospital patients which must be weighed in the balance. The EPA PAGs themselves permit special factors and criteria to be considered for hospital patients. FEMA has found the Plan reasonable based on the fact that special considerations are permitted for hospitals and that the hospitals in this case are at the boundary of the EPZ where the hazard is expected to be low. LILCO's conclusion that sheltering as a predetermined protective action will be the one required in practically all cases, given the location of the hospitals in question and the shielding factors for large buildings, is consistent with the planning basis of NUREG-0654.

The County would have the Board weigh the balance between the need to save dose on the one hand, and the need to protect the physical safety of incapacitated hospital patients on the other, more strongly in favor of a predetermined commitment to save dose. We cannot agree that this approach has more merit than LILCO's, given the low likelihood of excessive doses and the possibility of physical harm to hospital patients. We conclude that LILCO's Plan for protective actions for hospitals is a reasonable one. The planned actions are not in violation of NRC's regulations or guidance on emergency planning. Neither do they ignore the substantive need to carefully weigh the special health and safety requirements of hospital patients. We rule in LILCO's favor on this contention.

XI.B.17. Ad Hoc Evacuation of Hospitals (Contention 72.E)

This contention asserts that LILCO will evacuate hospitals through an *ad hoc* expansion of transportation resources rather than planning to provide protection to hospital patients in the event an evacuation is ordered.

XI.B.18. LILCO Plans for Evacuation of Hospitals

If evacuation of hospitals became necessary, LILCO would use the ambulances and ambulettes it has under contract to transport patients. These vehicles would be used first to evacuate other special facilities and the handicapped at home. Vehicles would be redirected to hospitals as they became available after completing the evacuation of special facilities.

LILCO defends its Plan for protective action for hospitals on the basis that 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. LILCO concludes

that an effort to pre-plan for hospital evacuation would be of marginal benefit because transportation requirements vary and can be altered by hospital admittances and releases, patients' recoveries, and daily surgery. For some patients the shock of transportation may be too great and a decision may be made not to evacuate them. The population of the radiosensitive patients, including babies, who would be the first group of patients to be evacuated, can change on a daily basis. Cordaro, *et al.*, ff. Tr. 9101, at 11. Additionally, the three hospitals in question are located on the boundary of the EPZ and would be among the last facilities to be evacuated in any event.

LILCO claims that it has not ignored the possible need for evacuation of hospitals, but has realistically taken account of the fact that hospital patients will in most cases be sheltered instead of evacuated. Nevertheless, if an evacuation were required, LILCO's plans specify that the health facilities coordinator will contact hospitals to determine transportation needs. Hospital needs would be relayed to the transportation support coordinators and the ambulance coordinator who would direct vehicles to each hospital. *Id.* at 13.

Intervenors argue that LILCO's Plan for *ad hoc* arrangement of transportation in the event hospitals were evacuated is in essence a plan to ignore the three hospitals until everyone else in the EPZ's special facilities has been evacuated. In the County's view, LILCO only will protect hospital patients if resources become available. I.F. 679.

XI.B.19. Conclusion

We confront at the outset the question of whether LILCO's preference for sheltering of hospitals is grounded on practical constraints imposed by the number of ambulances and ambulettes it has under contract or whether its decision is founded on sound emergency planning goals that are in the interest of public health and safety. As a practical matter, if evacuation of hospitals were necessary early in an evacuation, LILCO would not have enough vehicles to evacuate all of the special facilities and hospitals in one wave. Many of the vehicles would be required to make two and possibly three runs before all such facilities could be evacuated. The practical constraints appear to be most critical in the case of ambulances. We note from LILCO's Attachment 2 to its testimony that ambulances would not completely evacuate the Suffolk County Infirmary until some 8 hours, 50 minutes after the initial notification. This is because the ambulances that would evacuate Suffolk Infirmary would have first aided in the evacuation of other facilities. The evacuation of hospitals could well take similar amounts of time at least with regard to ambu-

ances since the Plan relies on vehicles that had already made other runs for other purposes. Ambulettes would leave the Suffolk Infirmary about 4 hours, 40 minutes from the time that an order to evacuate is given. Some of the ambulettes are also on second-wave runs, having first assisted in the evacuation of another facility. It is clear from the estimates made for the Suffolk County Infirmary, and from the fact that the hospitals are in a similar position, that the time for evacuation of hospitals if needed would significantly exceed the general public evacuation time estimates for some patients. We conclude that these are practical constraints imposed by the availability of ambulances and ambulettes which make a prompt simultaneous evacuation of all special facilities, including hospitals, impossible. These constraints might have influenced LILCO to plan for hospitals as it did.

Weighing in LILCO's favor on this contention is the fact that the hospitals, like the Suffolk Infirmary, are indisputably near the 10-mile EPZ boundary. Hazard from radiation releases from Shoreham diminishes with distance from the plant. We therefore regard LILCO's conclusion that in the vast majority of cases sheltering would be the protective action of choice to be a realistic one which is consistent with NRC's design basis for the EPZ. NUREG-0654, at 12. FEMA agrees with LILCO that it is appropriate to designate sheltering as a primary protective action and *ad hoc* evacuation as a backup action.

The Board does not share the County's view that LILCO's Plan for *ad hoc* evacuation of hospitals constitutes a cavalier disregard for the welfare of hospital patients. LILCO's preference for sheltering of hospital patients is well-founded, both because of the likelihood that radiation levels near the 10-mile EPZ boundary will not be excessive in most accidents and because of the specially sensitive nature of hospital patients who require special care. Nevertheless, in the worst accident scenarios LILCO could not extend the same level of radiation protection to all hospital patients that would be afforded to the general public by an evacuation that takes place in about 5 hours. We find that for some hospital patients delay in evacuation could create an additional increment of risk from radiation dose that is somewhat greater than that of the general public. The Board concludes, however, that the unquantified incremental risk to health and safety of some hospital patients under the LILCO Plan is small. Considering the severity of the accident that would have to occur and the location of hospitals, we conclude that the additional increment of risk to hospital patients over that of the general public does not stand as a barrier to licensing. We conclude that LILCO has sustained its burden of proof on this contention.

XI.C. Registration of Handicapped Persons (Contention 73.A)

Contention 73.A alleges that not all handicapped persons who require evacuation assistance will be known to LILCO because of defects in its preregistration system. The County alleges that LILCO's postcard registration system for the handicapped will not identify all persons who need assistance; that the Plan has no provision for verifying the completeness of the lists compiled from returned postcards, and that there is no provision for updating the listing.

XI.C.1. Means for Registering Handicapped People

LILCO's method for registering handicapped people includes: (1) sending letters asking persons with special needs to return a postcard; (2) a similar request contained in their brochure; (3) an article in their newsletter "Keeping Current"; and (4) a similar notice in telephone directories. Cordaro *et al.*, ff. Tr. 7526, at 5-8 and Attach. 1-2, 5-6; Tr. 7628-40 (Clawson, Cordaro). In addition, LILCO plans to review its list of customers with special priority for electric service restoration because they may have special health requirements, and to ask in letters and advertisements that people inform LILCO of the identity of individuals who might need assistance. Cordaro *et al.*, ff. Tr. 7526, at 9.

FEMA found plans for registering the handicapped adequate. However, FEMA did not address issues of implementation raised by Intervenor. Baldwin *et al.*, ff. Tr. 12,174, at 79; Tr. 12,933-38 (Keller, Kowieski).

XI.C.2. Problems with Registration of the Handicapped

The County believes that the postcard registration system for the handicapped used by LILCO is inherently inadequate for a number of reasons; first, the postcard questionnaire is poorly worded, a fact conceded by LILCO's witness. Tr. 10,130-31 (Mileti). This would result in inadequate identification of those with special evacuation needs. Saegert, ff. Tr. 9574, at 4; Acquario *et al.*, ff. Tr. 7854, at 7, 9; Tr. 9608-12, 9627-31 (Saegert); Tr. 7867-68, 7901-12 (Acquario, Albertin, Knighton); Tr. 9626-30 (Harris, Mayer); Tr. 7552-53, 7566-67, 7570-74 (Robinson).

A second problem asserted by Suffolk County is that mail-back surveys are recognized as inefficient and unreliable since they generally have a low response rate. Tr. 9617, 9620, 9641-42 (Saegert); Tr. 9615-20, 9636 (Harris, Mayer). In this case, psychological and social factors might prevent some people from registering with LILCO even though they would need help during an evacuation. For example, people

do not always accurately assess their physical condition. Saegert, ff. Tr. 9574, at 3-4. Some people may hesitate to label themselves as impaired even though they might be. Saegert, ff. Tr. 9574, at 4. Many people are unlikely to read LILCO's materials. Saegert, ff. Tr. 9574, at 5-6.

LILCO, however, is making other independent efforts to contact handicapped persons with the EPZ. It has obtained a list of hearing-impaired persons from the Service Bureau for the Deaf (Tr. 6663, 7603 (Robinson)) and it has contacted both the Suffolk County Handicapped Services and Office of the Aging. Tr. 7660-61 (Robinson). It has further plans to contact additional organizations associated with the handicapped. *Id.*

XI.C.3. Conclusion

LILCO is required by NRC guidance to establish plans which specify means for protecting those persons whose mobility may be impaired due to such factors as institutional or other confinement. NUREG-0654 § II.J.10.d. There is no specific regulatory requirement for preregistering handicapped persons. However, licensing boards have held that reasonable efforts to identify them are to be made. *See, e.g., Consolidated Edison Co. of New York* (Indian Point, Unit 2), LBP-83-68, 18 NRC 811, 1016 (1983). The Board concludes that LILCO is required to make reasonable efforts to identify handicapped persons in need of evacuation assistance within the EPZ at Shoreham.

We find that LILCO's efforts to identify handicapped persons in need of assistance during a Shoreham emergency are reasonable. In making this finding we do not discount the County's factual assertions that mail-back surveys of the type used by LILCO may have low return rates. We accept that a mail-back survey might not identify each and every person in the EPZ who might ultimately need assistance. We further conclude that there is no practical independent means of verifying the completeness of registration from mail-back surveys. Indeed, if there were a reliable independent method for verifying complete registration with certainty, that method would be the one of choice in the first instance. The County's testimony on this subject convinces us that there is no truly practical way to conduct such a verification. Drs. Harris and Mayer testified that the only method they could think of would be to conduct a door-to-door survey of the entire EPZ. Even they did not support that suggestion as a practical and reasonable use of resources. We conclude that the problem of complete identification of handicapped individuals with certainty is a difficult one. The difficulty does not arise from failure of planning, however, but is a result of human behavior itself which is

beyond LILCO's control. We conclude that LILCO fulfilled its obligation when it made the opportunity to become registered widely available. It has done this through multiple independent channels and we conclude that LILCO's efforts have been adequate.

The Board does not discount the County's assertion that the wording of the survey form could be improved. That does not raise a serious health and safety question, however. The wording of the survey was not so obscure as to create inevitable confusion on the part of potential respondents. Anyone who is inclined to read the material and respond would be able to do so from the information provided on the postcard registration form.

The Board is not impressed with the County argument that people will not respond properly because they do not understand what an evacuation entails. There is no evidence that a detailed understanding of evacuation is necessary in order to respond to the postcard registration form which seeks only to determine whether assistance would be necessary or not during an evacuation. Tr. 7652-58 (Clawson, Cordaro). The Board is also not impressed with the County's claims that there are large numbers of uncounted handicapped and hearing-impaired persons in the EPZ based on the 1980 Census. The Census data were not gathered with the purpose that LILCO has in mind. The only people that LILCO seeks to identify are those who are both handicapped and who have no means of emergency assistance, a fact not tabulated by the Census.

The Board finds that LILCO's planning and implementation of its handicapped registration program is not seriously flawed, even though the County is correct in its assertion that independent verification of completeness has not been made. Because of the difficulty of verifying completeness we conclude that it is reasonable for LILCO to continue its program for identifying handicapped individuals who might need assistance. Its efforts using multiple published information sources and exploration of organizations who are in touch with the handicapped are reasonable and adequate. We rule in LILCO's favor on this contention.

XI.D. Notification and Evacuation of Handicapped People at Home (Contentions 73.B.1, 73.B.3, 58, 73.B.4, 73.B.5)

XI.D.1. Notification of Handicapped People at Home (Contentions 73.B.1, 73.B.3, 58)

Contention 73.B.1 asserts that the only provision for notifying nondeaf handicapped individuals of a pending evacuation is by means of a telephone call from the LILCO home coordinator. This, they assert, is an inadequate means of communication. Contention 73.B.3 asserts that one

LILCO employee, the Home Coordinator, is responsible for contacting all the handicapped persons and identifying and contacting all reception centers. There is no indication that sufficient personnel would be available to make all of these telephone notifications and therefore there is no assurance that disabled persons will be notified promptly enough to permit timely evacuation. Contention 58 raises generally similar and overlapping issues concerning communication with special facilities and the handicapped at home.

XI.D.2. Means and Purposes for Notification

LILCO's response to these contentions is that nondeaf 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. 7798, at 8. LILCO asserts that there is no regulatory requirement for a separate notification of nondeaf handicapped persons at home and that the County and State have not presented a valid notification issue under Contentions 58, 73.B.1, or 73.B.3. A.F. 584. LILCO plans to telephone handicapped persons simply to confirm that a vehicle is being dispatched to evacuate them in the event of an emergency. Cordaro *et al.*, ff. Tr. 7698, at 8-12, Attach. 2. LILCO further asserts that it has adequate numbers of people to perform such telephoning duties since the Home Coordinator, who has primary responsibility for calling these people, may draw on communicators and administrative personnel for assistance. *Id.* at 9-10. There are fifteen administrative support personnel and communicators whose responsibilities would not begin until a later stage of the emergency who could assist in making the calls. *Id.* at 11-12; Tr. 7752-53 (Weismantle). It is not significant to the health and safety of the nondeaf handicapped for them to be contacted by telephone during an emergency because the phone call simply provides advance notice that a vehicle has been dispatched to assist them in evacuating. Whether or not these persons are reached by telephone, the vehicles would be dispatched automatically to the residences of the handicapped. Cordaro *et al.*, ff. Tr. 7698, at 11-12; Tr. 7720 (Weismantle). Similar reasoning applies to telephone notification of special facilities. Tr. 5396 (Weismantle).

The County concedes that Contention 73.B.1 is without merit on the basis that LILCO's proposal to telephone the handicapped is merely a supplement to the EBS and siren notification and since the Plan provides that evacuation vehicles will be dispatched in any event. I.F. 690. As to Contention 73.B.3, the County now asserts that its principal concern is for the number of the homebound handicapped that could be contacted

in a timely fashion. LILCO asserted that some seventy-five homebound handicapped persons would have to be evacuated by special vehicles. Cordaro *et al.*, ff. Tr. 7698, at 9-11; Tr. 7747-49 (Weismantle). Based on its proposed findings under Contention 73.A, the County asserts that the assumption that only seventy-five people will require phone calls and evacuation assistance is invalid. I.F. 692. In the County's view, since the number of handicapped individuals is not accurately known, there is no basis for finding how long it would take to accomplish the notification. Additionally, the sending of evacuation vehicles to the homes of individuals does not eliminate the concern raised in Contention 73.B of the need to identify and contact a sufficient number of reception centers. Because LILCO has not yet identified or obtained agreements with reception centers (Tr. 7716-19 (Weismantle)), this process could take substantial time during the emergency and would delay evacuation.

XI.D.3. Conclusion (Contentions 73.B.1, 73.B.3)

Intervenors have conceded that Contention 73.B.1 is without merit and the Board agrees. Accordingly, on this contention we rule in favor of LILCO. Contention 73.B.3 raises the issue of LILCO's ability to notify disabled persons promptly enough to permit timely evacuation. The issue of notifying reception centers is mentioned in the contention but principally in the context of the burden of telephoning that this would impose on the home coordinator. We agree with LILCO that this contention does not raise a significant issue of notification of the handicapped. Nondeaf handicapped will be notified by the EBS and siren warning systems. The telephone notification of these persons is not essential to their health and safety, but merely constitutes notice that a vehicle has been dispatched. That will occur regardless of whether the notification is completed. The County raises the issue in its proposed findings of whether the number of nondeaf handicapped identified by LILCO is accurate. We found in Contention 73.A that the number of registered handicapped may well have uncertainties. These uncertainties do not create a significant notification problem, however, because LILCO has adequate flexibility to assign communicators and because notification is not necessary to assure protection of health and safety of the handicapped. The manager of LERO has the authority and the capability to 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). It is adequate at this stage that LILCO has in place a management organization which would cope with problems as they arise

and that it recognizes the potential need to do so. LILCO's present obligation is to plan for the people it knows about, and this has been done. If it comes to know of others in the future it will have to plan for them, but we have reasonable assurance that LILCO could contact and evacuate nondeaf handicapped persons at home under its Plan.

The County also objects to the fact that relocation or reception centers have not been identified and that this constitutes an added burden of notification. We reject questions concerned with identification of relocation centers in the context of this contention. We have already specified that LILCO will be required to identify adequate relocation centers both for the general public and for special facilities and the handicapped.

There is, however, no reason to think that if and when those facilities are identified they would constitute a significant notification problem in view of LILCO's management flexibility for assigning communicators and the number of personnel it has available. Thus, we see no reason for believing that problems of notification of reception centers poses a threat to the health and safety of the handicapped at home or in special facilities. We find that telephone notification is not essential to the evacuation of the handicapped at home and that no question of health and safety of the handicapped hangs in the balance depending on whether these phone calls are completed or not. We rule in LILCO's favor on Contention 73.B.3.

XI.D.4. Evacuation of Handicapped (Contention 73.B.4)

This contention asserts that evacuation of the handicapped at home would take too long and as a result handicapped people would be likely to receive health-threatening doses of radiation. Suffolk County's objections stated in Contention 73.B.4 were narrowed in its proposed findings to essentially two issues. The County now asserts that LILCO's estimate of seventy-five handicapped people at home is flawed, and secondly, that the time estimates for evacuation may be flawed since there is, in the County's view, some uncertainty as to whether the evacuation of the handicapped at home can be accomplished in one wave of vehicles. I.F. 696-697.

XI.D.5. Plans for Evacuating the Handicapped at Home

LILCO will evacuate the handicapped at home using ambulances, ambulettes, and buses. It has presented a detailed analysis of the steps required to calculate evacuation times for each of these vehicles. Cordaro *et al.*, ff. Tr. 7698, at 14-15. Evacuation by ambulances and ambulettes

can be completed in 3 hours, 20 minutes or less while buses will require 5 hours, 5 minutes to complete their portion of the evacuation. *Id.* at 16-17. LILCO concludes that the times required for the three types of vehicles to complete evacuation of the handicapped at home is less than or equal to the evacuation time required for the general public. *Id.* at 17; Tr. 7767-68 (Lieberman, Weismantle). Since protective action recommendations are based on the principal of dose minimization and are keyed to the time needed to evacuate the general public, LILCO claims that the handicapped at home would also be protected. LILCO's witnesses, after extensive cross-examination, continued to assert that the handicapped at home will be evacuated in one wave. Tr. 7796 (Lieberman); Tr. 7802 (Weismantle). The number of vehicles necessary to evacuate the handicapped at home is twelve buses, twenty ambulances, and fifteen ambulettes. Tr. 7769-71 (Lieberman).

XI.D.6. Conclusion (Contention 73.B.4)

The County's concerns about the number of people LILCO plans to pick up as handicapped at home are without merit for the reasons we found in our resolution of Contention 73.A. LILCO has prepared to evacuate those persons it knows about and has in fact made diligent efforts to resolve uncertainties in the total number in need of evacuation assistance. Therefore, we find LILCO's Plan adequate with regard to the expected number of persons requiring assistance. If more are identified in the future, LILCO will have to make new arrangements to accommodate them. LILCO has the management flexibility for such accommodation. The County's concerns about whether the evacuation of the handicapped at home could be accomplished with one wave of vehicles is without merit. The extensive cross-examination of the witnesses on that subject and their firm stand that only one wave of vehicles would be used for the handicapped at home is convincing. Adding further to credibility is the small number of vehicles actually needed to accomplish handicapped-at-home evacuation. The Board finds that LILCO has carried its burden of proof on Contention 73.B.4.

XI.D.7. Plans for Notification of the Deaf (Contention 73.B.5)

This contention alleges that LILCO's proposed notification of the deaf by route alert drivers would not be timely.

LILCO will use route alert drivers to notify the deaf population who can drive an automobile and see to their own transportation. If the deaf are also in need of evacuation assistance, they would be evacuated by

LILCO's ambulances or ambulettes. LILCO asserts that the deaf who have their own transportation would be notified in 4 hours or less from the time that an order to evacuate is given the general population. Tr. 7809-10 (Lieberman); Cordaro *et al.*, ff. Tr. 7698, at 18-19. LILCO claims this is adequate notice because any person who mobilizes for evacuation within 4 hours can complete an evacuation within the overall evacuation time required for the general population. Overall evacuation time is relatively insensitive to mobilization time. Tr. 7810-11 (Lieberman). LILCO has available sixty route alert drivers whose principal duty would be to warn the general public in the event of siren failure. There are forty-six deaf people who would require special notification. Tr. 7813 (Lieberman). The route alert drivers would only be used in their route alerting function in the event that all or part of the sirens failed during an emergency. In that event, they would first alert the public and then notify the deaf. Even in the case of total siren failure it is likely that the deaf could be notified before completion of the general public notification since some drivers would finish their public alert function earlier than others and would be available to inform the deaf. Tr. 7818 (Weismantle).

XI.D.8. Suffolk County Concerns

The County objects to the 4-hour time period for alerting the deaf by route alert drivers. They say a 4-hour notification period is in violation of NRC guidance which requires the Applicant to assure 100% coverage within 45 minutes of the population who may not have received the initial notification (NUREG-0654, Appendix 3 at 3-3). The Board notes, however, that the section quoted by the County goes on to state “[t]he basis for any special requirements exceptions (e.g., for extended water areas with transient boats or remote hiking trails) must be documented.” *Id.* In commenting on the design objectives for notification systems, NUREG-0654 acknowledges: “this design objective does not, however, constitute a guarantee that early notification can be provided for everyone with 100% assurance.” *Id.* at 3-1.

XI.D.9. Conclusion (Contention 73.B.5)

The Board finds that a special requirements exception for notification of the deaf is warranted because the deaf cannot be notified by the siren system or the EBS messages. Further, we find that a 4-hour notification period does not subject the deaf to any special hazard to their health and safety since they can still be evacuated in about the same time frame as

the general public. A protective action recommendation keyed to evacuation time estimates of the general public would confer equivalent protection to the deaf provided that LILCO conducts its notification as it says it will. LILCO is prepared to conduct that notification using route alert drivers. In the event of a total or partial siren system failure, notification of the public by manual broadcast methods would take longer than 45 minutes. Even under those conditions the deaf could be notified to evacuate in about the same time as the general public. The Board therefore finds that LILCO has met its burden of proof on Contention 73.B.5.

XII. SCHOOLS (CONTENTIONS 24.E, 24.F, 24.M, 24.N, 61.C, 68-71)

Suffolk County's contentions concerning schools allege that the protective measures for schoolchildren (early dismissal, sheltering, and evacuation) would not and could not be adequately implemented in the event of an emergency at Shoreham because the schools have not planned for, and will not plan for, such an emergency.

XII.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Dr. Richard R. Doremus, Edward B. Lieberman, Michael L. Miele, Elaine D. Robinson, and John A. Weismantle. Charles V. Failla testified on behalf of New York State. Suffolk County presented the testimony of Dr. George Jeffers, Anthony C. Rossi, Nick J. Muto, J. Thomas Smith, and Robert W. Petrilak. FEMA's witnesses were Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

XII.2. Protective Measures for Schools

Eleven school districts have schools in the EPZ; six districts have no schools in the EPZ but do have students who live in the EPZ. There are two parochial schools inside the EPZ and three parochial schools outside the EPZ with students who live inside the EPZ. Thirteen nursery schools are also involved. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 12; LILCO Exh. 80, Appendix A at II-10 and Fig. 4. Board Findings III.4, III.6, and III.9, which require inclusion within the EPZ of several other schools, will, of course, alter these figures.

When an alert or site area emergency is declared, but no protective action is recommended for the general public, schools will be advised by tone alert radios (provided by LILCO) to implement early dismissal. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 13. If school is not in session, school officials will be contacted at home and advised to cancel classes. If school is in session when a protective action is recommended for the general public, all schools will be advised to take the same protective action. However, if some zones are advised to shelter and others to evacuate, all the schools will be advised to evacuate. *Id.* In addition to notification by tone alert radio, LERO school coordinators at the Emergency Operations Center (EOC) will contact by telephone each school district superintendent and the individual in charge of each private or nursery school in the EPZ to verify that schools have received the EBS messages and will implement the recommendation of the message. *Id.* Although the Kids-R-Us nursery school has not accepted a tone alert radio, the LILCO Private School Coordinator will telephone the school in the event of an emergency. *Id.* at 85. Principals of schools outside the EPZ with students who reside inside the EPZ will be notified by the district superintendent to keep the students at school when protective actions are recommended for the general public in the EPZ. *Id.* at 14.

If an alert or site area emergency were declared while schools were in the process of opening, and no protective action was recommended for the general population, school officials would be advised to have arriving buses return students to their homes and to have students who do not travel by bus return home in the usual manner. *Id.* at 15. If a protective action were recommended for the general public, school officials would be advised to shelter students or have the buses transport them to reception centers. *Id.*

XII.3. Letters of Agreement with Schools

Contention 24.E alleges that LILCO has no agreements with schools for schools to implement protective measures, and no agreements with nursery schools or parents to permit LILCO employees to drive buses or evacuate children.

Many of the school districts within and near the EPZ have refused to participate in emergency planning with LILCO. *Id.* at 29-30. Witnesses representing the Mount Sinai School District, Middle Island Central School District, and the Middle Country Central School District testified that their districts do not intend to reach any agreements with LILCO. Petrilak (Schools), ff. Tr. 11,001, at 2-3; Tr. 11,002-03 (Muto); Jeffers and Rossi (Schools), ff. Tr. 11,001, at 3. Several school boards have

passed resolutions critical of LILCO's emergency planning efforts, and no school district has endorsed the LILCO Plan. Tr. 9203-05 (Weismantle).

LILCO admits that it does not have written agreements with schools. Tr. 9170 (Weismantle). However, LILCO argues that NRC regulations do not require such agreements. NUREG-0654 § II.A.3, requires "written agreements" with "support organizations having an emergency response role within the Emergency Planning Zones." LILCO argues that schools are not "support organizations" within the meaning of NUREG-0654 and therefore written agreements are not required. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 31. FEMA agrees with LILCO's position. Mr. Kowieski testified that a school would not be a support organization unless the school were designated as a reception or relocation center to provide shelter for evacuees. Tr. 12,193 (Kowieski); *see also* Tr. 12,214 (McIntire); Tr. 12,433 (Keller). FEMA bases its conclusion on the fact that school officials would take protective actions similar to those of the general population and that assisting and supervising schoolchildren is part of the schools' normal function, although specific actions differ with the type of emergency. Tr. 12,194-95 (Kowieski); Tr. 12,214 (McIntire).

LILCO also relies on *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), LBP-81-59, 14 NRC 1211 (1981); A.F. 596, wherein the Board noted FEMA's testimony (in that case) that letters of agreement with school boards were unnecessary because FEMA was "essentially seeking a school district plan" that would be superior to letters of agreement. *Three Mile Island*, 14 NRC at 1639. FEMA also testified in the *Three Mile Island* proceeding that specific agreements are not needed if the "organization providing the service is a normal portion of government and . . . the services are the normal resources" of the organization. *Id.* The *Three Mile Island* Board concluded that agreements were not necessary as long as the schools had written generalized plans, but that "lack of written generalized plans for each district . . . is a deficiency which requires *prompt* correction prior to restart." *Id.* at 1640 (emphasis in original).

Intervenors rely on *Pennsylvania Power and Light Co. and Allegheny Electric Cooperative, Inc.* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-82-30, 15 NRC 771, 782 (1982), *sua sponte* review, ALAB-702, 16 NRC 1530 (1982), wherein the Board concluded that written school plans were a "necessity." *Id.*, 15 NRC at 798. LILCO distinguishes this decision on the basis that Pennsylvania did not require that schools submit to the State written disaster plans and so there was a need for NRC to require written school evacuation plans. LILCO argues

that since New York State requires schools to file written disaster plans additional plans are not required to meet Commission guidelines. A.F. 596. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 28; Tr. 9228 (Robinson); Tr. 9231-33 (Cordaro); Tr. 12,196, 12,754 (McIntire, Kowieski); Tr. 11,044 (Muto).

The Board finds that LILCO need not obtain written agreements with schools, and that the written emergency plans required by New York State are adequate to provide reasonable assurance that adequate protective measures can and will be implemented in the event of an emergency at the Shoreham plant.

Intervenors also argue that LILCO must obtain agreements with parents to permit LILCO employees to drive buses to evacuate the children. FEMA's witnesses testified that agreements with individuals are not required. Tr. 12,433 (Kowieski). We agree with FEMA and find no requirement for written agreements with parents for transportation of their children in the event of an emergency at Shoreham.

XII.4. Agreements to Provide Buses

Contention 24.F.3 asserts that LILCO will not have enough buses to evacuate the nonschool population of the EPZ that does not have access to private transportation because most buses would be required by schools.

LILCO's testimony indicates that it has 1236 buses under contract with twelve bus companies. Of these buses, 938 are under prior commitment to other uses, mostly schools, fewer than half of which are located in the EPZ. In the event of an evacuation of the entire 10-mile EPZ during school hours there remain 298 buses available immediately for LILCO's use. Cordaro *et al.*, ff. Tr. 9154, at 58.

The Board agrees with the County that most buses would be required by schools if an emergency occurred when school buses were in use and if both the schools and the public had to be evacuated. The issue of whether there would be enough buses available to evacuate the nonschool population is resolved in Board Finding IX.D.18.

XII.5. Agreements with School Bus Companies

Contention 24.M alleges that the lack of agreements with bus companies to implement early dismissal and evacuation or relocation of schoolchildren in the event of an emergency at Shoreham mandates a finding that protective actions for schoolchildren cannot and will not be implemented. The LILCO Plan relies on the schools' existing early dismissal

plans rather than individual agreements between LILCO and the bus companies. The existing plans require the availability of buses and drivers to implement early dismissal in the event of an emergency. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 62. Although FEMA witnesses testified that bus companies will not be required to drive school buses in the event of an evacuation and the LERO, or LILCO employees, would be the drivers (Tr. 12,256 (Keller)) LILCO's testimony indicates that evacuation involves summoning the school buses in the same manner as for early dismissal, but that students will be taken to relocation centers instead of home. Cordaro *et al.*, ff. Tr. 9154, at 42. The Board accepts LILCO's testimony and finds that school bus drivers are expected to drive school buses in an evacuation of schoolchildren.

Mr. Muto, Superintendent of the Middle Island Central School District (MICSD), testified that the contracts between MICSD and the bus companies require the companies to respond to a school's call to pick up children early if the school chooses to implement an early dismissal. Tr. 3115 (Muto). In Mr. Muto's experience, the bus companies have always met this obligation. Tr. 3116 (Muto).

Suffolk County contends that the fact that bus companies have always met their obligations under their contracts is no evidence that they would voluntarily undertake to respond to a radiological emergency. I.F. 728. The County cites no support for this allegation, but draws a distinction between early dismissal and evacuation, claiming that even if companies would respond to a call for early dismissal, there is no evidence that bus companies are obligated to transport students to relocation centers during an evacuation. *Id.* The issue of whether bus drivers would respond during a radiological emergency has been resolved in Board Finding I.B.10. The Board has concluded that, although some emergency workers may experience a conflict between their emergency duties and their family obligations, this would not be a significant problem at Shoreham. *See* Board Finding I.B.19.

LILCO will offer training in emergency response to school bus drivers and teachers. Cordaro *et al.*, ff. Tr. 9154, at 60. LILCO will also offer to provide dosimeters and training in how to use them to school bus drivers. *Id.* LILCO expects, based on usual school procedure, that if an insufficient number of school bus drivers report for duty, a properly licensed teacher or custodian will be designated to drive the bus. *Id.* at 61.

The Board concludes that the LILCO Plan provides reasonable assurance that an adequate number of bus drivers will be available in the event of either an early dismissal or an evacuation of the plume EPZ.

XII.6. Relocation Centers for Schoolchildren

Contention 24.N asserts that the LILCO Plan does not identify relocation or reception centers for schoolchildren and that the Plan does not include any agreements with facilities to be used as relocation or reception centers in the event of an emergency at Shoreham.

LILCO witnesses testified that they will “pick a reception center for each school within the 10-mile EPZ” and if the first choice will not agree to act as a reception center then LILCO will search “until we have found a reception center for every school in the EPZ.” Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 53. LILCO’s Proposed Findings reiterate the commitment to find reception centers for each school and to distribute information about the designated reception centers annually to households within the school districts in question. A.F. 627. However, the fact remains that reception centers have not as yet been identified. We therefore find for the Intervenor on the issue of the identity of reception centers for schoolchildren. We note that the record has been reopened on the matter of relocation centers for the public. However, the contentions concerning relocation centers for the public are separate from those concerning relocation centers for schoolchildren.

XII.7. Sheltering for Schoolchildren

Contention 61.C asserts that LILCO’s proposal to shelter students in their schools in the event of a sheltering recommendation would not work because (1) schools have not performed preplanning to ensure their capability of implementing a sheltering recommendation; (2) many school buildings do not have basements or other space suitable for sheltering large numbers of children; (3) there is no information in the Plan about sheltering capabilities or shielding factors for schools; and (4) the LILCO Plan states that LILCO will not change an early dismissal recommendation once early dismissal has begun, even if a sheltering or evacuation recommendation is made for the general public.

Sheltering in school buildings is performed in the same way as sheltering in one’s home. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 46. *See* Board Findings VII.2 to VII.5 (how sheltering works and when it would be a recommended protective action).

XII.8. LILCO’s Preplanning for Sheltering in Schools

Suffolk County alleges that LILCO’s proposal for sheltering is unworkable because the schools have done no preplanning. LILCO counters this allegation with its testimony that although many schools have

not engaged in preplanning, LILCO itself has done preplanning. LILCO's preplanning consists of preparation of a set of generic sheltering guidelines submitted to the schools and an offer to have a health physicist survey each school in the EPZ and make recommendations as to the best places for sheltering. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 26-27. Although Mr. Muto, of MICSD, testified that LILCO had not contacted him with an offer to send a health physicist to survey MICSD buildings, he did admit that he was aware of LILCO's offer to do so. Tr. 11,015 (Muto); Tr. 9220-23, 9436 (Miele); Tr. 9241 (Weismantle). In response to school officials' indications of a shortage of personnel to spend time planning for a radiological emergency, LILCO has offered to make available such personnel as the school district needs to do planning. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 78.

XII.9. Preplanning by Schools

Suffolk County asserts that sheltering of schoolchildren will not work without school staff training and planning. LILCO admits that some schools have declined to participate in emergency planning. *Id.* at 30. Officials from MICSD testified that the District has not performed any preplanning that would make it capable of implementing a LILCO recommendation to shelter students. Muto and Smith (Sheltering), ff. Tr. 11,001, at 6. These Suffolk County witnesses also testified that the District does not have the capability or resources necessary to shelter its students safely; none of the schools in the District have basements that could be used to shelter children; interior space is limited; and the school does not have adequate staff or supplies to care for schoolchildren beyond the end of the school day. *Id.* at 6-7. However, some of the schools' existing early dismissal plans expressly provide for sheltering. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 77-99.

Representatives from the Middle Country Central School District (MCCSD) testified that although the District has no schools in the EPZ, about 1100 schoolchildren live within the EPZ and attend MCCSD schools. Jeffers and Rossi, ff. Tr. 11,001, at 6. These school officials testified that their schools have not planned for an emergency at Shoreham because plans could not be implemented in a manner that would ensure adequate protection of students. *Id.*

LILCO argues that sheltering can be implemented without more preplanning by the schools. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 30. If a school district does not plan, the sheltering option can still be implemented by following "relatively simple guidelines that require no advance training or participation." *Id.* at 50. In the event of an emergency

and a sheltering recommendation, LILCO would convey sheltering information by EBS messages. *Id.* All schools except one now have tone alert radios on which to receive such messages. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 13; Tr. 11,020 (Muto). Sheltering guidelines could be given to the school superintendent during an emergency. LILCO concedes that this may not provide shelter as good as that which would be provided if a survey were done to locate the best shelter areas within a building, but argues that shelter would still be adequate. Tr. 9439 (Miele).

The refusal by some school officials to plan for an emergency raises the issue of how such officials would react to a sheltering recommendation. Suffolk County claims that LILCO has no way of ensuring that its protective action recommendations will be followed by school officials. LILCO concedes that cooperation of school officials will be necessary to implement sheltering. Tr. 9425 (Weismantle). However, the evidence indicates that school officials would do what is best for the children on the basis of the available information. Tr. 11,004, 11,009-10 (Muto); Tr. 11,058-59, 11,061 (Petrilak); Tr. 11,005 (Jeffers). The Board finds that although preplanning by the schools might enhance the dose savings to be gained from sheltering, it would be possible for schools to satisfactorily implement sheltering without preplanning.

XII.10. Sheltering Capacities and Shielding Factors for Schools

Suffolk County alleges that the LILCO Plan contains no information about sheltering capacities or shielding factors for schools. The shielding factor is the ratio of the dose one would receive within a particular shelter to the dose that would be received if shelter were not taken. *See* Board Finding VII.2. The County claims that LILCO has not demonstrated that schools have adequate space for sheltering. LILCO asserts that if schools are occupied, then they have the space to shelter. Tr. 9280 (Weismantle); Tr. 9281 (Miele). The question is where are the most effective shelters within the building in the event of a radiological accident. Mr. Miele and his staff are available to visit schools and to locate the best places for sheltering so schools can implement the most effective sheltering plan. Tr. 9280-81 (Weismantle). Mr. Miele and his staff have visited five school districts and surveyed their buildings. Although some school rooms are not satisfactory shelters because of the large number and size of windows, rooms with fewer windows do provide good shielding because of the thickness of floors, walls, and roofs. In general, institutional buildings such as schools have shielding factors as great or better than the typical home, which is probably where students would

shelter if they were not in school at the time of a sheltering recommendation. Tr. 9276 (Miele); Tr. 9281 (Weismantle); Tr. 9306 (Miele). LILCO witnesses testified that it is unlikely that any of the nursery schools are substantially less suitable as shelters from radiation than would be the children's own homes. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 84.

FEMA witnesses testified that although there are no specific requirements for including sheltering capacities for school buildings in offsite emergency preparedness plans, "it is projected that the schools would be sufficient to accommodate the sheltering of their students in the event of a radiological emergency." Baldwin *et al.*, ff. Tr. 12,179, at 59.

The Board finds that it is not necessary for LILCO to include sheltering capacities and shielding factors for each school in the EPZ. The Board gives great weight to the fact that, of the approximately thirteen schools surveyed by LILCO to date, none presented significant problems for sheltering. Tr. 9436, 9441 (Miele).

XII.11. Recommendation of Early Dismissal of Schoolchildren

Contention 68 alleges that the LILCO Plan fails to specify the bases on which LILCO would continue to recommend early dismissal (as opposed to sheltering or evacuation) to schools if they had initiated an early dismissal, even if sheltering or evacuation were being recommended for the general public. Revision 3 of the LILCO Plan specifies that once early dismissal has begun, LILCO would not inform the schools as to any subsequent and different protective action recommendation. OPIP 3.8.2. LILCO does not dispute this fact, but Mr. Weismantle testified that this procedure will be revised in the future. Tr. 9237-74 (Weismantle); *see also* A.F. 608. In addition, since schools have been provided with tone alert radios that are tuned to the EBS station, they will receive any recommendation to the public at the same time it is made to the public. Tr. 11,020 (Muto). The Board accepts LILCO's representations that the LILCO Plan will be revised to ensure that schools are provided the same protective action recommendations as are provided to the public. The Board finds that the present provisions of OPIP 3.8.2 are not an adequate basis on which to find reasonable assurance that schoolchildren's health and safety will be protected. The Board therefore directs that LILCO plan for alteration of early dismissal procedures to conform to the protective actions recommended for the general public. This plan must be made available to Staff to ensure necessary compliance has been established.

XII.12. Problems with Early Dismissal

Contention 69 asserts that (1) the LILCO Plan does not include essential details of the schools' early dismissal plans; (2) early dismissal will take too long to be considered an adequate protective action; and (3) parents will not be notified of the early dismissals, resulting in some children arriving at home to wait without proper supervision.

Under the LILCO Plan, when an alert or site area emergency is declared, but no protective action is recommended for the general public, schools will be advised (by tone alert radio) to implement their early dismissal plans. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 13; OPIP 3.6.5 and Appendix A, §§ II and IV. These plans are implemented whenever there is weather severe enough to close the schools early. The plans were used to accomplish early dismissal in 6 hours on January 18, 1984. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 34.

Suffolk County contends that LILCO's failure to include the schools' early dismissal plans in the LILCO Plan constitutes a failure to comply with NUREG-0654. LILCO claims that NUREG-0654 does not require that emergency plans for each individual school or school district be included in a radiological emergency plan. LILCO witnesses testified that although the plans differ for each school, in general the schools summon their buses, load the students on the buses, and send the students home along predesignated routes. *Id.* at 35. LILCO believes that the schools' experience in using the early dismissal plans is a major advantage in adopting them for use during a radiological emergency at Shoreham. *Id.* at 38. LILCO chose early dismissal rather than direct evacuation because LILCO's human behavior consultants have found that families try to unite during emergencies and early dismissal mitigates the difficulties for parents and children seeking to take protective action together. *Id.* at 35-38.

NUREG-0654 requires that emergency plans be kept as "concise as possible, yet make clear what is to be done in an emergency, how it is to be done, and by whom." NUREG-0654, at 29. The LILCO Plan indicates that early dismissal is to be recommended at the alert or site area emergency stage of an incident at Shoreham. The parties do not dispute that all schools have early dismissal plans that have been implemented in the past. Thus, the Board finds that inclusion of each school's early dismissal plan is not necessary to meet NUREG-0654 requirements.

XII.13. Time Required to Complete Early Dismissal

Contention 69.C alleges that early dismissal, which ordinarily takes a long time, will take even longer during a radiological emergency because

of congested road conditions and role conflict experienced by bus drivers and other personnel in authority. The contention alleges that large numbers of schoolchildren will have to walk distances of up to 2 or 3 miles and will take a long time to reach home. Contention 69.C also alleges that children going home in an early dismissal would be delayed by early evacuation and mobilization traffic.

LILCO has estimates for the time necessary to complete early dismissal for six of the affected school districts. This information was obtained through conversations with school officials and from examination of early dismissal plans and transportation schedules. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 39. These estimates range from 1 hour, 15 minutes to 3 hours. LILCO issued questionnaires to the school districts to obtain estimates for the remaining districts, but time estimates for those districts are not in the record. *Id.*

Suffolk County contends that the above times are unrealistic. The County presented testimony from MICSD officials who stated that although the theoretical time required for early dismissal is 3 hours under normal conditions and traffic flow, whenever the plan has actually been implemented it has "almost invariably taken 5 or 6 hours to implement since the early dismissal process involves administrative decisions, obtaining buses, and multiple bus runs." Tr. 11,024-26 (Muto); Smith (Schools), ff. Tr. 11,001, at 4, 9. Similarly, representatives of the MCCSD testified that "in light of the serious difficulties likely to occur in a Shoreham accident, especially traffic related problems, early dismissal for MCCSD would almost certainly take in excess of 5 hours." Jeffers and Rossi (Schools), ff. Tr. 11,001, at 4, 8; Tr. 11,094-96 (Rossi). In addition, MCCSD provides bus transportation for approximately 125 private schoolchildren who reside in or attend schools in the EPZ. Suffolk County claims that MCCSD drivers would have to travel into, and in some cases through, almost the entire EPZ to reach the private schools and then return to MCCSD to begin the take-home process. Jeffers and Rossi (Schools), ff. Tr. 11,001, at 10.

LILCO points out that these witnesses based their testimony primarily on their experience with snow emergencies, when travel conditions are very poor. LILCO concedes that there are practical problems associated with an unscheduled early dismissal. Tr. 11,027 (Smith); Tr. 11,028 (Muto). However, LILCO argues that NRC regulations do not require elimination of these problems, but require only that there be an adequate plan for dealing with them, and that the LILCO Plan to recommend early dismissal in the event of an alert or site area emergency is adequate. A.F. 616.

Suffolk County's witnesses voiced concern that buses used in early dismissal would encounter road congestion resulting from early evacuation or mobilization traffic. Tr. 11,027-28 (Smith). However, LILCO's testimony indicates that evacuation and mobilization traffic will have little or no effect on the time needed to complete an early dismissal. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 40. This is because schools will be dismissed at the alert stage of an emergency. At the declaration of an alert, tone alert radios in schools will be activated by an EBS announcement. While members of the general public who are tuned to an EBS station will hear this message, the majority of the public will probably be unaware of the alert because the sirens will not have been activated. Although the Director of Local Response has the option of sounding sirens at the alert stage, under most scenarios it is unlikely that the director would do so. *Id.* at 40-41. The EBS message will not recommend that EPZ residents begin evacuation preparations but will suggest that residents stay tuned to their radios for further information. *Id.*

LILCO also claims that even if early dismissal did occur at the same time as early evacuation and mobilization, the effect on the time needed to complete early dismissal would not be significant because a large percentage of buses will be traveling on residential streets that will not be heavily traveled by early evacuation or mobilization traffic. *Id.* at 41. One location where this is not true is Port Jefferson where buses must travel along Route 25A and North Country Road, which are two major evacuation arteries. Petrilak, ff. Tr. 11,001, at 8.

Suffolk County's witnesses testified that parents are well aware of how long early dismissals take even under normal conditions, and they are likely to believe that dismissal will take even longer in a radiological emergency. *Id.* at 11. The arrival of concerned parents at the schools would create added traffic congestion and confusion around the schools. *Id.* Traffic congestion around the schools would impede the arrival and departure of buses. Jeffers and Rossi (Schools), ff. Tr. 11,001, at 9.

The Board agrees with the County's witnesses that some parents, upon notification of an early dismissal, will depart for the school to collect their children. However, the Board finds no evidence or basis to believe that this activity will be of such a magnitude as to result in significant disruption of early dismissal. The Commission's regulations do not demand that each and every element of the Plan be capable of working with absolute precision. The regulations require reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The Board finds the requisite reasonable assurance that planning for this aspect of early dismissal can and will protect the health and safety of schoolchildren.

XII.14. Children Who Walk Home

Contention 69.C alleges that it will take a long time for some children to walk home from school, as far as 3 miles away. LILCO's testimony indicates that the number of students who walk home is quite small. Tr. 9435 (Lieberman); Tr. 9434 (Weismantle); Tr. 9264-65 (Robinson). New York State regulations allow elementary students to walk 2 miles and secondary students to walk 3 miles to school. However, most districts bus elementary students who live more than ½ mile away, intermediate-level students more than 1 mile away, and high school students 1.5 miles away. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 40; Tr. 11,037 (Rossi). LILCO witnesses testified that virtually all of those who have to walk home could do so in less than an hour. Some early dismissal plans ask teachers to remind those who walk home to do so without delay. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 40; LILCO Schools Attach. 25.

The Board finds reasonable assurance that children who walk home will be able to do so in a timely manner. Contention 69.C is without merit.

XII.15. Schoolchildren Who Go Home to Empty Houses

Contention 69.D asserts that the LILCO Plan does not provide for prior notification of parents if early dismissal is going to occur. Since many parents in the EPZ hold daytime jobs (including those in one-parent families), many children will be sent home to empty houses and may not be cared for during an emergency.

FEMA's witness testified that, for the general public, approximately 50% of the homes where both parents work have no adult supervision during the day. Tr. 12,217 (McIntire). Approximately 60-70% of homes in the Mount Sinai School District do not have adult supervision during regular school hours. Tr. 11,029 (Petrilak). The problem of "latchkey" children exists whenever early dismissal is initiated and LILCO witnesses explained that some schools' early dismissal plans make specific provisions for the possibility of children arriving at an unattended home. These plans require parents to complete a questionnaire indicating a responsible adult who has agreed to watch the children during the parents' absence. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 44; Tr. 9270 (Weismantle); Tr. 3144-45 (Jeffers). For example, Dr. Muto testified that MICSD uses PTA telephone chains to notify parents and a letter is sent to parents at the beginning of the year alerting them to the fact that there may be a weather or building emergency requiring that the children be sent home early. MICSD has asked parents to develop a plan for children to go to a neighbor, to place a key around the child's neck, or to make

some other arrangement. Tr. 3115 (Muto). Although schools in the Sinai District attempt to contact an adult, Mr. Petrilak testified that the District would encounter difficulty in doing so because many parents would be on their way to school to pick up the children. Petrilak, ff. Tr. 11,001, at 10-11. LILCO's witness testified that he does not believe that there would be a problem with parents picking up children. Tr. 9267 (Lieberman). LILCO concedes that the completion of a questionnaire does not ensure that someone will be home when children arrive there. However, informing parents of the possibility of early dismissal brings the issue to their attention, thus increasing the probability that they will make arrangements for such an occurrence.

FEMA testified that NUREG-0654 does not contain specific standards for returning children to their homes in the event of an early dismissal of schools.

The testimony indicates that only a small number of students will have to wait at a home without an adult present, and for those who do, the time until a parent arrives will be quite short. Mr. Lieberman used the KLD methods discussed in Board Finding IX.A to calculate the number of students who would arrive at an empty home and to calculate the time the student would have to wait until an adult arrived home. Mr. Lieberman used the distribution of work-to-home trip travel times and the distribution of school-to-home trip travel times representing the schedule of arrivals of workers and children, respectively, to the home. Tr. 9459 (Lieberman). This analysis indicates that nine-tenths of 1% of students who arrive home because of early dismissal will arrive at an empty house. *Id.* Their wait for an adult, assuming the adult is commuting from work, would be approximately 15 minutes for 82% of the students, and for 98% the wait would be less than 1/2 hour. *Id.* These figures are based on the assumption that two adults reside in the home and both work outside the home. *Id.*

The Board finds that some children will arrive at empty houses in the event of an early dismissal. However, the fact that such students will have to endure a relatively short wait for an adult to arrive home, and the fact that many measures have been taken by the schools to inform parents of the possibility of an early dismissal and to prepare children for such an event, provide reasonable assurance that the health and safety of the children will be adequately protected.

XII.16. Escalating Emergency

Contention 69.E alleges that LILCO does not plan to inform the schools of subsequent sheltering or evacuation protective action recommendations once an early dismissal has commenced. This issue has been addressed and resolved in Board Finding XII.11, *supra*.

Contention 69.E also asserts that in the event of an escalation of an emergency at Shoreham, schoolchildren are likely to be stranded in schools or en route to their homes (walking or on buses) without shelter, means of evacuation, or other protection. Suffolk County claims these children would be exposed to health-threatening radiation doses. Jeffers and Rossi (Schools), ff. Tr. 11,011, at 11-12; Muto and Smith (Schools), ff. Tr. 11,001, at 10. LILCO responds that students still at school could shelter there if sheltering were recommended. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 45. Students who had already departed for home would continue home and then take protective actions with their families. *Id.* LILCO argues that the risk of schoolchildren being caught without shelter or means to evacuate is very small. This is because if the emergency is classified as an alert or site area emergency, releases are not expected to exceed EPA Protective Action Guidelines (PAGs). LILCO admits that emergency conditions may change in an unforeseen manner but contends that officials will take appropriate actions based on conditions at the time and on available resources. *Id.* at 46.

Children who walk home generally live close to the school and can reach their homes in a short time. LILCO expects that such children would reach their homes or a neighbor's home and shelter there. Tr. 9447-48 (Robinson, Weismantle). In this respect, once they have left school, students will be treated like members of the general public and assume sheltering as would the public. Tr. 9448 (Cordaro). In addition, Dr. Cordaro noted that early dismissal would take place under an alert situation where there has not been a release of radiation. Thus, the probability of exposure to radiation in the time it takes to go from school to home would be remote. *Id.*

XII.17. Reception Centers for Schoolchildren and Reunification of Families

Contention 70 asserts that the LILCO Plan does not identify relocation centers for, or the means or procedures to evacuate any of the schools, and that the Plan has no provision for the safe reuniting of children with their families. The failure to identify relocation centers for schoolchildren has been addressed in Board Finding XII.6. As to reunification of families, we can find no regulation which requires LILCO to plan for

“safe reunification” of children with their families. In addition, FEMA testified that there is no such guideline. Tr. 12,751 (Kowieski). We therefore find for LILCO on this element of Contention 70.

XII.18. Preplanning for Evacuation

Contention 70 also asserts that the LILCO Plan is unworkable because school officials have not preplanned for evacuation of schoolchildren in the event of an emergency at Shoreham. The procedure for evacuation of schools under the LILCO Plan is different from the procedure for implementing early dismissal, in that buses will take students to relocation centers rather than to their homes. Cordaro *et al.*, ff. Tr, 9154, Vol. II, at 52. The schools would use their own resources, except that nursery schools, by prior arrangement, would be provided buses driven by LERO personnel. *Id.* LERO would recommend that students from all schools in the EPZ be evacuated to predesignated reception centers if a recommendation to evacuate the general public anywhere within the plume EPZ were made. *Id.* at 51. Schools located outside the EPZ which enroll students who live inside the EPZ would be advised to retain those students at school when the school day ends, rather than sending them into the EPZ. *Id.* at 52. LILCO will prepare maps for each school in the EPZ, providing a recommended best route between the school in the EPZ and its designated reception center outside the EPZ. *Id.* If schools refuse the maps, then LILCO will deliver them to the bus drivers at the schools at the time of an emergency. *Id.* at 53-54. Schools will call upon their buses in the same way as for early dismissal because of snow emergencies or natural disasters. *Id.* at 54.

The Board finds that LILCO has made available the information necessary for schools to implement an evacuation. In addition, schools have plans for early dismissal which can be used for evacuation. The Board finds that schools' existing plans combined with information provided by LILCO make the plan for school evacuation workable.

XII.19. Availability of School Buses

Contention 71.A.1 alleges that school buses needed for evacuation would be in the custody of the usual bus drivers or would be located substantial distances away from the schools. LILCO witnesses testified that each district, in its own disaster plan, addresses the issue of accessibility of buses according to the circumstances of the district. For example, some districts own their buses and keep them at a school garage, others

lease their buses from a company. LILCO believes that since the opportunity to exercise these plans arises whenever severe weather conditions necessitate early dismissal, problems with bus accessibility have already been worked out. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 62. The Board agrees with LILCO that school districts can handle the use of buses in the same way they ensure that school buses and drivers are available for early dismissal on account of snow emergencies or natural disasters.

XII.20. Supervision of Schoolchildren During Evacuation

Contention 71.A.2 alleges that the LILCO Plan has no provisions for supervising children at schools, on buses, or at relocation centers. Teachers and other supervisory personnel are not expected to accompany the children on the buses. Tr. 3114 (Muto). Dr. Jeffers testified that most school districts do not normally send teachers or other staff with children on buses, nor are teachers or other school staff normally expected or required to remain with children (or accompany them to a new location) for extended periods beyond the end of the school day. School districts cannot ensure that adequate staffing would be available. Petrilak (Schools), ff. Tr. 11,001, at 12-13. However, Dr. Jeffers conceded that when the District sends children home in a snow emergency and on an early dismissal, they are supervised by the school bus drivers. Tr. 11,013 (Petrilak). The Board finds that bus drivers will provide supervision on buses during an evacuation in much the same manner as during an early dismissal.

LILCO witnesses testified that if schools outside the EPZ serve as relocation centers, then it is reasonable to presume that there will be personnel there who can supervise the evacuees until their parents come to collect them. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 62. However, LILCO presented no evidence that schools will be the designated relocation centers, thus the Board cannot rely on the availability of school personnel to make a finding that evacuated students will be supervised adequately. It does, however, seem reasonable and we conclude that if students are evacuated to a relocation center where adults are present, some of those adults will be willing to supervise the students.

XII.21. Contention 71.B.1

Contention 71.B.1 alleges that an evacuation of nursery and other schools would take too long and children would not be adequately protected from health-threatening radiation doses because evacuating buses would encounter mobilization and evacuation traffic congestion, and

would be substantially delayed in traveling from schools to relocation centers. We have found in Board Finding XII.6 that reception centers for schools have not been identified. We find here that it is not possible to calculate how long an evacuation might take without knowing the location of reception centers. LILCO has admitted that the delay in evacuation may be extensive but claims that this will not endanger the children because they can shelter in the school buildings while awaiting the return of buses for evacuation. Cordaro *et al.*, ff. Tr. 9154, Vol. II, at 63. We do not find this acceptable. We find that the lack of a reasonable estimate of the time to evacuate is a defect in the LILCO Plan.

XII.22. Buses for Evacuation of Schoolchildren

Contention 71.B.2 asserts that normal school dismissals require substantial numbers of multiple bus runs as well as staggered dismissal times. In the event of an evacuation, an even larger number of multiple bus runs would be necessary to transport children out of the EPZ. LILCO estimates that 433 bus trips will be needed to evacuate the public and private schoolchildren from the EPZ on a normal school day. Lieberman and Robinson, ff. Tr. 9154, Vol. II, at 56. The school districts own their buses or have contracts with bus companies to provide buses. Tr. 9446 (Weismantle). Approximately 350 school buses plus 35 coaches are available to the eleven districts with schools in the EPZ, with some schools sharing. Tr. 9458, 9485-86 (Weismantle). LILCO admits that the number of bus trips required is greater than the number of buses currently under contract to schools within the EPZ, although LILCO is unable to answer how much greater. Lieberman and Robinson, ff. Tr. 9154, Vol. II, at 56. LILCO has sent questionnaires to school districts in an attempt to gain accurate information about the number of buses currently under contract. *Id.* at 57.

LILCO has suggested two options to compensate for the lack of sufficient buses under contract to schools. One option is to use multiple bus runs to provide the 433 bus trips. The extent to which multiple bus runs can be used will depend on the location of the schools needing multiple runs and the location of the reception centers serving these schools. *Id.* The other option would involve supplying additional buses to replace some or all of the multiple bus runs. *Id.*

LILCO's contracts for buses specify that schools have a prior right to use them before they become available to LILCO. LILCO does not have agreements with any school districts outside the EPZ to promptly release buses in the event of an emergency at Shoreham. Tr. 9297-99

(Weismantle). However, LILCO bases its belief that buses will be voluntarily relinquished in an emergency on Dr. Mileti's testimony about human behavior during emergencies. Tr. 9312 (Weismantle). Dr. Mileti believes that people will take steps to help out in an emergency response. Tr. 9310 (Weismantle). See Board Findings I.B for further discussion of Dr. Mileti's theories. Thus, LILCO claims that schools outside the EPZ will act to help out in an emergency by releasing some of their buses for use in an evacuation of the Shoreham EPZ. While it is probably true that some schools might release buses, this is simply not a firm enough basis for us to conclude that LILCO can plan on obtaining enough buses in an *ad hoc* manner.

LILCO also relies on the fact that the bus companies have not contracted their entire fleets to LILCO and that these additional buses would be available during an emergency. Tr. 9310 (Weismantle). However, these buses may also be subject to agreements with other users and therefore only available if released to LILCO. Tr. 9313 (Weismantle).

Commission regulations do not require that all schoolchildren be evacuated in a single bus run. The matter of the time to accomplish evacuation is left to be determined on a case-by-case basis upon consideration of all relevant conditions prevailing in the specific locality. However, as the Appeal Board stated in *Cincinnati Gas & Electric Co.* (Wm. H. Zimmer Nuclear Power Station, Unit 1), ALAB-727, 17 NRC 760, 770-71 (1983),

If the responsible governmental officials are to make an informed decision respecting what is appropriate protective action in a given radiological emergency, they must have available to them time estimates that are realistic appraisals of the minimum period in which, in light of existing local conditions, evacuation could reasonably be accomplished.

The Appeal Board in *Zimmer* recognized that the Licensing Board's concern in that case was directed to whether, in the absence of simultaneous evacuation (because of the limited number of buses), all of the students would be efficiently removed from the plume EPZ. In *Zimmer* the Licensing Board had found that the Applicant's assertion that arrangements were being made for additional buses was an insufficient basis for a finding of reasonable assurance. Likewise, LILCO has presented two options to deal with the shortage of buses for evacuation of the plume EPZ. LILCO claims that under these options students could still be evacuated in the same time frame as the general public. Tr. 9461-62 (Lieberman). LILCO estimates that all schoolchildren can be evacuated in two to three waves in 6 hours, 30 minutes. Tr. 9460 (Lieberman). LILCO's

projections have been made without benefit of a critical piece of information. That is, to what location are the students to be evacuated and how long will it take buses to reach that location and then return? As long as the relocation centers for schoolchildren remain unknown there is no basis on which to determine how long it will take to make multiple bus runs to complete the evacuation. Thus we give no weight to Mr. Lieberman's estimate of evacuation time as 6.5 hours.

LILCO has presented no evidence that buses committed to other uses will be released to LILCO in the event of an emergency at Shoreham. LILCO witnesses testified that they are "confident" that buses would be released. LILCO has failed to provide an adequate basis for a Board finding that an evacuation of schoolchildren could be accomplished within approximately the same time as a general public evacuation. We find that the subordination of LILCO's agreements for buses for use in an emergency to preexisting contracts for normal daily use by schools outside the EPZ constitutes a flaw in the LILCO Plan. This deficiency could be corrected by a showing that multiple bus runs will accomplish evacuation of schoolchildren in approximately the same time as a general population evacuation or that LILCO has received commitments for release of buses from schools outside the EPZ, thus eliminating the need for multiple bus runs. However, on the record before us, we find that the LILCO Plan does not provide reasonable assurance that adequate protective measures can and will be taken in the event of an evacuation of schoolchildren from the Shoreham EPZ.

We note that Board Findings III.4, III.6, and III.9 order that several schools located just outside the 10-mile line of the EPZ be included within the EPZ. Since these schools were not within the EPZ when LILCO developed its Plan, LILCO must now add them to its plans for protective actions for schools. This includes planning for bus transportation in the event of an early dismissal or evacuation. These schools are located at the outer boundary of the EPZ and therefore such planning should not be unduly difficult. We therefore delegate to Staff the responsibility for ensuring that LILCO provide for incorporation of these schools in the Plan.

XIII. INGESTION PATHWAY (CONTENTIONS 81, 85, 88, 92, 24.R)

XIII.A. Fifty-Mile EPZ (Contention 81)

XIII.A.1. Implementation of Protective Action

This contention alleges that the Plan contains insufficient procedures or means of implementing the protective action set forth in OPIP 3.6.6 and that LILCO has not developed adequate plans for the 50-mile ingestion exposure pathway; therefore, there is no compliance with 10 C.F.R. § 50.47 and NUREG-0654 § II.J.11. This contention consists of numerous subparts labeled Contention 81.A through 81.F that allege that the Plan does not have adequate procedures for management of a host of specific actions that need be taken in the ingestion pathway EPZ in the event of a serious accident. However, Intervenors did not brief their specific concerns in their Proposed Findings of Fact. They narrowed the dispute to focus only on LILCO's ability to ensure implementation of its protective actions in the ingestion pathway by imposing them on producers or processors of food as called for in NUREG-0654 § II.J.11. There is no remaining controversy over whether the Plan, if implemented, makes adequate provision for protection of public health in the ingestion pathway EPZ. I.F. 764.

XIII.A.2. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Charles A. Daverio, Sidney W. Porter, Jr., and Richard J. Watts. FEMA presented the testimony of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

XIII.A.3. LILCO's Planning Basis

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. The Plan provides that samples of milk, water, and food will be collected by LILCO personnel at predesignated sampling locations within the ingestion pathway EPZ and subjected to laboratory analysis, if needed, in the event of an emergency. Cordaro *et al.*, ff. Tr. 13,563, at 34-35, Attach. 1. The Plan provides that protective action guidelines established by the Food and Drug Administration regarding radionuclide levels in milk, water, and other foods will be

used to make protective action determinations. *Id.* at 18-19, Attach. 1; Baldwin *et al.*, ff. Tr. 12,174, at 86-87.

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 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 implement appropriate protective actions as set forth in the Plan. Cordaro *et al.*, ff. Tr. 13,563, at 37, Attach. 1; Baldwin *et al.*, ff. Tr. 12,174, at 89; Tr. 14,251, 14,289 (Keller).

The LILCO Plan contains protective actions to be chosen on the basis of monitoring, sampling, and analysis, which if implemented would be effective in preventing the public from eating contaminated foodstuffs. Methods of protection include removing dairy animals from pasture and placing them on stored feed; withholding milk, poultry, and other foods, including ducks, from markets; and washing and peeling fruits and vegetables before they are eaten. LILCO will communicate recommended protective actions to farmers, food processors, and other food chain establishments by telephone and by EBS bulletins. When milk and other food products show contamination after an accident, farmers will be instructed to remove dairy animals from pasture and to provide them with stored feed; they will be instructed to keep dairy animals indoors; and they will be advised to withhold milk from commerce, to store it at reduced temperatures, and to take a representative sample from each milking. Milk processors will be advised to withhold milk contaminated with short-lived nuclides from commerce, and they may be advised to freeze and store contaminated milk for a specified time or to direct fluid milk to the production of dry or evaporated milk, butter, or cheese; they will be instructed to store all incoming shipments in separate tanks and take samples from each shipment. Farm stand operators will be advised to withhold their produce from market until further notice and will be instructed to wash, brush, or scrub uncovered produce. If water samples show contamination, LILCO will contact and inform water supply operators. I.F. 765.

XIII.A.4. Suffolk County's Argument

Suffolk County finds in essence only one flaw in LILCO's plans for the ingestion pathway. LILCO's proposal to rely on voluntary compliance with its ingestion pathway advice does not cure noncompliance with § II.J.11 of NUREG-0654, which clearly requires authority to impose controls. I.F. 769. The County argues that to have an adequate

plan under that section, LILCO must have the authority for imposing protective procedures on food producers or processors. Such procedures include impoundment, decontamination, processing, decay, product diversion, and preservation. LILCO is without authority to impose any such protective procedures on farmers, food processors, distributors, or vendors. It may not impound, impose embargoes on, confiscate, or condemn contaminated food. I.F. 768.

Suffolk County rejects LILCO's argument that its plan to compensate farmers and other food chain establishments for loss of food during a radiological emergency would be effective. In this matter, however, the Board finds FEMA's testimony persuasive. According to FEMA, farmers will have a difficult time disposing of food harvested at the time of an emergency because the situation will be one in which buyer resistance prevents the sale of fresh food products even if a farmer or processor were inclined to ignore LILCO's advice and attempt such sales. That fact, combined with LILCO's offer to purchase food, provides a strong incentive for farmers to sell contaminated foods to LILCO, thereby preventing their entry into commerce. Tr. 14,256-58 (Keller).

XIII.A.5. Analysis

In lengthy and tedious cross-examination, Suffolk County did not succeed in eliciting any facts that would undermine LILCO's prefiled testimony concerning the ingestion pathway. In its proposed findings, the County has abandoned all complaints about LILCO's emergency plan for the ingestion pathway except for its criticism of LILCO's reliance on voluntary compliance with its advice. It is clear from the record that LILCO has a plan for management, monitoring, issuing of warnings, and means for implementation through notification of producers and through purchase of possibly contaminated food in the ingestion pathway EPZ. The only remaining flaw, in Suffolk County's view, is LILCO's lack of authority to impose these plans on the public or food producers.

The Board finds no barriers to LILCO's ability to warn the public through EBS messages or indeed to telephone individual farmers and food processors with appropriate messages concerning the withholding of food products from the market. LILCO has compiled lists of producers and processors for this purpose. The Board finds it reasonable to assume that food producers and processors would comply voluntarily with warning notices. Further, we find that LILCO's offer to purchase contaminated or unsalvageable food in a situation where the consuming public is likely to resist purchase of fresh foods is a persuasive argument that LILCO's reliance on voluntary compliance will be effective. It seems to

us altogether reasonable that milk producers or fresh fruit and vegetable producers, having as a practical matter no other outlet for possibly contaminated food, would welcome an opportunity to sell to LILCO. We therefore find that LILCO's lack of authority to impose the terms of its plan on food producers or processors is not a fatal flaw in its plan for the ingestion pathway zone.

Suffolk County is correct that § II.J.11 of NUREG-0654 uses mandatory language in its discussion of ingestion pathway requirements. However, it does so in the context of guidance to States for which such language would be appropriate. In this case, no State participation has been committed, but we have reasonable assurance that the LILCO Plan is workable. The Board rules in LILCO's favor on Contention 81.

XIII.B. Recovery and Reentry (Contentions 85 and 88)

Contention 85 alleges that no plan exists to provide for recovery and reentry and that no procedures for implementing recovery and reentry operation exist.

XIII.B.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Charles A. Daverio, and Richard J. Watts.

Suffolk County presented the testimony of Gregory C. Minor and FEMA presented the testimony of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

XIII.B.2. LILCO's Planning Basis

At the time of an emergency LERO will establish a Recovery Action Committee whose function will be: (1) to assist the Director of Local Response in making recovery-reentry decisions, and (2) to facilitate reentry upon authorization by the Director of Local Response. The Chairman of the Recovery Action Committee will be the Manager of Local Response. Other members include a nuclear engineer, the Health Services Coordinator, Evacuation Coordinator, Support Services Coordinator, Coordinator of Public Information, and Radiation Health Coordinator. Representatives of Federal, State, and local governments will also be invited to participate. Cordaro *et al.*, ff. Tr. 15,282, at 7. The Recovery Action Committee will base its recovery and reentry actions on environmental monitoring data. *Id.* at 7-8. The Plan recognizes three classes of emergency situations, which are categorized according to the existence

and amount of radioactive surface contamination in the environment. These classes, which indicate levels of seriousness, are (1) an emergency that does not involve offsite radiological release, (2) one in which release occurs and results in little or no surface contamination, and (3) one in which a release occurs that results in surface contamination at unacceptably high levels. In cases where no hazard exists from environmental radiation, the Committee will determine whether utilities are properly functioning in the evacuated area and will provide for public transportation for those who require it during evacuation. *Id.* at 8-9. In cases where radiological release results in unacceptably high levels of surface contamination, the Committee will define the contaminated area and will warn the public through EBS messages that they should not reenter that area. Environmental monitoring would continue until it has been determined that the level of surface contamination no longer exceeds acceptable levels. At that point the public would be permitted to reenter the contaminated area. *Id.* at 9-10.

The nuclear engineer who is a member of the committee will determine that the plant is stable before any permission is granted for the public to reenter the area. Tr. 15,291-92, 15,321-28 (Cordaro, Daverio).

XIII.B.3. Decontamination and Disposal of Waste

LILCO will depend on publicly available technical literature as guidance for decontamination. Cordaro *et al.*, ff. Tr. 15,282, Attach. 1; Tr. 15,293-95, 15,312-14 (Daverio); Tr. 15,298-99, 15,314-15 (Watts). Solid radioactive waste collected from decontamination activities will be transported to Shoreham pending ultimate disposition. Liquid wastes will be discharged to sewers only after it has been determined that radioactivity in such waste materials is at or below an acceptable level. Cordaro *et al.*, ff. Tr. 15,282, Attach. 1; Tr. 15,319-21 (Cordaro, Daverio, Watts).

XIII.B.4. Suffolk County's Position

Suffolk County believes that a plan to create the Recovery Action Committee at the time of an accident is insufficient and that there should be specific plans now for recovery and reentry operations. Minor, ff. Tr. 15,384, at 3-4. The County complains that a plan to create a committee does not constitute a plan that can be assessed now. *Id.* at 4. The plan should now include recovery activities that should or would be implemented to reduce dose rates in contaminated areas; it should identify and discuss decontamination methods that would or could be employed

during recovery operations, and the criteria to determine which methods are necessary or appropriate. *Id.* at 4-5. The plan fails to specify how the effectiveness of decontamination activities would be considered by LILCO in determining that protective measures could be lifted. The plan does not specify how actions relating to decontamination, security, traffic control, and food and water control would or could be taken by LILCO as part of recovery operations. *Id.*

XIII.B.5. Analysis

The Board notes at the outset that recovery and reentry activities will be undertaken after an accident and an evacuation have occurred. It is fair to conclude that the public would be safe from radiation exposure at the time that consideration of recovery and reentry was undertaken. There is no basis in the testimony for concluding that the Recovery Action Committee would face an urgent question of public health and safety. When the Committee begins its deliberations, the immediate health- or life-threatening emergency would be over. The Committee would have time to deliberate and decide what it should recommend.

XIII.B.6. Conclusion (Contention 85)

The Board concludes that LILCO's general plans for recovery and reentry are adequate under the guidelines of 10 C.F.R. § 50.47(b)(13) and NUREG-0654 § II.M. A plan to form an expert committee at the time of an accident to make decisions according to predetermined guidelines constitutes a reasonable plan for recovery and reentry. It is not necessary to preplan at this stage for contingencies that a committee can resolve at the time of an accident when it has the necessary information for decisionmaking. None of the problems cited by the County such as decontamination, radioactive waste disposal, security, adequacy of food and water supplies, or traffic control are novel or technically obscure. Their management depends on situation-specific information, and there is no advantage to public health and safety to solve them now in the abstract rather than at the time of the emergency when the specific facts of the situation are known. The Recovery Action Committee is a reasonable means for making the necessary decisions about recovery and reentry in the aftermath of an evacuation. Contention 85 is without merit.

XIII.B.7. Dose Criteria (Contention 88)

Contention 88 alleges that the LILCO Plan fails to state the dose criteria that will provide the basis for a determination that it is safe for the public to reenter evacuated areas and that LILCO's methods for estimating population dose are inaccurate.

XIII.B.8. LILCO's Planning Basis

LILCO has set forth criteria for recovery and reentry of contaminated areas in its Plan. The criteria provide that environmental monitoring, plant data, and laboratory analysis of isotopes will be used to estimate dose from direct constant exposure and from inhalation of resuspended particulates. If those efforts show an integrated annual dose greater than 500 millirem whole body or the equivalent to any organ, the area will be considered contaminated. Cordaro *et al.*, ff. Tr. 15,284, at 6, Attach. 2; Tr. 15,329-30, 15,361 (Daverio, Watts).

The criterion of 500 millirem per year (mrem/yr) whole-body or equivalent organ dose is taken from 10 C.F.R. § 20.105(a). This criterion was adopted since there is no other NRC regulation or NUREG-0654 guideline that addresses acceptable offsite radiological levels for reentry. Cordaro *et al.*, Tr. 15,284, at 7. New York State radiological emergency preparedness plans also use 500 millirem as a threshold contamination level for reentry. *Id.* at 8, Attach. 4; Tr. 15,369-72, 15,375-79 (Daverio, Watts). The NRC Staff finds this level appropriate. S.F. 755, 756.

LILCO also has a method for calculation of total population exposure, which is needed in assessing the potential long-term consequences of a radiological accident. Tr. 15,341-42 (Watts); Tr. 14,338, 14,579 (Keller). The calculation of total population dose is a tool for assessing the long-term health consequences, if any, of a radiological release. There is no immediate need to know the total population dose during emergency operations; the dose will be calculated only after deliberations with LERO and consultations with other outside agencies. Cordaro *et al.* (Supp. 85), ff. Tr. 15,284, at 4, Attach. 1; Tr. 15,341-42, 15,347-48 (Daverio, Watts).

XIII.B.9. Suffolk County's Position

Suffolk County concedes that a dose criterion of 500 millirem for reentry is included in the Plan. It also concedes that a method for calculating total population dose is set forth in the Plan. I.F. 778, 779. The County complains that LILCO should take into account other factors including

benefits from reducing doses even further and that LILCO's sources of population data are likely to be inaccurate and unreliable.

XIII.B.10. Analysis

The Board finds that LILCO's criteria for recovery and reentry are adequate and that its plans for estimating population dose are adequate. The Board agrees with Suffolk County that there might be merit in reducing population doses further than 500 millirems annually. However, we see no reason why the Committee could not act in the interest of public health and safety at the time of an accident by considering the as-low-as-reasonably-achievable principles of 10 C.F.R. Part 20 on the one hand against the prescribed reentry dose on the other. That, however, is not a requirement for approval of the Plan. It is sufficient for the Board to know at this time that whatever deliberation might be done by the Recovery Action Committee, reentry would not be permitted if the projected dose to the population is greater than 500 mrem/yr. Suffolk County's concerns about possible inaccuracies in population dose estimates have no merit because the population of the EPZ and its subparts are well known and because this presents no issue of protection of public health and safety in an emergency. The Board finds that LILCO's plans with regard to recovery and reentry dose criteria and population exposure estimates are adequate and that Contention 88 is without merit.

XIII.C. New York State Plan (Contention 92)

Contention 92 alleges that there is no New York State emergency plan to deal with an emergency at Shoreham. In addition, the LILCO Plan fails to provide for coordination of LILCO's emergency response with that of the State of New York, assuming such a response would occur.

XIII.C.1. Identification of Witnesses

Dr. Matthew C. Cordaro and John A. Weismantle appeared for LILCO. FEMA presented the testimony of Dr. Thomas E. Baldwin, Joseph H. Keller, Roger B. Kowieski, and Philip H. McIntire.

XIII.C.2. State Emergency Plan for Shoreham

No site-specific emergency plans for Shoreham exist in the New York State plan. Cordaro and Weismantle, ff. Tr. 13,899, at 4.

XIII.C.3. State Functions in an Emergency

New York State plans for other plants specify that the State would perform four specific functions in an emergency at a nuclear power plant in the State: (1) dose projection based on release data communicated to State officials, (2) ingestion pathway sampling in the 50-mile EPZ, (3) interdiction of contaminated foods, and (4) protective action recommendations. *Id.* at 6. LERO would perform all four of these functions in the absence of State participation. *Id.*

XIII.C.4. State Participation in an Emergency

There is insufficient evidence in our record to conclude that New York State would participate in an actual emergency at Shoreham as contemplated by the NRC's regulations and guidance. In reaching this finding, we reject LILCO's assertion that a press release dated November 20, 1983, by the Governor of New York, constitutes a commitment by the State to participate in an emergency at Shoreham. *Id.* at 7. New York has had ample opportunity to state affirmatively on this record what its intended actions would be in the event of an emergency; it has not done so. The Board accepts that the State of New York has a general policy to take actions to prevent or mitigate the effects of natural or man-made disasters, to respond to an emergency or disaster, and to expedite recovery. *Id.* at 1-3, Attach. 10. Thus, while the State might respond in an emergency at Shoreham, we cannot find a clear commitment in the record that it would respond in a meaningful way.

XIII.C.5. Plans for State Participation

The LILCO Plan allows for participation of both New York State and local officials during an emergency if State and Suffolk County officials choose to participate in an emergency response. *Id.* at 8. Communication systems are installed within the State and space for State officials exists in the LILCO emergency operations facility, emergency operations center, and the emergency news center. *Id.* at 8, Attach. 13. LILCO's Director of Local Response will take into account advice that may be received from local and State government officials. *Id.* at 9, Attach. 14. The Board concludes that LILCO has done all that it can in this matter. However, the Board agrees ultimately with the State and County that LILCO's willingness to cooperate and coordinate and its preparations for that contingency do not provide reasonable assurance that cooperation with New York State would actually occur given the State's recalcitrant position in this case.

The guidance of NUREG-0654, which was developed jointly by NRC and FEMA, is premised partly on the

shared belief that an integrated approach to the development of response plans to radiological hazards is most likely to provide the best protection of health and safety of the public. NRC and FEMA recognize that plans of licensees, state and local governments should not be developed in a vacuum or in isolation from one another. Should an accident occur, the public can best be protected when the response by all parties is fully integrated.

NUREG-0654, at 23-24. That guidance cannot be met in this case where the State refuses to participate in planning or to commit to respond in an emergency. The Board does not have reasonable assurance that an integrated or coordinated emergency response that included the State would occur. The State's position is essentially identical to that of Suffolk County. The Board therefore adopts the same review posture regarding State participation that we do with the County. We examine whether LILCO's own actions during an emergency would provide an adequate response. In this instance the Board has found in other contentions that the four specific functions normally performed by the State at other plants during a radiological emergency are within LILCO's physical capability in a radiological emergency at Shoreham.

Suffolk County notes correctly that there is no provision in NRC case law, regulations, or guidance that provides for the situation that now confronts us wherein both the State and local governments refuse to participate in planning for an emergency and also refuse to commit to respond to an emergency at Shoreham. I.F. 783. The Board concludes that the provisions of 10 C.F.R. § 50.47(c)(1) for adequate interim compensating measures were not intended to stretch as far as LILCO urges in this case where no participation whatever from State and local authorities can be counted on. NUREG-0654 counsels that reviewers can find that an adequate state of emergency preparedness exists if weaknesses in one organization are identified but compensated for in another organization. NUREG-0654, at 24. However, the term "weakness" in that context applies to specific weaknesses regarding elements of the implementing guidance. We cannot read that language to apply to total withdrawal of State and County support from emergency planning and preparedness.

XIII.C.6. Conclusion

The Board has no trouble finding that LILCO has the capability to perform the four specific tasks that have been identified as State functions; however, we have a great deal of trouble accepting that that is all that a

State might do in a genuine emergency. Clearly the State has broader powers and resources than those called for in performing the four specific elements of State emergency function. Uncertainty about the course of future events requires that commitment, resources, and decisionmaking capability regarding elements of the Plan be in place now. NRC's regulations and guidance are founded on a fundamental assumption that there will be an integrated approach to emergency planning among State and local governments and utilities. Further, our review of LILCO's Plan indicates that protection of public health and safety in the Shoreham EPZ would require the best efforts of response agencies to be successful. The Board need not specify a long list of contingent possibilities as to how future accidents might play out to find that absence of commitment, resources, and decisionmaking capability and authority of the State together with similar absences on the part of the County constitute a serious deficiency in the Plan. We do not believe that public health and safety can be protected as well by LILCO acting alone as it could if LILCO were acting in concert with the State of New York and with the County. The Board is well aware that LILCO cannot remedy this situation; a finding of deficiency penalizes it for circumstances beyond its control. Nevertheless, the Board finds that the County and State have prevailed on Contention 92 and that lack of State participation constitutes a serious substantive deficiency in emergency preparedness at Shoreham.

XIII.D. Connecticut (Contention 24.R)

Contention 24.R alleges that LILCO has no agreement with the State of Connecticut under which the State agrees to plan for or implement protective actions for portions of the ingestion exposure pathway emergency planning zone (EPZ) that are in Connecticut. Without such an agreement, protective actions for the entire ingestion exposure pathway EPZ cannot and will not be implemented.

XIII.D.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, William F. Renz, and Elaine D. Robinson. Cordaro *et al.*, Tr. 6547, Vol. II; Cordaro and Renz, ff. Tr. 13,858 (Supp.).

The testimony included a letter dated December 15, 1983, from Frank Mancuso, State Director of the Office of Civil Preparedness in Connecticut, to Dr. Don Devito, New York State Director of the Office of Disaster Preparedness. That letter stated Connecticut's willingness to

provide support and radiological assistance in that part of the 50-mile ingestion pathway that lies within the State of Connecticut in the event of a radiological emergency at Shoreham. Cordaro *et al.*, Tr. 6457, Vol. II, Attach. 28. Subsequently, Dr. David Axelrod, Commissioner of Health and Chairman of the New York State Disaster Preparedness Commission, wrote to Mr. Mancuso responding to his December 15, 1983 letter. New York Exh. 3, ff. Tr. 6598. The letter disavowed any agreement between New York State and the State of Connecticut to exchange information in the event of a nuclear accident at Shoreham.

Mr. Mancuso responded to Dr. Axelrod in a letter dated April 18, 1984, in which he stated that although there is no agreement between New York State and Connecticut with regard to the Shoreham Nuclear Power Station, nonetheless Connecticut was meeting the requirements of NUREG-0654. LILCO Exh. 48, at 2, ff. Tr. 9945.

Finally, LILCO wrote directly to the State of Connecticut on May 22, 1984, asking Connecticut to confirm that it would in fact implement the necessary protective actions for the 50-mile ingestion pathway in Connecticut as set forth in NUREG-0654. Cordaro and Renz, ff. Tr. 13,858, at 2-3, Attach. 1. The State of Connecticut responded on June 14, 1984, and stated that it would react to an accident at Shoreham or any other nearby facility by instituting existing emergency plans and resources to protect the health and safety of the residents of Connecticut. This is true whether or not State officials would be notified by LILCO or any other competent source such as the Federal Emergency Management Agency. *Id.* at Attach. 2.

There is no evidence in the record that would dispute the authenticity of the letters from the State of Connecticut, nor has Suffolk County introduced any evidence that would cast doubt on the ability or intentions of the State of Connecticut to do what was necessary to protect the health and safety of its citizens.

XIII.D.2. Conclusion (Contention 24.B)

The Board finds uncontroverted evidence that there is a commitment by the State of Connecticut to implement protective actions for the portions of the Shoreham 50-mile ingestion pathway that are within its boundaries.

We do not read Contention 24.R as raising issues concerning the adequacy of the State of Connecticut's emergency response plan. Thus, we reject Intervenor's suggestion that we must see the plan before we can evaluate its adequacy. Neither do we read the Connecticut letters as constituting letters of agreement with LILCO to do anything in its plan. The

State of Connecticut is not merely a supporting organization for implementation of the LILCO response plan. The State of Connecticut independently commits to take actions to protect its citizens in the event of an accident at Shoreham regardless of what other parties in this case might do. That is a sufficient commitment. We further note that the State of Connecticut lies on the outer reaches of the Shoreham 50-mile ingestion pathway zone where the principal protective action required is interdiction of the food supply if it should become contaminated. As a practical matter the Board would find it incredible to suppose that the State of Connecticut would stand idle in the event of an emergency and not take actions to interdict a contaminated food supply. *Id.*, Attach. 2. It is clear to the Board that the State of Connecticut has no desire to become embroiled in the controversy that exists between LILCO and the State of New York. Under those circumstances we can hardly expect it to commit to anything more than it has already done, which is to protect its own citizens and to retain its independence and distance from this controversy.

The Board has reasonable assurance based on the record before us that the State of Connecticut will act responsibly to protect its own citizens in the ingestion pathway zone in Connecticut if an accident should occur at Shoreham. Contention 24.R is without merit.

XIV. LOSS OF OFFSITE POWER (CONTENTIONS 93-96)

Intervenors' 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.

XIV.1. Identification of Witnesses

LILCO presented the testimony of Dr. Matthew C. Cordaro, Norman A. Hobbs, Jr., William F. Renz, John A. Weismantle, William G. Schiffmacher and Elaine D. Robinson. FEMA witnesses were Dr. Thomas E. Baldwin and Philip H. McIntire.

XIV.2. The Allegations

Contentions 93-96 allege that if there were a loss of offsite power, the emergency response would be severely disrupted due to a lack of backup power sources. Overall, these contentions claim that the Plan must provide for even "the worst possible accident, regardless of its extremely low likelihood."

The contentions specifically allege that the LILCO Plan does not provide backup power to:

- (a) the staging areas, bus transfer points, receiving hospitals, or relocation centers (Contention 93);
- (b) the Customer Service Office and EOC (Contention 94);
- (c) the sirens, tone alert radios and the Emergency News Center (Contention 95); and
- (d) ambulance and bus companies, hospitals, nursing homes, facilities for the handicapped, residential lighting, public streetlights, traffic signals, and service stations (Contention 96).

XIV.3. Conclusion on Loss of Offsite Power

NUREG-0654 does not require an adequate response for the "worst possible accident" at Shoreham. It provides that the worst possible accident be taken into consideration in the planning basis for the provisions of NUREG-0654. Tr. 5581-83 (Weismantle). An accident at Shoreham 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. The probability of a loss of offsite power in conjunction with an accident at Shoreham is extremely low. Tr. 5592, 5594-95, 5653-55 (Cordaro).

The contentions allege that there is a requirement for backup. However, there is no such regulatory requirement. Cordaro *et al.*, ff. Tr. 5575, at 12. A majority of the facilities controlled by LILCO have backup power and some other facilities have such power as well. The loss of power to entities without such power would not have a significant effect on an evacuation. Intervenors agreed that on the merits there is adequate backup power and that there is no substantial deficiency in this regard. I.F. 796.

XIV.4. Board's Conclusion

Contentions 93-96 were shown to be without merit.

XV. STRIKE BY LILCO EMPLOYEES

XV.A.1. The Sua Sponte Issues

In July of 1984, LILCO's union employees commenced a strike, which lasted for several weeks. The Board became concerned about the effect such a strike might have on LERO's ability to respond to an

emergency at Shoreham. We accordingly issued a "Memorandum and Order Determining That a Serious Safety Matter Exists" (July 24, 1984) (unpublished), in which we admitted *sua sponte* three specific questions for the parties to address:

- (1) Whether LILCO's ability to implement its offsite emergency preparedness plan would be impaired by a strike involving a 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."

XV.A.2. Stipulation

Prior to the presentation of evidence, LILCO stipulated that it could not demonstrate that a strike involving LERO members would leave that organization's functions unimpaired. Cordaro *et al.*, ff. Tr. 15,434, at 1-2; Tr. 13,989. After considering LILCO's stipulation and the arguments of the parties we ruled that Issue 1 had been totally resolved; that is, that an emergency response would be impaired. Tr. 13,997.

LILCO also proposed to bring the reactor to a cold shutdown mode 24 hours prior to the commencement of a strike, or immediately in the event of a strike involving less than 24 hours' notice. The specific license condition which LILCO proposed was as follows:

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 off-site 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.

ff. Tr. 15,434, LILCO Exh. 71.

XV.A.3. Identification of Witnesses

LILCO presented Dr. Matthew C. Cordaro, Dr. John A. Scalice, Dr. Elias P. Stergakos, and John A. Rigert. Suffolk County presented Gregory C. Minor. The NRC Staff presented Robert A. Benedict, Marvin W. Hodges, Theodore R. Quay, and John R. Sears.

XV.B.1. Questions 2 and 3 of the Board's July 24, 1984 Order: The Risks of Cold Shutdown

Having decided by virtue of the stipulation notice in Finding XV.A.2 above, that LERO's response could be impaired during a strike, and being confronted with LILCO's proposed licensing condition, the Board must, of course, decide whether that condition, or indeed any similar condition, is safe enough. That is, in effect, the thrust of Questions 2 and 3 of our order.

XV.B.2. Risks During the Process of Achieving Cold Shutdown

LILCO expects to receive several days' notice of any significant strike by LILCO workers. Cordaro *et al.*, ff. Tr. 15,439, at 2. Under normal operating procedures, cold shutdown can be achieved in 16 hours. If the reactor is manually scrammed, cold shutdown can be achieved in as little as 8 hours. *Id.* at 2, 4. Thus with as little as 24 hours' notice there would be ample time to place the plant in cold shutdown prior to commencement of the strike. LILCO witnesses also testified that there would be a sufficient number of non-union reactor operators to shut the reactor down and maintain it in cold shutdown indefinitely. *Id.* at 5; Tr. 15,444-45 (Scalice); ff. Tr. 15,446, at 2, LILCO Exh. 78.

Suffolk County witness Minor pointed out that core melt accidents could occur during the descent from full power to cold shutdown. Tr. 15,600, 15,628 (Minor). LILCO's witnesses agreed that accidents capable of causing offsite exposures beyond PAG limits could occur during descent. Tr. 15,477 (Cordaro); Tr. 15,469 (Rigert). LILCO's witness Cordaro noted, however, that it was "very unlikely" that a situation

would occur, engendered by a strike, in which the plant would not achieve cold shutdown before the LERO organization had departed. Tr. 15,536 (Cordaro).

When we consider the speed with which shutdown can be achieved, the small likelihood of a rapidly developing strike, the small chance of a serious accident in the period of power descent, and the slim chance that LERO workers would be in a great hurry to abandon their responsibilities, we are convinced that the hazard presented by a lack of LERO capability during descent to cold shutdown is not a serious one.

XV.B.3. Risks During Cold Shutdown

LILCO's witnesses reviewed the events mentioned in Chapter 15 of the Shoreham Final Safety Analysis Report (FSAR) to determine which of these accidents could occur during cold shutdown. They testified that there are no credible events that could lead to a degraded core or result in radiological consequences in excess of the EPA PAGs offsite. Cordaro *et al.*, ff. Tr. 15,439, at 2; Tr. 15,447 (Rigert). This conclusion was based upon the facts that, in cold shutdown, the reactor is subcritical, the coolant temperature is below 200°F, and many systems are not in service. Cordaro *et al.*, ff. Tr. 15,439, at 3; Tr. 15,448 (Rigert). NRC's witness Hodges reviewed the LILCO analysis of the Chapter 15 events and also concluded that none of them would lead to offsite consequences exceeding the EPA PAGs. Tr. 15,662-63, 15,672 (Hodges). Nor did Suffolk County's witness Minor take issue with the analyzed likelihood or consequences of accidents such as are described in Chapter 15 of the FSAR. Tr. 15,617-18 (Minor). He did, however, contend that restricting analysis to accidents similar to those described in Chapter 15 was ill-advised. He believed so restricted an analysis failed to consider some accident sequences including degraded core accident sequences. Tr. 15,600-04 15,627-28 (Minor). And indeed, Staff witness Hodges agreed that there are conceivable accidents, not described in FSAR Chapter 15 which could be more severe than those examined and could lead to large offsite doses. Tr. 15,664 (Hodges). It is consideration of these larger accidents, in fact, that is normally the basis for emergency planning. *Id.* Such accidents would, however, be of low probability, involving multiple features. Tr. 15,665 (Hodges). Staff witness Quay agreed in principle that there were possible events, not yet examined, which could exceed the PAG offsite, but that these events were of very low probability. Tr. 15,667 (Quay). Witness Hodges also testified that the probability of serious accidents was much less at cold shutdown than at power. Tr. 15,671, 15,676-77 (Hodges).

After careful consideration of the evidence, we believe it is well established that the chance of an accident that would produce offsite consequences, while not zero, is greatly reduced by putting the reactor in cold shutdown. We have not quantified this reduction, of course, but it is clear that the total contribution to risk would be greatly lowered. Witness Hodges characterized it as "the safest condition they could put the reactor in." Tr. 15,677 (Hodges). We find this lowered risk similar to that examined *supra*, where we noted the low chance that an accident would occur during shutdown, but after LERO was rendered ineffective. Here, as there, we note also our intuitive belief that in an actual emergency, it is unlikely that LERO strikers, many of whom live near the plant, would refuse to help simply because of the strike.

XV.B.4. Regulatory Standard

Having found that a licensing condition requiring shutdown during a strike would make a serious accident very unlikely, we nevertheless desired to determine whether there is some regulatory standard, expressed or implied, to aid us in deciding whether this condition would result in a "safe enough" situation. We were aware of the fact that 10 C.F.R. § 50.47(d) indicates that approved offsite emergency preparedness is not required for operation at up to 5% of rated power. With that in mind we attempted to determine whether cold shutdown would in some sense be comparable to operation at low power; that is, whether the proposed condition would be "as safe as" operation at low power. Tr. 15,562 (Laurenson). We were aware that the Commission gave as its reasons for not requiring an offsite emergency plan at low power the following:

First, the fission product inventory during low power testing is much less than during higher power operation due to the low level of reactor power and short period of operation. Second, at low power there is a significant reduction in the required capacity of systems designed to mitigate the consequences of accidents compared to the required capacities under full-power operation. Third, the time available for taking actions to identify accident causes and mitigate accident consequences is much longer than at full power.

47 Fed. Reg. 30,232 (1982). Accordingly, we sought the opinions of the expert witnesses on how each of these factors compared between low power and cold shutdown after substantial full-power operation. Tr. 15,537-46.

With respect to fission product inventory, analyses by LILCO showed that the inventory of halogens and inert gases at cold shutdown is initial-

ly higher than for 5% power but eventually declines to a lower value. Tr. 15,631-34 (Stergakos); ff. Tr. 15,642, LILCO Exh. 81. These figures did not include long-lived isotopes, however. These might be released in severe core damage accidents and would be in greater concentration in a high-power core which had operated a long time. Tr. 15,644 (Stergakos); Tr. 15,621 (Minor). Intervenors' witness Minor believed there could be no meaningful comparison of the inventories under these differing conditions. Tr. 15,620 (Minor).

The times available for taking action to mitigate an accident are similar in the two modes of operation, and there are fewer safety system challenges in the cold shutdown mode. Tr. 15,542, 15,545-46 (Rigert); Tr. 15,563 (Cordaro). NRC Staff witnesses stated explicitly that, in their judgment, a reactor in cold shutdown after having operated is as safe as a reactor that is operating at 5% power but has not operated above that value. Tr. 15,705-06 (Sears, Hodges). Even Intervenors' witness agreed that, from the standpoint of the three factors mentioned by the Commission, the safety advantage would be with the shutdown, previously operated reactor, although he nevertheless believed the situations were not strictly comparable. Tr. 15,626-27 (Minor).

Although clearly the two situations, operation at no more than 5% of full power and cold shutdown after full-power operation, are not completely comparable, we are convinced that the risks are sufficiently similar to allow us to make the judgment that offsite emergency planning need not be in place during cold shutdown.

XV.B.5. Resolution of Questions 2 and 3 of the Board's July 24, 1984 Order

We conclude that, in the interest of reducing risks to a minimum, LILCO should indeed be required to place the reactor in cold shutdown in the event of a strike by LERO workers. We further conclude that, under the proper conditions as outlined below, placing the reactor in cold shutdown during such a strike will give "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency."

XV.C.1. Intervenors' Objections to the Language of the Proposed Condition

Intervenor's witness objected to the language of the proposed condition in three respects:

- (1) The language leaves unclear the exact timing of the start and end of the strike.
- (2) It also leaves unclear the extent to which LERO is disabled by a strike of a union or unions.
- (3) The condition contains two exceptions, neither of which should be allowed.

Tr. 15,605-08 (Minor). The last objection is twofold. Suffolk County's witness believes that allowing transition to the refueling mode would permit operation which risks the kind of accident which represents the worst release analyzed for shutdown. The second condition is so open-ended that it could justify almost any operation, including operation at various power levels. Tr. 15,607-08 (Minor). Indeed, with respect to this last point, it appears that the Staff's witness agrees that the second exception would permit operation at full power if the Staff did not think the emergency response was impaired. Tr. 15,695 (Quay).

XV.C.2. Conclusions

We find that the proposed condition does indeed suffer certain infirmities with respect to precision of definition and scope. We are convinced that Exception 2, in particular, is unjustified. We see nothing in the record that would suggest excessive risk for refueling, and we can envision substantial need for refueling, but authorizing so broad a category as "such other operations" seems to exceed both what is prudent and what is needed. We note that, if a need for some such operation were in fact demonstrated under the (admittedly rare) condition of shutdown because of a strike, an application for a change in the license could be made and processed. We therefore will eliminate Exception 2.

As to the ambiguities of the start and end of the strike and the question of the union involved, we believe that a more precise expression of these conditions can be achieved by the wording changes below.

We also note with some concern the ambiguity inherent in the last paragraph of the proposed condition in which termination of the entire condition is made dependent upon written notice that some agency or agencies "agree to assume" responsibility for emergency planning. Clearly, a mere agreement of that sort would not ensure that the agency or agencies were in any way *prepared* to assume such responsibility.

We therefore direct that the language of the proposed condition be modified to read:

Since LILCO relies on an offsite emergency response organization consisting entirely or primarily of LILCO employees, in anticipation of the commencement of any strike by such 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 a cold shutdown condition until the strike is over and review by FEMA and the NRC Staff has given assurance that LERO capability is fully restored. During a strike-occasioned shutdown, with the prior approval of the NRC Staff upon review of written application by LILCO, LILCO shall be permitted 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. This condition shall be terminated only in accordance with the regulatory procedures for amendment of an operating license.

XV.D. Overall Conclusion on the Strike Issue

As long as LILCO relies upon LERO for local emergency response, we find that, to prevent undue hazard to the public health and safety in the event of a strike by LERO employees, it is both necessary and sufficient to impose the conditions set forth in XV.C.2, above.

XVI. LEGAL AUTHORITY ISSUES (CONTENTIONS 1-10)

The LILCO Plan relies on the services of LILCO personnel and contractors to perform emergency functions. It does not rely on Suffolk County or New York State government personnel or resources for response to a radiological emergency at Shoreham. Contentions 1-10, the Legal Authority Issues, allege that various activities called for in the LILCO Plan are prohibited by New York State statutes (or in the case of Contention 9, by Suffolk County ordinance). They further allege that because of the prohibitions, the LILCO Plan cannot and will not be implemented as required by regulation.

Contentions 1-10 respectively set forth the alleged prohibited actions as follows: (1) guiding traffic; (2) blocking roadways, erecting barriers in roadways, and channelling traffic; (3) posting traffic signs on roadways; (4) removing obstructions from public roadways, including towing private vehicles; (5) activating sirens and directing the broadcasting of emergency broadcast system messages; (6) making decisions and recommendations to the public concerning protective actions; (7) making decisions and recommendations to the public concerning protective actions for the ingestion exposure pathway; (8) making decisions and recommendations to the public concerning recovery and reentry; (9) dispensing fuel from tank trucks to automobiles along roadsides; and (10) per-

forming access control at the Emergency Operations Center (EOC), the relocation centers, and the emergency planning zone (EPZ) perimeters.

XVI.1. Procedural History of the Legal Authority Issues

On January 27, 1984, the Board stated its belief that "these legal contentions are properly matters to be disposed of by the New York State courts." Tr. 3675 (Laurenson, J.). Intervenors started to commence actions for declaratory judgments in the New York State courts in March 1984. The three cases were consolidated in the Supreme Court, Suffolk County in August 1984. No hearings have been held on Contentions 1-10 before this Board, and the parties had agreed that no such hearings are necessary. Tr. 13,823 (Irwin); Tr. 13,831 (Lanpher); Tr. 13,832 (Zahnleuter); and Tr. 13,834 (Pirfo).

August 6, 1984, LILCO filed a motion before this Board for summary disposition of all ten contentions. LILCO asserted three independent federal bases to justify summary disposition in its favor, assuming *arguendo* that Intervenors are correct in their assertion that State law prohibits LILCO's proposed activities. The bases were stated as "(1) Preemption: Preemption by the Atomic Energy Act; (2) Realism: The single fact, already established on the record of this proceeding, that the State and County would respond in a real emergency; and (3) Immateriality: The fact, already developed on the record of this proceeding, that the actions specified in Contentions 1-4, 9 and 10 are not required to meet NRC regulations." On September 24, 1984, the State and County filed their opposition to the LILCO motion. They argued, *inter alia*, that the LILCO motion should be dismissed because the New York State court was considering dispositive motions on all of the legal authority issues, the federal law does not preempt the pertinent provisions of New York law, the realism argument is based on factual and legal predicates that are completely erroneous, and the immateriality argument is defective because no viable plan for traffic-related and other services is presented. On October 4, 1984, Staff filed its opposition to the LILCO motions. It did so on the grounds that without the New York court ruling on the legality of the proposed actions the LILCO motion is premature, that if the Board did not dismiss the motion the Board should find that LILCO has not established that federal law would preempt the State and local laws cited by Contentions 1-10, and that summary disposition of Contentions 1-10, grounded on LILCO's assertions of realism and immateriality, would be inappropriate at that time.

On October 22, 1984, the Board issued a Memorandum and Order (unpublished) finding that the preemption issue was then premature. It

relied on *Consolidated Edison Co. of New York* (Indian Point Station, Unit No. 2), ALAB-399, 5 NRC 1156, 1170 (1977). There the Appeal Board stated:

Thus, in cases where a state statute could be interpreted in such a way as to be either consistent or in conflict with Federal law or where an actual conflict between state law in a valid area of state concern and Federal law was possible but had not yet arisen, the Supreme Court has held that the Federal judiciary should stay its hand until such time as the state courts interpret the statute or an actual conflict arises.

Id. at 1170. The Board concluded that it would “hold the LILCO motion for summary disposition in abeyance until the issuance of the Initial Decision at which time we shall rule upon the motion and all other issues in this proceeding.”

In order to complete the record on the first ten contentions, all parties were invited to submit briefs as to whom they believed should prevail on each contention and why the contention should be resolved in that manner. The Board also invited all parties to discuss in their briefs, *inter alia*, (a) in connection with LILCO’s immateriality argument, whether the LILCO activities enumerated in Contentions 1-10 are necessary pursuant to NRC regulations; and (b) in connection with LILCO’s realism argument, what effect would an unplanned response by the State or County have and whether such a response would result in chaos, confusion, and disorganization so as to compel a finding that there is no “reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency” at Shoreham. The parties then filed another round of briefs, arguments, and responses.

LILCO and the Intervenors took positions consistent with their original filings as to why they should prevail on each of the ten contentions. On December 7, 1984, the Staff submitted its response and argued that “the Licensing Board should defer reaching a decision on the State law and preemption questions raised by Contentions 1-10, until such time as a definitive ruling has been issued by the New York State courts or prejudice would result to LILCO by withholding a decision on its request for a full power license.” As to the actions specified in Contentions 1-4, 9 and 10, for which LILCO raised the immateriality argument, Staff asserted they have been identified by the utility as a means of satisfying the emergency planning regulations and that if they are found to be prohibited under State and local law LILCO should submit a revised plan for review before any determination may be made as to whether it has satisfied the Commission’s emergency planning regulations. As to the

realism argument, it was the Staff's position that the effect of an unplanned State and local response had not previously been addressed by the parties in such a manner that the Board could resolve these questions on the present record.

On February 20, 1985, the New York State Supreme Court, Suffolk County, rendered its decision on Intervenors' consolidated actions for a declaratory judgment on LILCO's legal authority to carry out its utility-sponsored offsite emergency response plan for Shoreham. *Cuomo v. LILCO*, Consol. Index No. 84-4615, Supreme Court of the State of New York, Memorandum Opinion dated February 20, 1985. The gravamen of the County's complaint in the action was that the implementation of the LILCO Plan would be unlawful, illegal, and an usurpation of the police powers of the State. The County claimed that LILCO would violate the New York State Constitution, the Municipal Home Rule Law, and the Executive Law. The State made similar allegations and asserted that implementation of the Plan would be violative of the Transportation Corporations Law, the Vehicle and Traffic Law, the Public Health Law, the Agricultural and Markets Law, and the Penal Code. *Id.* at 6, 12 and 17. The Court found for the plaintiffs and ruled that LILCO, in providing for implementing the Plan with its own employees and others under contract, intends to carry out activities which are inherently governmental in nature and as a private corporation LILCO does not have the right to exercise these governmental functions, which fall within the State's historic police power.

In reaching its decision the Court found the elements of the LILCO Plan, including those functions alleged in Contentions 1-10, to be illegal for the utility to perform. The Court noted the existence of the ten Legal Authority Issues in the subject proceeding. *Id.* at 4-6 and 11. At the behest of the parties, the Court had previously ordered that the issue to be decided was that of LILCO's legal authority to implement its Plan only under the laws of the State of New York. *Id.* at 8.

In finding for the plaintiffs, the Court stated that the Plan LILCO intends to implement in the event of a radiological emergency at Shoreham falls clearly within the ambit of the State's historical police power and that as a private corporation LILCO has no authority by any means whatever to perform the governmental functions contained in the Plan. *Id.* at 12, 17 and 18.

On February 27, 1985, LILCO renewed its motion for summary disposition of the Legal Authority Issues on the alleged grounds that federal law preempts the State law which prohibits it from implementing its emergency response plan. Applicant's position is that the New York State Supreme Court opinion, issued on February 20, 1985, makes the

matter ripe for decision; and thus there is no need to await any higher-level State court opinion. Intervenor filed an answer on March 19, 1985, requesting that the renewed motion should be denied because LILCO has not identified any legal authority that could be the basis for summary disposition in its favor and that the New York State Supreme Court's ruling on legal authority requires summary denial of the renewed motions. They further request that if the Board wished to address the renewed motion, it should establish a briefing schedule and provide for oral argument.

Intervenor also argue in their answer of March 19, 1985, that this Board should again defer its ruling on these issues because the question of preemption is still before the New York Courts. The record before us indicates only that LILCO is attempting to place this matter before the New York State Courts. Intervenor's Brief of March 19, 1985, at 18. LILCO initially placed the preemption issue before this Board on August 6, 1984.

On March 19, 1985, Staff filed its response. Its position is that the legal authority issue is ripe for decision by the Board. The State court has now interpreted the State laws and found that LILCO may not carry out its offsite emergency response plan and that it is no longer premature for the Board to determine whether federal law gives LILCO the authority to carry out its offsite emergency response plan notwithstanding the proscriptions of State law. The question of the federal bases is a matter of federal law and it is no longer necessary to await State court action.

LILCO filed a motion on March 26, 1985, seeking leave to reply to Suffolk County's and the NRC Staff's filings. It should be initially stated that considering the exhaustive filings and arguments already made on the Legal Authority Issue by all of the parties, Intervenor's request for further briefing or oral argument in the matter would serve no useful purpose and the request is denied. Similarly, the Board finds no need for a reply by LILCO and its motion is denied. It follows that Intervenor's proffered pleading titled "Answer of Suffolk County and the State of New York to LILCO's Motion for Leave to File Response to Intervenor's and NRC Staff's Answer to LILCO's Renewed Motion for Summary Disposition," dated April 8, 1985, is also without a useful purpose and is therefore dismissed.

The Board defers to the New York State Supreme Court in interpreting New York State law where the latter's jurisdiction and expertise lies. We accept the finding of the New York State Supreme Court in *Cuomo v. LILCO, supra*, that the actions cited in Contentions 1-10 to be implemented in the Plan are prohibited by State law. The Board agrees with the NRC Staff and further finds that the Legal Authority Issues are now

ripe for decision by us. The matter of the interpretation of State law has been determined by a competent court. No useful purpose would be served by awaiting decisions by appellate bodies, which could postpone the resolution of the application indefinitely. Administrative practice requires that issues be decided timely.

The Board agrees with the Staff that the Legal Authority Issues are ripe for decision. All that remains for decision are LILCO's arguments on federal law for resolution of the contentions. Clearly they are questions which we are empowered to decide. There is no reason to await further action by anyone on the Legal Authority Issues before the Board decides.

LILCO relies on what it terms three independent federal bases to find its proposed actions lawful, and for summary disposition to be made in its favor. They are preemption, realism, and immateriality. The Board finds all three to be without merit so that a finding in Applicant's favor is not in order. To the contrary, the Board finds in favor of the Intervenor on Contentions 1-10.

XVI.2. Preemption

LILCO bases its request for summary disposition of Contentions 1-10 on an argument that the laws cited in those contentions are preempted by the Atomic Energy Act of 1954, as amended, "because they invade the field of radiological health and safety regulation, a field exclusively occupied by the federal government . . ." and further that "emergency planning . . . is inherently and exclusively a matter of radiological health and safety." LILCO Brief at 4, 11. LILCO also argues that recent NRC Authorization Acts demonstrate Congressional intent to occupy the area of offsite emergency planning for nuclear power plants.

Suffolk County and New York State oppose LILCO's motion, contending that LILCO cannot meet its burden of demonstrating that it was the "clear and manifest purpose of Congress" to preempt the traditional police powers upon which the State and local laws cited in Contentions 1-10 are based.

The NRC Staff has concluded that federal law does not clearly preempt the State and local laws cited in Contentions 1-10, and thus the Staff also opposes LILCO's motion for summary disposition.

The parties do not dispute the fundamental principles of federal preemption. The foundation of the preemption doctrine is the Supremacy Clause of the United States Constitution, art. VI, cl. 2, which provides as follows:

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

Thus, when Congress acts pursuant to its enumerated powers it may expressly preempt a given field. The parties do not maintain, nor have we found, that Congress has expressly occupied the area of offsite emergency planning for nuclear power plants. The Atomic Energy Act of 1954, as amended, is silent with respect to offsite emergency planning. It does not address the responsibility and authority of State and federal governments to regulate in this area. Nor do the 1980, 1982-83, or 1984-85 NRC Authorization Acts provide an express statement of Congressional intent to preempt State law.

In the absence of an explicit statement of intent to preempt a particular area of law, preemption may still be found where Congress has established a "scheme of regulation so pervasive as to make reasonable the inference that Congress left no room to supplement it." *Pacific Gas & Electric Co. v. State Energy Resources Conservation and Development Commission*, 461 U.S. 190, 75 L. Ed. 2d 752, 765 (1983), citing *Jones v. Rath Packing Co.*, 430 U.S. 519, 525, 51 L. Ed. 2d 604 (1977); *Fidelity Federal Savings and Loan Association v. de la Cuesta*, 458 U.S. 141, 73 L. Ed. 2d 664 (1982); *Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218, 91 L. Ed. 1447 (1947). State law may also be preempted when an actual conflict exists between State and federal law. Such a conflict arises when "compliance with both federal and state regulations is a physical impossibility," *Florida Lime and Avocado Growers, Inc. v. Paul*, 373 U.S. 132, 142-43, 10 L. Ed. 2d 248 (1963). Actual conflict may also be found where State law "stands as an obstacle to the accomplishment and execution of the full objectives of Congress." *Hines v. Davidowitz*, 312 U.S. 52, 67, 85 L. Ed. 581 (1941); *Jones, supra*, 430 U.S. at 525-26. Thus, State law may be preempted where the federal government exclusively occupies an area of law or where State law actually conflicts with federal law.

The State and local laws which Judge Geiler, of the New York State Supreme Court, ruled prohibit LILCO from performing the functions described in Contentions 1-10 were enacted pursuant to the State's police powers. A conclusion that a State's traditional police powers are preempted must be premised on a finding that it was the "clear and manifest purpose of Congress" to supersede State law. *Pacific Gas & Electric Co., supra*, 461 U.S. 190, 75 L. Ed. 2d at 766; *Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218, 230, 91 L. Ed. 1447 (1947). Thus, a mere

inference that Congress intended to preempt State law will not be sufficient to support a finding of preemption where State police powers are involved.

LILCO relies on the language from *Pacific Gas & Electric Co.*, 75 L. Ed. 2d at 770, that “[t]he federal government has occupied the entire field of nuclear safety concerns, except the limited powers expressly ceded to the States,” for its argument that federal law preempts the State and local laws cited in Contentions 1-10. LILCO claims that Congress has not expressly ceded to the States the power to regulate emergency plans for nuclear power plants. The Supreme Court in *Pacific Gas & Electric Co.*, 75 L. Ed. 2d at 766, and most recently in *Silkwood v. Kerr-McGee Chemical Corp.* — U.S. —, 78 L. Ed. 2d 443 (1984), however, has adhered to the standard set forth in *Rice, supra*, that the party seeking to show preemption carries the burden of demonstrating that it was the “clear and manifest purpose” of Congress to preempt State law. Thus we find that LILCO carries the burden of demonstrating that the federal government intended to preempt the State and local laws which prohibit LILCO’s proposed activities.

LILCO wisely does not attempt to argue that the State and local laws at issue are preempted in their entirety. Clearly they are not. LILCO instead argues that the Atomic Energy Act of 1954, as amended, preempts State law insofar as it attempts either to prohibit the operation of a nuclear power plant on grounds of radiological health and safety, or to interfere with emergency planning so as to reduce the safety afforded the population. LILCO is correct that preemption will not occur in all cases of concurrent Federal-State power. Preemption will only allow a federal law to supersede that of a State to the extent that the two are inconsistent. Thus, Congress can legislate within a limited portion of a broader area of law, without infringing upon a State’s right to regulate other aspects of the subject area. Again, because of the strong policy of maintaining State’s rights the Supreme Court has instructed the judiciary that a determination of federal supremacy is not to be lightly made. *Alessi v. Raybestos-Manhattan, Inc.*, 451 U.S. 504, 522, 68 L. Ed. 2d 402 (1981).

The first issue before us is whether Congress has exclusively occupied the field of nuclear safety insofar as it relates to offsite emergency planning. In order to make this determination we will examine the federal law governing nuclear power, as well as the legislative history of the relevant federal acts.

The Atomic Energy Act (AEA) of 1954, 42 U.S.C. §§ 2011-2282 governs the civilian use of nuclear power. Section 271 of the AEA states:

Nothing in this chapter shall be construed to affect the authority or regulations of any Federal, State or local agency with respect to the generation, sale, or transmission of electric power produced through the use of nuclear facilities licensed by the Commission: Provided, that this section shall not be deemed to confer upon any Federal, State or local agency any authority to regulate, control, or restrict any activities of the Commission.

42 U.S.C. § 2018. This section was enacted to allow States to exercise the same regulatory authority over nuclear power as they had over the production of electricity by other means. The AEC, and eventually the NRC, retained regulatory responsibility for “construction and operation of any production or utilization facility,” under § 274(a)(1), 42 U.S.C. § 2021(c)(1). However, subsection (k) of § 274 clearly stated that the federal government had only occupied the field of radiological hazards associated with nuclear materials. The § 274(k) limit on federal power states “nothing in this section shall be construed to affect the authority of any State or local agency to regulate activities *for purposes other than protection against radiation hazards.*” § 274(k), 42 U.S.C. § 2021(k) (emphasis added).

In *Pacific Gas & Electric Co.* the Supreme Court interpreted these provisions and recognized that some areas of nuclear power regulation were to be left to the States.

Even a brief perusal of the AEA reveals that despite its comprehensiveness it does not at any point expressly require the States to construct or authorize nuclear power plants or prohibit the States from deciding, as an absolute or conditional matter, not to permit the construction of any further reactors . . . as we view the issue, Congress, in passing the 1954 Act and in subsequently amending it, intended that the federal government should regulate the radiological safety aspects of a nuclear plant, but that the States retain their traditional responsibility in the field of regulating electrical utilities for determining questions of need, reliability, cost, and other related State concerns.

Pacific Gas & Electric Co., *supra*, 461 U.S. 190, 75 L. Ed. 2d at 765. These passages make clear that Congress contemplated States would play a role in regulation of nuclear power. The preliminary question before the Board is whether the State and local statutes at issue fall within the scope of the States’ authority or whether they constitute an impermissible attempt to regulate radiological safety.

In *Pacific Gas & Electric Co.* the Supreme Court held that a California statute imposing a moratorium on the certification of new nuclear plants was not preempted by the Atomic Energy Act because the California law was based upon an economic rationale independent of radiological safety. That is, the State legislation was a response to a State concern, engen-

dered by the problems of disposal of radioactive wastes, that nuclear power might become an uncertain and uneconomical source of energy. The statute banned construction of nuclear generating facilities until such time as a federally approved method for radioactive waste disposal is developed. Likewise, the State laws at issue here were enacted pursuant to the State's police powers, for purposes totally unrelated to nuclear safety concerns. Thus, under the reasoning of *Pacific Gas & Electric Co.*, such statutes are not preempted by federal regulation. In *Pacific Gas & Electric Co.* the Court stated that a ban on nuclear power plant construction because of the economic uncertainties associated with disposal of radioactive waste was not preempted. It seems to us that it is because of the radiological hazard that a more secure method of disposal — a method not yet in existence — is needed, and thus the economic uncertainties are the result of the radiological hazard. No feasible method of disposal exists, thus as radiological waste accumulates the possibility arises that plants may have to be shut down, leading to economic problems within the State. The radiological hazard forms the foundation for the economic rationale upon which the moratorium is based. Yet the Supreme Court was quite clear in its ruling that the economic rationale for the ban was adequate to remove it from the area of health and safety regulation which is preempted by federal law. In the case before us the statutes at issue were passed long before LILCO began emergency planning for Shoreham and for purposes totally unrelated to nuclear power or emergency planning. This mandates a finding that these State and local laws are not preempted.

LILCO counters this line of reasoning by arguing that the State laws at issue here are being *applied* to prohibit LILCO from operating the Shoreham nuclear power plant. The Supreme Court, however, has stated that we are not to "become embroiled in attempting to ascertain [the State's] true motive." *Pacific Gas & Electric Co.*, 75 L. Ed. 2d at 772. The apparent purposes of the New York State laws and the local laws at issue in Contentions 1-10 have no nexus with regulation of radiological health and safety. They are simply laws regulating local matters such as flow of traffic on public roads. If such laws are being used in a way not contemplated by Congress in delineating the State and federal governments' respective powers, then it is for Congress to speak to the issue. We agree with the Supreme Court's statement in *Pacific Gas & Electric Co.* that "it should be up to Congress to determine whether a State has misused the authority left in its hands." *Id.* at 773.

Recent NRC Authorization Acts have recognized that State and local governments are responsible for developing offsite emergency plans for review by FEMA. The 1980, 1982-83, and 1984-85 NRC Authorization

Acts do not mandate a finding of preemption. These statutes did permit the NRC to consider a utility-sponsored emergency plan in the absence of a State or local plan, but they did not exclude State and local governments from submitting such plans, or from performing an offsite emergency preparedness function. When debating these Authorization Acts, Congress squarely faced the problem of failure of States to participate in emergency planning. Two proposals were put forth as alternatives to the final provision which allowed NRC consideration of a utility-sponsored offsite emergency plan. One alternative was to require each State without an approved emergency response plan to develop such a plan. Failure to develop a plan within the statutory time limit would result in shutdown of operating plants and prohibit issuance of new operating licenses. The other option considered would have permitted the NRC itself to establish an interim emergency plan for a power plant in a State which failed to submit an acceptable plan within the statutory deadline. *See* 125 Cong. Rec. S9471-77. The Congressional debate surrounding these alternatives clearly demonstrates that Congress was well aware of the possibility that States could refuse to, or through inadvertence or honest mistake, fail to submit a workable plan. *Id.* at S9476.

Members of the Senate acknowledged that States were not required to plan:

State and local compliance with requirements for emergency planning is now voluntary. A utility seeking to operate a nuclear plant must present its own emergency plan for the plant and must establish arrangements with appropriate State and local authorities for assistance, but the State and local officials responsible for emergency response planning are under no compulsion to develop an acceptable plan.

Senate Comm. on Environment and Public Works, S. Rep. No. 176 on S.562, Pub. L. 96-295, at 45 (May 15, 1979), 96th Cong., 2d Sess. (1980), *reprinted in* U.S. Code Cong. & Ad. News 2257-58.

The Commission itself has also brought this matter to the attention of Congress. In testimony before the Subcommittee on Environment, Energy, and Natural Resources of the House Committee on Government Operations in May 1979, Commission Chairman Joseph M. Hendrie stated:

The question is whether the NRC ought to have authority under the law to require a State or locality to [participate in emergency planning] . . . I am not quite sure. I would prefer to have the Congress recognize the nature of the problem and then let you decide whether it is appropriate for the Federal Government to come down and preempt an area which previously has been regarded as a State and local prerogative.

Emergency Planning Around Nuclear Power Plants: Nuclear Regulatory Commission Oversight Hearings Before a Subcomm. of the Comm. on Government Operations, 96th Cong., 1st Sess. 534 (1979).

Congress chose not to enact either of the proffered provisions and instead adopted a section providing that in the absence of a State or local emergency preparedness plan, the Commission may issue an operating license if it determines that "there exists a State, local or utility plan which provides reasonable assurance that public health and safety is not endangered by operation of the facility concerned." Pub. L. 96-295, § 109, 94 Stat. 784 (1980). This provision is stated in substantially similar terms in the 1982-83 NRC Authorization Act, Pub. L. 97-415, § 5, 96 Stat. 2067 (1983), and the 1984-85 NRC Authorization Act, Pub. L. 98-553, § 108, 98 Stat. 2825 (1984).

LILCO points out that the proposal requiring shutdown of nuclear power plants in States lacking adequate emergency plans, and prohibiting issuance of operating licenses for plants in such States, was defeated. Thus, LILCO argues "Congress flatly rejected the notion that a State or local government could shut down existing plants by refusing to perform emergency planning." LILCO Brief at 19. However, LILCO fails to give proper attention to the fact that Congress, after acknowledging the potential veto power of a State, failed to enact the alternative provision which would have allowed the NRC to establish interim emergency plans in the absence of a State plan.

In its statements of consideration on regulations requiring emergency planning for nuclear power plants the Commission stated:

The Commission recognizes there is a possibility that the operation of some reactors may be affected by this rule [requiring reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency] through inaction of State and local governments The Commission believes that the potential restriction of plant operation by State and local officials is not significantly different in kind or effect from the means already available under existing law to prohibit reactor operation, such as zoning and land-use laws, certification of public convenience and necessity, State financial and rate considerations . . . and Federal environmental laws.

45 Fed. Reg. 55,402 (Aug. 19, 1980). This statement indicates that even after passage of the 1980 NRC Authorization Act allowing consideration of a utility-sponsored emergency plan, the Commission believed Federal law did not preempt State and local regulation, but that emergency planning fell within the regulatory field left to the States.

In *Silkwood, supra*, the issue was whether a State-authorized award of punitive damages arising out of the escape of plutonium from a federally

licensed nuclear facility constituted regulation of radiological health and safety and was, therefore, preempted. The Supreme Court held that Congress had *not* preempted State tort remedies, including punitive damage awards that were based upon a desire to penalize safety violations and thereby influence conduct. The Court held that “there is no indication that Congress even seriously considered precluding the use of such remedies.” 78 L. Ed. 2d at 454. In the case before us the argument against preemption is even stronger than in *Silkwood*, in that Congress considered preempting State law but chose not to do so and also chose not to compel States to participate in emergency planning. Thus we cannot conclude that it was the “clear and manifest purpose” of Congress to preempt State laws that might impinge upon emergency planning efforts. On the contrary, Congress deliberately decided not to invade State authority or force States to take specific emergency planning action.¹³

In analyzing the scope of preemption under the AEA, the Supreme Court in *Silkwood* noted “Congress’ decision to prohibit the States from regulating the safety aspects of nuclear development was premised on its belief that the Commission was more qualified to determine what type of safety standards should be enacted in this complex area.” *Id.* The Court found that Congress had decided that “technical safety considerations” relating to the handling of hazardous nuclear materials were of such “complexity” that regulation of such materials should be reserved to the NRC. *Id.* Although the Commission’s regulations requiring offsite emergency planning and preparedness were adopted for the purpose of protecting the public health and safety from potential radiological hazards, planning for an effective response to an emergency does not raise technical issues relating to the radiological aspects of nuclear power generation. Rather, such planning raises a host of questions more akin to land use, in that local conditions and the capabilities of local agencies will determine how plans for evacuation, transportation, and relocation will be implemented. We agree with Intervenor, and find that the development of an offsite emergency response and the way in which the functions required by the Commission’s emergency planning regulations are to be performed raise questions that are a matter of local concern. We find that Congress did not intend to preempt any of the State laws cited in Contentions 1-10.

¹³ Although this portion of the Partial Initial Decision was prepared prior to the issuance of *Citizens for an Orderly Energy Policy, Inc. v. Suffolk County*, CV-83-4966 (E.D.N.Y. March 18, 1985), we note that the United States District Court analyzed whether Suffolk County’s resolutions refusing to participate in emergency planning for Shoreham were preempted by federal law, and by the same line of reasoning reached a conclusion in accord with our finding.

Actual Conflict

State law will be preempted if it actually conflicts with federal law. Actual conflict arises where compliance with both laws is a physical impossibility or where State law stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress. *Pacific Gas & Electric Co.*, *supra*, 75 L. Ed. 2d at 765. LILCO claims as to Contentions 5-8 that it is impossible to comply with both federal and State law, and that as to each of Contentions 1-10 the State laws pose an obstacle to the accomplishment of the full purposes and objectives of Congress. Thus, LILCO seeks a ruling that the New York State and local laws which prohibit implementation of its Transition Plan are preempted. Intervenor's respond that LILCO is not subject to conflicting laws such that compliance with one law requires LILCO to violate another law. Intervenor's maintain that although LILCO must submit an adequate offsite emergency response plan as a condition of licensing, LILCO has no *obligation* under federal law with which it cannot comply.

LILCO asserts that it is under a federal mandate to perform the functions in Contentions 5, 6, 7 and 8 (warning the public and making decisions and recommendations), and that the State mandate not to perform them creates a conflict giving rise to federal preemption. We find, however, that LILCO is not under a federal obligation to perform these acts. Indeed, LILCO is forbidden by federal regulation from performing one of these acts. Part 50, Appendix E of 10 C.F.R. states: "The responsibility for activating such a public notification system shall remain with the appropriate *governmental* authorities." (Emphasis added.)

Federal regulations require an adequate offsite emergency plan before a nuclear power plant operating license will be issued. The NRC Authorization Acts of 1980, 1982-83 and 1984-85 allow the NRC to consider a utility plan in the absence of a State or local plan, but LILCO can point to no language by which the federal government compels LILCO to do any act or compels States and local governments to participate in the development of emergency plans. While it is true that LILCO cannot obtain a license without an adequate emergency plan, and that LILCO is forbidden by State and local law from performing certain acts required to make the plan adequate, nowhere does the federal government mandate that LILCO perform these functions. We are aware of the dilemma this poses for LILCO, but the issues surrounding the State's refusal to act pursuant to its police powers are not before this Board. We have no authority to fashion a remedy for LILCO's difficulties and find only that there is no "actual conflict" as that term has been used by the Supreme Court.

LILCO next argues that the State and local laws cited in the ten legal authority contentions “stand as an obstacle to the accomplishment of the full purposes and objectives of Congress.” LILCO states that the purposes and objectives of Congress are to have effective emergency plans, uniform standards for emergency planning, and to encourage nuclear power. The Board accepts LILCO’s assertion that these are the purposes of Congress concerning nuclear power development. However, the development of nuclear power is not the only objective we consider in deciding this issue. Both parties cite the language of the Supreme Court in *Silkwood*, *supra*, 78 L. Ed. 2d at 458.

“[t]here is little doubt that a primary purpose of the Atomic Energy Act was, and continues to be, the promotion of nuclear power,” [75 L. Ed. 2d at 775.] However, we also observed that “the promotion of nuclear power is not to be accomplished ‘at all costs’.” [*Id.* at 776-77.]

We must bear in mind the cost to our federal system of transferring a State’s historic police powers to a private entity. We find no evidence to suggest that Congress ever intended to allow a private utility to exercise powers that have traditionally belonged to the States. We cannot believe that so fundamental a shift in the structure of Federal-State relations could be accomplished by the NRC Authorization Act provision which merely allows the NRC to consider the adequacy of a utility-sponsored emergency plan. Indeed, Congress would not even enact a provision requiring the States to perform emergency planning or placing responsibility for emergency planning with the federal government. The Supremacy Clause is not a basis for accomplishing that which the Congress itself chose not to accomplish. There is no precedent for using the Supremacy Clause to transfer authority from government to a private entity. We find LILCO’s argument that the laws cited in Contentions 1-10 are preempted to be without merit.¹⁴

XVI.3. The Realism Argument

LILCO argues that despite the fact that it may be precluded under New York State law from carrying out the activities objected to in Contentions 1-10, and its preemption argument is invalid, the State and County would respond in a real emergency and this would cure any lack of legal authority. LILCO recognizes this would not apply to Contention

¹⁴ We agree with the NRC Staff that having decided State and local law is not preempted we have no need to reach the question of Tenth Amendment limits to Congressional power and the implications of *Garcia v. San Antonio Metropolitan Transit Authority*, 53 U.S.L.W. 4135 (U.S. February 19, 1985).

3, which involves the posting of "trail-blazer" signs by LILCO in advance of an actual emergency. LILCO Motion at 5.

LILCO claims that if there were an emergency at Shoreham it would be taking emergency response actions in conjunction with, or authorized by, government officials and this government participation would remove any legal bar to a LILCO response. LILCO primarily predicates its assumption that the State and County will respond to any emergency at Shoreham on a sentence in a December 1983 press release of the Governor of the State of New York that "if the plant were to be operated and a misadventure were to occur, both State and County would help to the extent possible." Staff's Answer to LILCO Motion at 27, 28.

Applicant contends that its activities would be legalized by the government participation under authority contained in N.Y. Exec. Law, art. 2-B §§ 28 and 29a (McKinney 1982). Section 28 gives the Governor the authority to suspend specific provisions of any statute, local law, ordinance, and the like during a State disaster emergency. LILCO contends that in an emergency the Governor would take the necessary step to remove the legal impediment to LILCO's actions. LILCO further asserts that § 29a authorizes any actions taken pursuant to governmental authority, and the response by governmental officials would include conferring the necessary authorization on LILCO to act. LILCO Motion, at 43 n.15, 56 n.22.

Intervenors find the realism argument to be fanciful, asserting that nowhere is it established on or off the record that there will be a governmental response to an emergency at Shoreham that will be, in any sense, meaningful for purposes of the proceeding. The State and County have no emergency plans for implementation in the event of a Shoreham emergency and at most all that was offered was to provide governmental resources on an unplanned, *ad hoc* basis. Intervenor Opposition to LILCO Motion at 90. It is also argued there is no evidence that the State or County would help LILCO implement its plan. Their lack of such commitment is evidenced by the institution of court actions to stop LILCO from usurping police powers and by Suffolk County Resolution III-1983, which provides that the County's radiological emergency planning process is terminated and no radiological emergency plan for response to an accident at Shoreham plant shall be implemented. *Id.* at 92. Intervenors also asserted that as a matter of New York State law, LILCO cannot exercise the State's police powers in the manner contemplated by the Plan under any circumstances because as a private corporation it can never be given the power to do so. *Id.* at 97.

In discussing the realism issue in the context of whether summary disposition is appropriate, the Staff noted that the Governor's pronounce-

ment in his press release had not been tested or explored by the parties, and because of the uncertainties surrounding it, summary disposition of Contentions 1-10 in LILCO's favor would be inappropriate. Staff's Answer to LILCO Motion at 28.

Proceeding directly to the heart of the matter, LILCO assumed that if the State and County were to participate in an emergency response at Shoreham, they would authorize the utility to perform the functions it proposes to carry out in an emergency as enumerated in the subject contentions. The realism argument is wholly predicated on the State and County authorizing LILCO to act as planned. Without such authorization the realism argument vanishes. LILCO relied on New York State law, more particularly the Executive Law, discussed previously, for the deputization. Judge Geiler, in his decision of February 20, 1985, found that there are no means under New York State law by which LILCO can be vested with the authority it would need to implement the emergency response plan it proposes. He stated, "[t]he Court, no matter how many times it has read and re-read Article 2B [The Executive Law] could not find any authorization for LILCO, expressed or implied, to exercise the State's police powers in emergency situations." The Court ultimately concluded, "[t]he State and County would be breaking their 'fiduciary duty' to protect the welfare of its citizens if they permitted a private corporation to usurp the police powers which were entrusted solely to them by the community." *Cuomo v. LILCO, supra*, at 18. The Supreme Court interpretation of the New York State law, which we have accepted, disposes of the realism argument. The realism argument, predicated upon LILCO being authorized to participate in its proposed emergency response plan, fails because Applicant cannot be delegated the authority to perform the functions enumerated in Contentions 1-10.

Even assuming *arguendo* that LILCO were able to participate in implementing that part of the Plan dealt with in Contentions 1-10, Applicant's expectation of a response by the State and County to an emergency at Shoreham, rather than bolstering the value of realism as a legal basis for its actions actually tends to negate it.

The emergency planning regulations, in order to provide for an effective response to a broad spectrum of possible accidents, require through comprehensive, cooperative, and detailed preplanning and ability by the concerned entities, including the utility, the various government groups, and the citizenry, to mount a very highly coordinated effort. The regulatory scheme presupposes the working of a complex, cooperative effort to achieve a satisfactory result.

These regulations came about, in part, because the TMI emergency showed what can happen without an adequate emergency response plan.

The various entities involved in the TMI incident acted at times in an uncoordinated manner at cross purposes with one another, to the detriment of all concerned.

On the basis of the probative evidence of record, it is clear that any government response that can be anticipated will be on an uncooperative, uncoordinated, *ad hoc* basis considering the State's and County's opposition to the Plan and their deliberate unwillingness to participate in it. Intervenor's Response to ASLB Memorandum at 89, 92-95. There is nothing on which to base a finding that there will be a cooperative, coordinated effort between the government and the utility to prepare for and implement the existing emergency response plan.

Applicant anticipates the State and County will provide for a planned response, but only after Shoreham begins to operate. LILCO Brief on Contentions 1-10, at 44. We must base our determination on what the proposed plan actually provides and whether it currently complies with the regulatory requirements so that a determination can be made whether there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The State and County affirmatively oppose participating in LILCO's Plan. We cannot base a judgment on the adequacy of the Plan on conjecture, as LILCO would have us do. Although Intervenor may well respond in a planned manner insofar as they do respond, there is no reasonable assurance of record that the response will be in cooperation and coordination with Applicant, which is what is contemplated for an adequate plan. (See Board Findings on Contention 92 in § XIII.C.)

Any acceptance of the participation of the State and County in the emergency response on an uncooperative, uncoordinated and unpre-planned bases does not further compliance with current regulations. It instead creates the potential for repetition of what occurred prior to the enactment of the regulations and was the reason for their promulgation. Emergency planning as required by the current regulations demands pre-planning, cooperation, and coordination, thus to rely upon an impromptu response, even from the State and County, with all of their resources, is not in keeping with the emergency planning regulations. Any proposal which introduces the highly undesirable element of uncertainty as to how the various entities will react, is inadequate.

The realism argument has been shown to be without merit and is rejected.

XVI.4. The Immateriality Argument

LILCO argues that despite the fact that it may be precluded under New York State law from carrying out the activities objected to in Contentions 1-10, and that its preemption and realism arguments are invalid, Contentions 1-4, 9, and 10 should be resolved in the utility's favor because the activities challenged as illegal in those contentions are not essential for meeting NRC regulations. It contends that for the most part these activities improve evacuation time if evacuation is called for, but their absence by no means makes evacuation impossible, and in a few cases the activities alleged to be illegal are not the activities called for in the LILCO Plan. LILCO Motion at 5.

More specifically, LILCO alleges Contentions 1-4 and 9 all challenge the legality of actions to be taken to support the traffic control portion of the LILCO Plan, and Contention 10 challenges the actions to be taken to maintain security at the EOC, EPZ perimeter, and relocation centers. LILCO asserts that "directing" traffic, "channeling" traffic, putting up traffic signs and dispensing fuel from tank trucks are not necessary for reasonable assurance that adequate protective measures can and will be taken in the event of an emergency at Shoreham. Moreover, LILCO does not plan to "tow cars or maintain security" as law enforcement functions in the manner envisioned by Contentions 4 and 10. *Id.* at 51.

LILCO claims that the record developed¹⁵ in this proceeding shows that LILCO could implement an uncontrolled evacuation — using no traffic guides, signs, cones or channelization — with an increase in evacuation times of less than 1 hour, 35 minutes under normal conditions and 1 hour, 55 minutes in inclement weather. It stated NUREG-0654 and the NRC regulations regarding adequate protection do not provide specific traffic time estimates that must be met in order to adequately respond to an emergency, but instead require that adequate estimates be developed so that the goal of dose minimization can be achieved. LILCO's evacuation times, including the "uncontrolled" evacuation time estimate, are said to be comparable to estimates for other nuclear power plants. *Id.* at 51-52.

LILCO agrees that an uncontrolled evacuation would not be better planning or result in a better response, but claims it would result in an adequate response in keeping with NUREG-0654. It requests that it be found that for Contentions 1-3 an "uncontrolled" evacuation would adequately protect the public in an emergency at Shoreham. *Id.* at 52.

¹⁵ The utility acknowledged that some of the facts recited in the motion may not be uncontested but since the evidence from both sides is already in the record, the Board can decide the few facts that may be contested without further hearing, so summary disposition is appropriate.

LILCO contends Contentions 4 and 10, dealing with towing and maintaining security at the EOC, EPZ perimeter, or relocation centers, do not include the compelling of any particular behavior by threat or by force and cannot be considered an exercise of police power. LILCO asserts the behavior alleged in the contentions as the exercise of police power is not a part of the LILCO Plan. *Id.* at 53.

The utility claims the dispensing of fuel is not required by NRC regulations and the evacuation time estimates are not affected if this function is not performed. *Id.*

Intervenors assert LILCO's immateriality argument does not comport with 10 C.F.R. § 50.47(a)(1), which requires that adequate measures "can and will be taken" in the event of a radiological emergency. They state that an emergency may present a multitude of possible accident scenarios, making rigid protective actions unsatisfactory; that there must be a flexible capability to respond to whatever events may occur, including adverse traffic conditions. They contend the Board cannot approve a plan where there is no participating entity that has the authority and capability to implement traffic control measures or other actions that are the subject of Contentions 1-4, 9, and 10. Intervenors further contend LILCO is asking for the licensing of Shoreham with no plan or even capability to perform any of the traffic-related functions addressed in the disputed contentions despite the unqualified assertions of the LILCO Plan that those functions would be implemented. Intervenors claim that inherent in LILCO's argument is that in case of a serious accident at Shoreham all LILCO need do is notify the public and the public can take care of itself, and that implementation of traffic control measures is not needed even if it could reduce evacuees' exposure to health-threatening radiation. Intervenors state that for adequate emergency preparedness to exist there must be a dependable response capability so that protective and supportive actions can and will be implemented as necessary. Intervenors' Opposition to LILCO Motion at 101-05.

Intervenors assert the immateriality argument cannot be considered unless a further evidentiary hearing is held because LILCO's claim is essentially factual in nature and the disputed facts are material. *Id.* at 105-09.

NRC Staff in its October 4, 1984 Answer to LILCO's Motion for Summary Disposition, noted that Contentions 1-10 have been construed by the Licensing Board to raise questions of law rather than fact, and that until the filing of the LILCO motion for summary disposition, no party had asserted that the contentions require findings of fact. Staff contends that LILCO's attempt to argue that the contentions can be disposed of on the evidentiary record comes too late. At the very least if LILCO's

approach is to be followed, the other parties should be afforded the opportunity to determine whether they wish to make a focused evidentiary presentation with respect to the contentions before they are resolved. Staff Answer to LILCO Motion at 27-28.

As to LILCO's assertion that the actions specified in Contentions 1-4, 9, and 10 are not required in order to provide reasonable assurance that adequate protective measures can and will be taken in the event of an emergency because an uncontrolled evacuation would result in only slightly greater evacuation times, the Staff contends the assertion fails to provide support for the summary disposition of Contentions 1-10. The Licensing Board currently has under review a specific emergency plan submitted by LILCO. In the event of an emergency, it is LILCO's plan to carry out the traffic functions specified therein, and not to proceed with an uncontrolled evacuation. Accordingly, the Board is not required to determine the hypothetical question of whether, if State and local laws preclude LILCO from performing a traffic control function, a plan involving an uncontrolled evacuation would provide the reasonable assurance required by Commission regulation. *Id.* at 28-29.

In its brief in response to the Board Memorandum and Order of October 22, 1984, LILCO acknowledges that for a few postulated accidents the alleged increase of 1 hour, 35 minutes for an uncontrolled evacuation would change a protective action recommendation to sheltering, when a controlled evacuation might provide greater dose savings than an uncontrolled evacuation. It agrees that the "trail-blazer" signs would facilitate an emergency evacuation and enhance the public health and safety. LILCO's position is that it is not required to guarantee the best possible evacuation, especially when the government officials are against it. LILCO's Brief at 13-14. The utility further contends the obstacles involved are beyond its control, which provides a basis for not requiring the cited activities, should they be found to be required.

Intervenors also filed a brief in response, in which they took the position that the Board is being asked to license Shoreham, where despite the unqualified assertions of the existing LILCO Plan that the traffic and security functions will be performed, the utility has no plan or capability to perform them. Intervenors' Brief at 85.

Staff, in its response to the Board's Memorandum and Order of October 22, 1984, takes the position that the functions specified in Contentions 1-4, 9, and 10, while not specifically listed as regulatory requirements, provide a means of satisfying applicable Commission regulations. Section 50.47(b)(10) of 10 C.F.R. requires, in part, that "a range of protective actions be developed for the plume exposure pathway EPZ" and that "guidelines for the choice of protective actions, consistent with

Federal guidance are developed and in place.” It is the Staff’s position that while none of the functions in question are specifically identified in § 50.47(b)(10), LILCO has identified them as elements in its Plan, and they have been considered in reviewing the adequacy of LILCO’s offsite emergency plan. Staff asserts that if these functions are prohibited under State law, LILCO should submit a revised plan for review before any determination be made as to whether it has satisfied the Commission’s emergency planning regulations. Staff Response at 32-33.

LILCO filed a reply brief consistent with its prior positions.

The Board finds that LILCO’s immateriality argument is without merit. It fails to overcome the fact that Intervenors established that the activities the utility seeks to perform in its Plan, as set forth in Contentions 1-4, 9, and 10, are beyond its authority to do so, and that because of this LILCO cannot satisfy applicable Commission regulations.

Contrary to LILCO’s claims, the New York State Supreme Court held that the activities described in Contentions 4 (removing obstructions from public roadways, including towing private vehicles) and 10 (performing access control at the EOC, the relocation centers, and the EPZ perimeters) involve the unauthorized usurption of police power, as do those functions specified in Contentions 1-3 and 9. We have accepted the New York State Supreme Court interpretation of New York State law, which finds the activities to be unlawful. We found the preemption and realism arguments do nothing to alter that conclusion. Thus, for purposes of deciding the immateriality argument we find that LILCO has no legal authority to perform these activities.

The LILCO Plan, submitted to the Board and under review for these many months, provides for a range of protective actions for the plume exposure pathway EPZ to enable a response to a broad spectrum of accidents. The traffic control procedures specified in Contentions 1-4, 9, and 10, were incorporated in the Plan in order to facilitate traffic flow for an effective evacuation that would meet the regulatory requirements for protective actions in the event of a radiological emergency. *See* § IX for the reasons for the use of traffic guides and for the identification of preferred routes marked by “trail-blazer” signs.

Section 50.47(a)(1) of 10 C.F.R. states that licensing is dependent on the requirement that there is “reasonable assurance that protective measures can and will be taken in the event of a radiological emergency.” Section 50.47(b)(10) of 10 C.F.R. provides, in part, that “[a] range of protective actions be developed for the plume exposure pathway EPZ for emergency workers and the public” and that “[g]uidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place.” Federal guidance provides, in

part, that: the purpose of emergency planning is to achieve dose savings to the general public; absolute protection of the public against all radiation doses cannot be guaranteed and is not required for all possible accident scenarios; the emergency response plans should be framed to cope with a spectrum of accident possibilities including the worst accidents; and that there is no standard time required to be met for evacuation in a radiological emergency.

Although the functions specified in Contentions 1-4, 9, and 10 are not specifically listed as regulatory requirements by the regulations or in NUREG-0654, they are material elements comprising the Plan LILCO submitted for the purpose of satisfying the regulations and guidelines. The abandonment of these elements would result in an uncontrolled evacuation for an EPZ that includes in the land portion 138,500 individuals during the winter and 160,000 in the summer. Although Applicant asserts that evacuation time will only be increased by 1 hour, 35 minutes, under normal weather conditions, which does not make an evacuation impossible, it acknowledges that the resulting uncontrolled evacuation can limit responses so that it might require sheltering as a protective action where a controlled evacuation could provide greater dose savings. LILCO further agrees that elimination of the "trail-blazer" signs would not facilitate an emergency evacuation and enhance the protection of public health and safety.

It is evident that the unplanned evacuation LILCO now proposes will not meet the regulatory requirements as the utility expected to do with its planned evacuation. The range of protective actions available to the public is reduced, as is the means to achieve dose savings. The emergency response plans would be framed to cope with a smaller spectrum of accident possibilities.

In seeking to abandon the performance of the traffic-related functions provided for in the LILCO Plan, which would result in an unplanned response with its attendant consequences, Applicant would be acting contrary to the requirements of §§ 50.47(a)(1), 50.47(b)(10), and elements of the federal guidance set forth above.

The fact that the elimination of the traffic-related functions would not make evacuation impossible is of no assistance to LILCO. That is not the test. Although there is no standard time required for evacuation in an emergency, there should be available and employable means to achieve dose savings for a spectrum of accidents, which abandonment of the traffic functions to be implemented in the original Plan effectively limits.

The fact that the uncontrolled evacuation time estimate may be comparable to estimates for other nuclear plants is without meaning absent a showing of similar situations.

LILCO's claim that even if the functions specified in Contentions 1-4, 9, and 10 are ordinarily required under § 50.47(c)(1), the obstacles to their fulfillment are beyond the Applicant's control and can be eliminated by the State and County, thus providing a basis for not requiring the performance of the traffic-related activities, is a request for relief the Board is not empowered to grant. The Board is a body of limited authority with a responsibility to determine if the emergency response planning is in conformity with existing regulatory standards. It cannot substitute other standards for those set by the Commission, which are binding upon the Board. The Board does not require LILCO "to guarantee the best possible evacuation" as the utility contends, because that is beyond the regulatory requirement. By the same token it cannot lessen the regulatory standard as LILCO would have the Board do. The Board cannot alter the regulatory scheme, nor has it equity jurisdiction, so that it may do what it considers equitable.

The Board has found that the LILCO Plan, which was offered as the one the utility would follow in an emergency, is based on transit control functions that the utility now cannot implement as proposed. The Board can appreciate LILCO's frustration in its attempt to meet the regulatory requirements, and that its opponents can be of assistance in alleviating obstacles but refuse to do so. Despite this, the regulatory standard remains the same, that there be "reasonable assurance that adequate protective measures can and will be taken in a radiological emergency." The standard does not change because of the activities engaged in by the State and County in opposing the Plan or because it is exclusively a utility plan without the participation of State and local governments. The health and safety of the public must be protected regardless of the foregoing.

The Board agrees with Intervenor and finds LILCO cannot lawfully perform the functions set forth in Contentions 1-4, 9, and 10 and because of this obstacle Applicant's Plan cannot and will not be implemented as proposed and fails to comply with the regulatory standards. The immateriality argument is without merit and is rejected.

LILCO never raised the immateriality argument in connection with Contentions (5) activating sirens and directing the broadcasting of emergency broadcast system messages; (6) making decisions and recommendations to the public concerning protective actions; (7) making decisions and recommendations to the public concerning protective actions for the ingestion exposure pathway; and (8) making decisions and

recommendations to the public concerning recovery and reentry. It is evident Applicant recognized that absent approval of these activities on the preemption or realism bases, its exclusive utility plan for these important functions could not meet the regulatory requirements. The applicable requirements include 10 C.F.R. §§ 50.47(b)(5), (6), (10), (13), and (c)(2).

XVI.5. Conclusion on Contentions 1-10

The Board finds that the Applicant cannot prevail on its motion for summary disposition because its preemption, realism, and immateriality arguments are without merit and cannot overcome the conclusion that the activities it seeks to perform as specified in Contentions 1-10 are unlawful. We further find that because of Applicant's inability to perform these functions the LILCO Plan cannot and will not be implemented as required by regulation. As a consequence of the foregoing the Board finds for Intervenors on Contentions 1-10.

From a practical standpoint, the foregoing findings leave LILCO without an implementable, comprehensive, and effective emergency response plan for Shoreham. LILCO noted in its renewed motion for summary disposition that "unless the New York State court decision is overriden on federal-law grounds, LILCO will not be able, by itself, to implement its emergency plan regardless of its substantive merits." LILCO Renewed Motion at 6. The Board would consider entertaining a request by LILCO to submit another revised plan to be based on a probative evidentiary record to which the other parties can fully respond.

Conclusion

The foregoing sets forth the Board's findings of fact and conclusions of law made in this Partial Initial Decision. The concluding segment of the Initial Decision will incorporate these findings of fact and conclusions of law in reaching the ultimate decision as to whether "there is rea-

sonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency” at Shoreham.

**ATOMIC SAFETY AND
LICENSING BOARD**

**Morton B. Margulies, Chairman
ADMINISTRATIVE LAW JUDGE**

**Dr. Jerry R. Kline
ADMINISTRATIVE JUDGE**

**Mr. Frederick J. Shon
ADMINISTRATIVE JUDGE**

**Dated at Bethesda, Maryland,
this 17th day of April 1985.**

APPENDIX A
LISTS OF WITNESSES

LILCO

LILCO presented the following witnesses:

Witness	Position	Tr. Location
Harry N. Babb	Chairman and Associate Professor, Criminal Justice Department, State University of New York, Farmingdale	4068, Tab 1
Steven Barnett	Vice President of the Cultural Analysis Group at Planmetrics, Inc., New York, New York	4068, Tab 2
Gary J. Berger	Director of Corporate Training and Development, American Financial Corporation and its subsidiary, American Savings & Loan Association	4068, Tab 3
Frank A. Cipriani	President, State University of New York, Farmingdale	14,922
Carol A. Clawson	Associate Director, Public Affairs, LILCO	4068, Tab 4
Matthew C. Cordaro	Vice President of Engineering, LILCO	4068, Tab 5
Charles A. Daverio	Supervisor, Emergency Planning and Regulatory Services, LILCO	4068, Tab 6
Richard R. Doremus	Superintendent, Shoreham-Wading River Central School District, Shoreham, Long Island, New York	4068, Tab 7
Russell R. Dynes	Professor and Chairman, Department of Sociology, University of Delaware	831

Witness	Position	Tr. Location
David Glaser	Executive Vice President, Jewish Institute for Geriatric Care, New Hyde Park, New York	4068, Tab 8
James Hines	District Superintendent of Schools for the Second Supervisory District of Suffolk County	15,003
Norman A. Hobbs, Jr.	Emergency Planner, HMM Associates, Concord, Massachusetts	4068, Tab 9
William G. Johnson	President, Bill Johnson & Associates, a polling and survey research firm, Fleetwood, New York	831
Jay R. Kessler	Vice President of Gas Operations, LILCO	10,194
Philip A. Lichtenfels	Consultant, Human Resource Systems, North Carolina	13,465
Edward B. Lieberman	Vice President, KLD Associates, Huntington Station, New York	4068, Tab 10
Michael L. Miele	Radiation Protection Section Supervisor, LILCO	4068, Tab 11
Dennis S. Mileti	Associate Professor, Department of Sociology, Colorado State University, Fort Collins	4068, Tab 12
Sydney W. Porter, Jr.	Certified Health Physicist, President Porter Consultants, Inc., Ardmore, Pennsylvania	4068, Tab 13
Frank M. Rasbury	Executive Director, Nassau County Chapter, American Red Cross	14,707
William F. Renz	Offsite Emergency Preparedness Coordinator, Nuclear Operations Support Preparedness/Manager of the Technical Division of LERIO, LILCO	4068, Tab 14
David N. Richardson	Vice President, Yankelovich, Skelly and White, Inc., New York, New York	1470

Witness	Position	Tr. Location
John A. Rigert	Manager, Nuclear Systems Engineering Division, Nuclear Engineering Department, LILCO	15,434
Elaine D. Robinson	Special Assignment, LERIO team leader for external organizations, LILCO	4068, Tab 15
John A. Scalice	Operations Manager, Shoreham Nuclear Power Station, Nuclear Engineering Department, LILCO	15,434
William G. Schiffmacher	Manager, Electrical Engineering Department, LILCO	4068, Tab 16
John H. Sorensen	Research Associate, Oak Ridge National Laboratory, Oak Ridge, Tennessee	4068, Tab 17
Elias P. Stergakos	Radiation Protection Engineer, LILCO	15,434
Edward Thompson	Director of Disaster Services, American Red Cross, Mineola, New York	14,977
Ronald A. Varley	Senior Engineer, Emergency Planning Consultant, Impell Corporation, Melville, New York	4068, Tab 18
Richard J. Watts	Supervising Engineer, Radiological Services Section, Impell Corporation, Melville, New York	4068, Tab 19
John A. Weismantle	Manager, LERIO, LILCO	4068, Tab 20
Andrew W. Wofford	Vice President, Purchasing and Stores, LILCO	4068, Tab 21
Jay Okun Yedvab	Executive Director, Bergen Pines County Hospital, Paramus, New Jersey	4068, Tab 22

SUFFOLK COUNTY

Suffolk County presented the following witnesses:

Witness	Position	Tr. Location
Stephen J. Cole	Professor of Sociology, State University of New York at Stony Brook; President, Social Data Analysts, Inc.	2792
Peter F. Cosgrove	Deputy Inspector, Suffolk County Police Department; Executive Director, Third Precinct	8407
Donald J. Dilworth	Commissioner of Suffolk County Police Department, April 5, 1977 to September 13, 1983	1213
Kai T. Erikson	Professor of Sociology and American Studies, Yale University; Editor, Yale Review	1455
John L. Fakler	Commanding Officer of Recruit Training and Media Services (Lieutenant), Suffolk County Police Academy, Westhampton, New York	8407
Fred C. Finlayson	Principal Associate of F.C. Finlayson & Associates, Cerritos, California	12,320
David Harris	Commissioner of Suffolk County Department of Health Services	1218
Philip B. Herr	Associate Professor of City Planning, Massachusetts Institute of Technology, Department of Urban Studies Planning	2909
Donald A. Hoffman	Sergeant, Marine Bureau, Suffolk County Police Department	5522
George Jeffers	Superintendent, Middle Country Central School District, Long Island, New York	3087

Witness	Position	Tr. Location
James H. Johnson, Jr.	Assistant Professor of Geography at the University of California at Los Angeles	1455
Michael Lipsky	Professor, Political Science, Massachusetts Institute of Technology	10,727
Martin Mayer	Deputy Director of Public Health, Suffolk County	9574
Philip McGuire	Commanding Officer, Special Patrol Bureau, Suffolk County Police Department	2260
Edwin J. Michel	Executive Officer (Captain), Highway Patrol Bureau, Suffolk County Police Department	2260
Gregory C. Minor	Vice President, MHB Technical Associates, San Jose, California	12,320
Joseph L. Monteith	Inspector, Suffolk County Police Department	2260
Nick J. Muto	Superintendent, Middle Island Central School District, Long Island	3087
David J. Olson	Professor and Chairman, Department of Political Science, University of Washington, Seattle	10,727
Robert W. Petrilak	Vice President, Mount Sinai Union Free School District Board of Education, Long Island	3087
Bruce William Pigozzi	Assistant Professor, Geography, Michigan State University, East Lansing	2909
Peter A. Polk	Civil Engineer (transportation planning), Associate Vice President of PRC Engineering, a division of Planning Research Corporation, McLean, Virginia	2909
Arthur H. Purcell	Executive Director, Resource Policy Institute, Washington, D.C.	10,727

Witness	Position	Tr. Location
Edward P. Radford	Director, Center for Environmental Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pennsylvania	12,320
James J. Read	Police Officer, Marine Bureau, Suffolk County Police Department	5522
Kenneth J. Regensburg	Executive Officer, Suffolk County Police Department	4442
Richard C. Roberts	Inspector, Suffolk County Police Department	2260
Anthony C. Rossi	Transportation Director, Middle Country Schools, Long Island	3084
Susan C. Saegert	Associate Professor, Environmental Psychology Program, the Graduate School and University Center of City University of New York	2059
J. Thomas Smith	Transportation Coordinator, Middle Island Central School District, Long Island	3085
Robert A. Snow	Commanding Officer (Deputy Inspector) Communications and Records Bureau, Suffolk County Police Department	4442
Vincent R. Stile	Police Officer, Communications Technical Services Unit, Suffolk County Police Department	4442
Michael J. Turano, Jr.	Deputy Inspector, Patrol Division, Suffolk County Police Department	2260
Andrea Tyree	Associate Professor of Sociology, State University of New York at Stony Brook	3907
Donald J. Ziegler	Assistant Professor of Geography, Old Dominion University, Norfolk, Virginia	2789

NEW YORK STATE

New York State presented the following witnesses:

Witness	Position	Tr. Location
William J. Acquario	Bureau Director, Transit Management Assistance Bureau, State Department of Transportation	7854
Richard D. Albertin	Associate Transportation Analyst, Transit Division, New York State Department of Transportation	3695
Foster J. Beach, III	Licensed Professional Engineer in New York; Supervisor, Regional Transportation Planning and Development III, New York State Department of Transportation	3695
John Coyne	Assistant Vice President, Administration Services, State University of New York, Farmingdale	15,093
Charles V. Failla	Supervising Motor Vehicle Inspector, New York State Department of Transportation	9948
Thomas D. Gibbons	Regional Highway Maintenance Engineer III, New York State Department of Transportation	7005
David T. Hartgen	Director, Transportation Statistics and Analysis, New York State Department of Transportation	3695
Robert G. Knighton	Associate Transportation Analyst, Transit Program and Evaluation Bureau, New York State Department of Transportation	3695

NRC STAFF

The NRC Staff presented the following witnesses:

Witness	Position	Tr. Location
Robert A. Benedict	Senior Management Systems Engineer, License Qualifications Board, Division of Human Factors Safety, Office of Nuclear Reactor Regulation, NRC	15,652
Marvin W. Hodges	Section Leader, Reactor Systems Branch, Division of Systems Integration, NRC	15,652
Theodore R. Quay	Section Leader, Action Evaluation Branch, Division of Systems Integration, NRC	15,655
Sheldon A. Schwartz	Deputy Director, Division of Emergency Preparedness and Engineering Response, NRC	15,139
John R. Sears	Senior Reactor Safety Engineer, Division of Emergency Preparedness and Engineering Response, Office of Inspection and Enforcement, NRC	4709
Thomas Urbanik	Professional Engineer, Texas and Michigan; Engineer, Texas Transportation Institute of the Texas A&M University, College Station, Texas	3430

FEMA

FEMA presented the following witnesses:

Witness	Position	Tr. Location
Thomas E. Baldwin	Senior Demographer/Economist, Environmental Systems Engineer, Energy and Environmental Systems Division, Argonne National Laboratory, Garden City, New York	12,174
Joseph H. Keller	Scientist with Allied Chemical Corp., Exxon Nuclear Idaho, Inc. and Westinghouse Idaho Nuclear Company, Inc.	12,174
Roger B. Kowieski	Chairman, Regional Assistance Committee, National and Technological Hazards Division, Region II, FEMA	12,174
Philip H. McIntire	Chief, Natural and Technological Hazards Division, FEMA	12,174

APPENDIX B

EXHIBITS BY PARTY AND NUMBER

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page*
LILCO EXHIBITS			
LILCO Exh. 1	Long Island Lighting Company, Local Offsite Radiological Emergency Response Plan ("Transition Plan"), Rev. 2, four volumes, updated through 12/06/83	835	1204 (Not bound in)
LILCO Exh. 2	Suffolk County Police Department letter dated March 17, 1982, from Dilworth to Meunkle	1284	1284 (Bound in)
LILCO Exh. 3	Selected pages from the Ronald Perry article on community emergency planning entitled "Incentives for Evacuation in Natural Disaster: Research Based Community Emergency Planning"	1329	1329 (Bound in)

*Explanation of terms used in this column:

- Bound in — Admitted into evidence and included in the transcript following this page.
- Not bound in — Admitted into evidence at this page but not included in the transcript.
- Denied — Denied admission at this page.
- Withdrawn — Withdrawn by moving party at this page.
- Not offered — Not offered into evidence.

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 4	Selected pages from article entitled "Disasters," by Charles E. Fritz, appearing in the International Encyclopedia of the Social Sciences, dated 1968	1334	1334 (Bound in)
LILCO Exh. 5	Document entitled "Attitudes Towards Evacuation: Reactions of Long Island Residents to a Possible Accident at the Shoreham Nuclear Power Plant," June 1982, prepared for Suffolk County by Social Data Analysts, Inc.	2847	2849 (Denied)
LILCO Exh. 6	Page 4B-2 of the 1978 version of the DOT Manual on Uniform Traffic Control Devices (published by the Department of Transportation Federal Highway Administration)	3007	3010 (Bound in)
LILCO Exh. 7	Page 158 of <i>Highway Capacity Manual, 1965</i> (published by the Highway Research Board, Special Report 87)	3223	3223 (Bound in)
LILCO Exh. 8	12/22/83 Computer run entitled ".1 x '85 Summer LILCO EPZ with Shadows"	3265	3271 (Bound in)
LILCO Exh. 9	Document prepared by David Solomon entitled "Accidents on Main Rural Highways Related to Speed, Driver and Vehicle," prepared for the U.S. Department of Commerce, Bureau of Public Roads, dated July 1964	3280	3316 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 10	DOT Memorandum from Albertin (NYSDOT) to Dillenbeck (DPC), dated 9/15/82, entitled "Review of Shoreham Nuclear Power Station Emergency Response Plan"	3700	3702 (Bound in)
LILCO Exh. 11	Document entitled "Transportation Research Circular," dated January 1980, prepared by the Transportation Research Board, National Academy of Sciences	3729	3733 (Bound in)
LILCO Exh. 12	Letter dated January 11, 1982, from Meunkle, unaddressed	4487	4572 (Bound in)
LILCO Exh. 13	Letter dated January 15, 1982, to Meunkle from Regensburg	4489	4572 (Bound in)
LILCO Exh. 14	Letter dated January 11, 1982, to Koppelman from Meunkle	4499	4572 (Bound in)
LILCO Exh. 15	Letter dated January 19, 1982, to Meunkle from Stile	4499	4572 (Bound in)
LILCO Exh. 16	Memo dated January 19, 1982, to McHaffie from Stile	4499	4572 (Bound in)
LILCO Exh. 17	Letter dated March 1, 1982, to Treder from Meunkle	4500	4572 (Bound in)
LILCO Exh. 18	Memo dated March 11, 1982, to Treder from Parrella	4500	4572 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 19	Letter dated March 17, 1982, to Meunkle from Dilworth	4501	4567 (Withdrawn)
LILCO Exh. 20	Memo dated March 16, 1982, to Erikson from Parrella	4501	4572 (Denied)
LILCO Exh. 21	The Draft Suffolk County Radiological Emergency Response Plan	4557	4568 (Not offered)
LILCO Exh. 22	Memorandum dated January 19, 1982, from Vincent R. Stile to David J. McHaffie	4626	4629 (Bound in)
LILCO Exh. 23	Three pages from the deposition of James Biggers, dated September 23, 1983	4633	4633 (Bound in)
LILCO Exh. 24	Three pages from the deposition of Ronald Brady, dated September 22, 1983	4633	4633 (Bound in)
LILCO Exh. 25	Memo to Richard W. Krimm from Edward L. Jordan, dated May 9, 1983, on the subject of "NRC Position Concerning 15 Minutes Public Notification Capability"	4812	4816 (Bound in)
LILCO Exh. 26	Excerpts of Depositions of Kenneth J. Regensburg, Robert A. Snow, and Vincent Stile, dated September 8, 1983	6259	(Not offered)
LILCO Exh. 27	Document which matches the bus company storage locations with staging areas and transfer points	7275	7313 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exhs. 28-30	_____		[Never identified or received in evidence]
LILCO Exh. 31	Issue of "Keeping Current" from Spring 1984	7969	7969 (Bound in)
LILCO Exh. 32	Tabular document, headed "Data Sheet, Long Island Lighting Company," and noted "Prepared by RJP"	8137	8139 (Bound in)
LILCO Exh. 33	Long map of Census Tracts of 1980, prepared by the Long Island Regional Planning Board	8137	8139 (Bound in)
LILCO Exh. 34	Two-page document which has five numbered items, the first of which is labeled "Bus Requirements for Households Without Cars"	8152	8279 (Bound in)
LILCO Exh. 35	Document headed "Derived from Herr Analysis" which is a small matrix with three columns titled "Households," "Population per Household," and "Population"	8213	8279 (Bound in)
LILCO Exh. 36	Document entitled "Estimate of Transit Requirements Using 1980 Census Data, Updated to 1985"	8377	8377 (Bound in)
LILCO Exh. 37	One-page document entitled "Table 2.3.2-1, Mean Values of Temperature, Precipitation, Snow, Relative Humidity, Heavy Fog, Wind Speed and Prevailing Wind Direction"	8980	8983 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 38	Letter dated March 27, 1984, to the Administrator of the Sunrest Health Facilities, Inc.	9824	10,125 (Not bound in)
LILCO Exh. 39	Letter dated May 29, 1984, to a Sister at our Lady of Perpetual Help Convent	9824	10,125 (Not bound in)
LILCO Exh. 40	Letter dated April 9, 1984, addressed to an administrator of the Ridge Rest Home	9824	10,125 (Not bound in)
LILCO Exh. 41	Letter dated April 6, 1984, to the Administrator of the Millcrest Rest Home	9824	10,125 (Not bound in)
LILCO Exh. 42	Letter dated March 26, 1984, to the Administrator for the Woodhaven Home for Adults	9824	10,125 (Not bound in)
LILCO Exh. 43	Letter dated April 18, 1984, to an Administrator at the Oak Hollow Nursing Center (including two attachments — (1) a Draft Plan of the Oak Hollow Nursing Center and (2) a Draft Plan for the Crest Hall Health-Related Facility)	9824	10,125 (Bound in)
LILCO Exh. 44	Letter dated April 12, 1984, to the Administrator of the Woodhaven Nursing Home	9824	10,125 (Not bound in)
LILCO Exh. 45	Letter dated May 17, 1984, to an Administrator of Mather Memorial Hospital	9824	10,125 (Not bound in)
LILCO Exh. 46	Letter addressed to the Executive Vice President of Central Suffolk Hospital, dated May 31, 1984	9824	10,125 (Not bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 47	Letter addressed to an Assistant Vice President at St. Charles Hospital, dated May 30, 1984	9824	10,125 (Not bound in)
LILCO Exh. 48	Four letters: (1) letter from Stout and Wendrovsky to Mancuso, dated 3/9/84; (2) letter from Mancuso to Axelrod, dated 4/18/84; (3) letter from Wendrovsky to Mancuso, dated 10/3/83; and (4) letter from Mancuso to Wendrovsky, dated 10/28/83	9945	9945 (Bound in)
LILCO Exh. 49	Mc-19 sheet which records an operator's vehicle by number, year, chassis, body, type of service, capacity in adults and children, and the vehicle serial number	9957	10,010 (Not offered)
LILCO Exh. 50	Short excerpt from <i>Theft of the City</i> , by Professor David J. Olson	10,730	10,883 (Not bound in)
LILCO Exh. 51	Series of news clippings from newspaper articles	10,730	10,888 (Denied)
LILCO Exh. 52	The Consolidated Laws of New York	10,730	10,889 (Denied)
LILCO Exh. 53	Excerpt from the deposition of Dr. Olson	10,730	10,889 (Withdrawn)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 54	Article entitled "Disaster Planning: Small and Large — Past, Present and Future," by E.L. Quarentelli (Disaster Research Center, OSU)	10,730	10,902 (Bound in)
LILCO Exh. 55	Paper entitled "Crisis Evacuation During the Three Mile Island Nuclear Accident: The TMI Population Registry" by Marilyn K. Goldhaber, M.P.H., and James E. Lehman, M.S., dated November 1982	10,730	10,902 (Bound in)
LILCO Exh. 56	Final Report entitled "The Implications of Natural Hazard Evacuation Warning Studies for Crisis Relocation Planning," by Ronald W. Perry, Michael K. Lindell, and Marjorie K. Greene, dated February 1980	10,730	10,902 (Bound in)
LILCO Exh. 57	Article from the August 1968 <i>Journal of Marriage and the Family</i> entitled "Families in Disaster: Reactions and Relatives," by Thomas E. Drabek and Keith S. Boggs	10,730	10,902 (Bound in)
LILCO Exh. 58	Article entitled "When Disaster Strikes," by Thomas E. Drabek and John S. Stephenson, III	10,730	10,902 (Bound in)
LILCO Exh. 59	Article entitled "Things Fall Apart: Problems of Governance and Social Control," by Michael Lipsky	10,730	10,902 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 60	Article from the March 1983 journal <i>Environment and Behavior</i> entitled "Educational Programs and Human Response to Natural Hazards," by John H. Sims and Duane D. Baumann	10,730	10,902 (Bound in)
LILCO Exh. 61	Article from the 1963 <i>Journal of Abnormal and Social Psychology</i> entitled "Communicator Credibility and Communication Discrepancy as Determinants of Opinion Change," by Elliot Aronson, Judith A. Turner and J. Merrill Carlsmith	10,730	10,902 (Bound in)
LILCO Exh. 62	Study entitled "READY OR NOT: Public Preparedness for an Accident at Indian Point," a survey of Westchester County residents living within 10 miles of the Indian Point Nuclear Power Plants, by Richard J. Altschuler with an introduction of Joan Holt	10,730	10,902 (Bound in)
LILCO Exh. 63	Report submitted to the TMI Advisory Panel on Health-Related Studies entitled "Health-Related Behavioral Impact of the Three Mile Island Nuclear Incident," by Peter S. Houts, Ph.D., dated November 21, 1980	10,730	10,902 (Bound in)
LILCO Exh. 64	Report entitled "SHOREHAM NUCLEAR POWER PLANT," prepared for <i>Newsday</i> by Social Data Analysts, Inc., dated February 24, 1983	10,730	10,902 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 65	Report entitled "SHOREHAM NUCLEAR POWER PLANT, WAVE II," prepared for <i>Newsday</i> by Social Data Analysts, Inc., dated October 4, 1983	10,730	10,902 (Bound in)
LILCO Exh. 66	Two editions of a document labeled "County Comments" which purports on its face to be by County Executive Peter F. Cohalan	11,030	(Not offered)
LILCO Exh. 67	Letter dated May 30, 1984, from Gerald L. Freeborn, Deputy Commissioner for Elementary, Secondary and Continuing Education to two district superintendents	11,057	(Not offered)
LILCO Exh. 68	Memorandum from Brian Walsh to district school superintendents concerning disaster plan for early school dismissal in New York State	13,123	(Not offered)
LILCO Exh. 69	5/31/84 letter from Hines to Zahnleuter concerning an agreement with the Red Cross to provide shelter	15,020	15,029 (Bound in)
LILCO Exh. 70	Letter dated 10/07/81 from Meunkle to Hines concerning the use of the BOCES campus as a relocation center	15,026	15,029 (Bound in)
LILCO Exh. 71	8/3/84 Affidavit of Matthew C. Cordaro	15,431	15,439 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
LILCO Exh. 72	8/3/84 Affidavit of Elias P. Stergakos and John A. Rigert with one attachment	15,431	15,439 (Bound in)
LILCO Exh. 73	8/3/84 Affidavit of John A. Scalice with two attachments	15,432	15,439 (Bound in)
LILCO Exh. 74	Curriculum Vitae for John A. Scalice	15,432	15,439 (Bound in)
LILCO Exh. 75	Curriculum Vitae for Dr. Elias P. Stergakos	15,432	15,439 (Bound in)
LILCO Exh. 76	Curriculum Vitae for John A. Rigert with one attachment	15,432	15,439 (Bound in)
LILCO Exh. 77	Excerpt from Shoreham Technical Specifications Chapter 3/4.0 Applicability, Limiting Condition for Operation	15,432	15,446 (Bound in)
LILCO Exh. 78	Document entitled "Non-Union Manpower Available to Bring Plant to Cold Shutdown and Maintain It in That Condition"	15,433	15,446 (Bound in)
LILCO Exh. 79	The insert pages used to transform Revision 2 to Revision 3	15,590	15,590 (Not bound in)
LILCO Exh. 80	Revision 3, LILCO Plan	15,590	15,590 (Not bound in)
LILCO Exh. 81	Calculations re: Fission Product Inventories During Cold Shutdown Following 100% Plant Operation and 5% Power	15,631	15,642 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
MISCELLANEOUS LILCO LAY-IN'S			
04/24/84	Attachment 22.H to LILCO testimony on Contention 24 (Letters of Agreement)	6467	6467 (Bound in)
SUFFOLK COUNTY EXHIBITS			
SC Exh. 1	“Structural Factors in the Minimization of Role Conflict: A Reexamination of the Significance of Multiple Group Membership in Disasters, Preliminary Paper 49,” two-page document published by the Disaster Research Center (DRC) Ohio State University	1032	1131 (Bound in)
SC Exh. 2	Figure 2 of P.S. Slovic, S. Lichtenstein, and B. Fischhoff article entitled “Characterizing Perceived Risks”	1741	1750 (Bound in)
SC Exh. 3	Study by John Sorensen and Brad Richardson entitled “Evacuation Behavior at TMI: Review and Reexamination”	1839	1839 (Bound in)
SC Exh. 4	Organizational Chart — Suffolk County Police Department	2257	2258 (Bound in)
SC Exh. 5	National Center for Telephone Research (NCTR) Survey	2603	2606 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 6	01/09/84 Computer Run entitled ".1 x '85 Summer LILCO EPZ with Shadows"	2904	2909 (Bound in)
SC Exh. 7	01/09/84 Computer Run entitled ".1 x '85 Winter LILCO EPZ with Shadows"	2905	2909 (Bound in)
SC Exh. 8	SCPD Diagram	3332	3340 (Bound in)
SC Exh. 9	SCPD Field Report, PDCS 1053	3351	3353 (Denied)
SC Exh. 10	Letter from Urbanik to Sears, dated 12/02/82	3508	3515 (Bound in)
SC Exh. 11	Urbanik notes, two-page document dated 07/28/82 with the heading "Shoreham 7-28-82 Cloudy"	3528	3531 (Bound in)
SC Exh. 12	"Storm Conditions of Readiness" Manual, prepared by the Long Island Lighting Company Customer Service Department	4284	4294 (Bound in)
SC Exh. 13	Two-page letter, dated February 22, 1984, to Mr. Chester Lenda, c/o LILCO, from Neal W. Saiff, Systems Operations Manager, Radiofone Corporation	4365	4373 (Bound in)
SC Exh. 14	Document entitled "Standard Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants," prepared for FEMA, and dated September 1983	5085	5100 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 15	Document entitled "Drill Surveys from October-November 1983"	5676	5707 (Bound in)
SC Exh. 16	Letter to Captain E.W. Weigand (United States Coast Guard) from William F. Renz, dated February 23, 1984	5857	5864 (Bound in)
SC Exh. 17	Six-page document, dated January 20, 1984, authored by Norman Hobbs at the conclusion of the observation of a drill, and addressed to William Renz	5883	6058 (Bound in)
SC Exh. 18	Thirteen-page document entitled "Drill Surveys from October-November 1983." This document is labeled "3/14 Discovery Requests 4.C. and 4.D."	5917	5923 (Denied)
SC Exh. 19	Thirty-four-page document detailing drill scenario critique questionnaires	5995	6021 (Denied)
SC Exh. 20	Ten-page letter provided by LILCO counsel to the County, dated November 1, 1983	6174	(Not offered)
SC Exh. 21	Draft of revision to Attachment 12, in the form of a Table, reflecting the current status of vehicle stock and where these vehicles are located	6702	(Not offered)
SC Exh. 22.A thru G	Aerial photographs of the areas described in Attachment 4 of LILCO's testimony on Contention 66 (Highways and Roads)	6835	6847 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 23	Ninety-three-page document whose first page reads "Median Reporting Times," with the subheading of "Brentwood"	7098	7244 (Bound in)
SC Exh. 24	Document with the heading "January 28th Data Sheet," received during discovery. This document is a summary sheet for the three different staging areas	7144	7244 (Bound in)
SC Exh. 25	Summary status sheet of contracted ambulance/ambulette response times to staging areas (with cover letter from J.M. Livolsi to Rosemary LeGoff, dated 2/17/84)	7200	7244 (Bound in)
SC Exh. 26	Computer printout (received during discovery) which is a callout list for dosimetry recordkeepers and for road crews	7219	7243 (Denied)
SC Exh. 27	Computer printout (received during discovery) which is a callout list for traffic guides	7219	7243 (Denied)
SC Exh. 28	Master callout list of emergency response personnel (Computer printout)	7243	7244 (Not bound in)
SC Exh. 29	Version of a Table that distributes bus company locations by staging area and also indicates numbers of buses at each bus company	7273	7314 (Not offered)
SC Exh. 30	Matrix showing distance and time between various points	7312	7312 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 31	LILCO letter dated February 1, 1984, to person in Ridge, New York, who might require special assistance	7583	7616 (Bound in)
SC Exh. 32	LILCO letter dated February 1, 1984, to person in Sound Beach, New York, who might require special assistance	7583	7616 (Bound in)
SC Exh. 33	LILCO letter dated February 9, 1984, to person in Shoreham, New York, who might require special assistance	7585	7616 (Bound in)
SC Exh. 34	Form letter entitled "FOR HEARING IMPAIRED WITH OWN TRANSPORTATION"	7590	7616 (Bound in)
SC Exh. 35	Form letter entitled "FOR HEARING IMPAIRED WHO ALSO REQUIRE SPECIAL TRANSPORTATION"	7590	7616 (Bound in)
SC Exh. 36	"Bi-County Ambulance and Ambulette Transportation Service, Inc.": Information provided by various ambulance companies regarding year, make, vehicle I.D. number, plate number, type, and number of passengers of every ambulance or ambulette provided by each company	7783	7841 (Bound in)
SC Exh. 37	National Center for Telephone Research questionnaire	8004	8122 (Bound in)
SC Exh. 38	Table showing the distribution of calls attempted in the NCTR survey	8005	8122 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 39	Memorandum to file 166 from G.F. King regarding the EPZ O-D survey	8005	8122 (Bound in)
SC Exh. 40	_____		[Never identified or received in evidence]
SC Exh. 41	Study examining the relationship between the mobilization activities associated with bus drivers and the evacuation activities as indicated by this schedule	8093	8122 (Bound in)
SC Exh. 42	Six pages of tables, the first page of which is entitled "AUTO NON-RETURN ANALYSIS," Shoreham Nuclear Power Station	8483	8522 (Bound in)
SC Exh. 43	Graph entitled "Bus Demand and Capacity"	8483	8522 (Bound in)
SC Exh. 44	Document drawn from the final draft of Appendix E of the Emergency Planning Zone Evacuation Time Study and entitled "New Hampshire Radiological Emergency Response Plan, Volume I"	8555	(Not offered)
SC Exh. 45	Three-page document entitled "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," dated September 1975, revised June 1980	8853	(Not offered)
SC Exh. 46	_____		[Never identified or received in evidence]

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 47	Resolution adopted by the Shoreham-Wading River Central School District Board of Education, dated April 9, 1984	9496	9560 (Bound in)
SC Exh. 48	Memo from Doremus to all Faculty and Staff of the Board of Education, dated April 12, 1984	9499	9560 (Bound in)
SC Exh. 49	Memo from Doremus to the Faculty and Staff of the Board of Education, dated March 17, 1983, addressing the question: "What If Shoreham Doesn't Open?"	9505	(Bound in)
SC Exh. 50	Petition to Intervene, filed on behalf of the Shoreham-Wading River School District in Civil Action No. 83-4966, dated February 27, 1984	9505	9560 (Bound in)
SC Exh. 51	Document entitled "Spring 1977 Parent Survey — Shoreham-Wading River Central School District," dated June 1, 1977, prepared by Bridge and Wheeler of Teacher's College, Columbia University	9539	9560 (Bound in)
SC Exh. 52	Survey dated December 20, 1982, to Albert Prodell, Chairman, Emergency Evacuation Committee, from Robert J. Sokel	9539	9560 (Not offered)
SC Exh. 53	Document entitled "Bus Driver Survey"	9539	9560 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 54	Six-page document entitled "Emergency Evacuation Center Survey"	9539	9560 (Bound in)
SC Exh. 55	Document headed Social Systems Analysts and entitled "LILCO: THE CUSTOMER AND THE COMPANY," a detailed report dated July 1979	9695	9757 (Bound in)
SC Exh. 56	Document entitled "October 1983 Survey, Customer Attitudes Towards Nuclear Energy"	9731	9757 (Bound in)
SC Exh. 57	Document entitled "Interview I — June 10, 1983, Moderator: Daisy"	9759	9760 (Bound in)
SC Exh. 58	Three-page letter to Charles Daverio from Kenneth Krasner, dated February 23, 1984, transmitting a summary critique of the February 28 drill	10,297	10,302 (Denied)
SC Exh. 59	Excerpts from the second edition of Robert F. Mager's book entitled <i>Preparing Instructional Objectives</i>	11,326	11,337 (Bound in)
SC Exh. 60	Three-page memo dated May 1, 1984, to Dr. Cordaro from Mr. Weismantle	11,426	(Not offered)
SC Exh. 61	Two-page letter dated March 23, 1984, from Don Irwin to Tip Letsche	11,435	(Not offered)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 62	Four-page document labeled Rev. 1, 3/22/83 in the bottom right-hand corner, wherein LERO outlines to the Personnel Department the types of tasks that people within LERO might have to perform, the approximate number of people they might need, and the background of some of the emergency planning people	11,441	(Not offered)
SC Exh. 63	February 8, 1984 report from Mr. Krasner of IMPELL to Mr. Daverio which is a written critique supplied to LILCO for the February 8 training exercise	11,504	11,557 (Bound in at 11,561)
SC Exh. 64	February 15, 1984 report from Mr. Krasner of IMPELL to Mr. Daverio, which sets forth a number of deficiencies in the performance of personnel during the February 15, 1984 training exercise	11,504	11,557 (Bound in at 11,561)
SC Exh. 65	Numerous drill/exercise critique/evaluation forms, the first page of which is dated November 1983. These documents were provided to the County by counsel for LILCO on June 1 pursuant to the Board's Order requiring LILCO to give the County completed drill and exercise critique/evaluation forms.	11,504	11,561 (Denied)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 66	Three pages of a manual entitled "Diagnostic and Statistical Manual of Mental Disorders" (Third Edition)	11,657	11,662 (Bound in)
SC Exh. 67	Drill exercise critique/evaluation forms which go to the issue of procedures not being followed by drill and exercise participants, procedures not being revised and being kept up to date, and procedures being incomplete	11,978	(Not offered)*
SC Exh. 68	Documents relating to the absence of sufficient personnel at the drills and exercises and the fact that personnel not trained before the exercise and drill sometimes substituted to perform other emergency functions. These documents also address the need for additional staffing of certain emergency positions within LERO	11,978	(Not offered)
SC Exh. 69	Documents addressing the offer of proof made regarding inadequate briefings being given to drill and exercise participants prior to the drill or exercise being conducted	11,978	(Not offered)
SC Exh. 70	Documents referencing inadequate briefings given to the observers and controllers of the drills and exercises	11,978	(Not offered)

*Following the Board's ruling denying SC Exh. 65, Suffolk County's Exhibits 67-74 were offered by the County in an Offer of Proof at Transcript page 11,975.

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 71	Documents regarding problems with communications aspects of the LERO training program	11,978	(Not offered)
SC Exh. 72	Documents referencing problems which in particular concern radio equipment and the use of such equipment during the drills and exercises, including the lack of an appropriate number of radios, inadequate transmissions, and the failure of equipment	11,978	(Not offered)
SC Exh. 73	One of two separate groupings of documents which are comprised of the comments and evaluations completed by observers and controllers during LILCO drills and exercises regarding problems with participants not checking their dosimeters while performing in the drills and exercises	11,978	(Not offered)
SC Exh. 74	The second of two separate groupings of documents which are comprised of the comments and evaluations completed by observers and controllers during LILCO drills and exercises regarding problems with the emergency worker decontamination facility	11,978	(Not offered)
SC Exh. 75	Local Emergency Response Organization Traffic Guide Training Record	11,995	12,042 (Bound in)
SC Exh. 76	RAC Review document dated 9/15/83	12,641	12,957 (Not offered)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 77	RAC Review document dated 10/4/83 from Petrone to FEMA, Region II	12,641	12,957 (Not offered)
SC Exh. 78	RAC Review document dated 11/18/83 from Kowieski to McIntire	12,641	12,957 (Not offered)
SC Exh. 79	Memorandum dated 11/23/83 from Kowieski to Petrone and McIntire	12,641	12,960 (Bound in)
SC Exh. 80	RAC Review document dated 12/22/83 from Jordan (NRC) to Krimm (FEMA)	12,641	12,957 (Not offered)
SC Exh. 81	Memorandum dated 1/24/84 from Petrone to Speck	12,641	12,960 (Bound in)
SC Exh. 82	Letter dated 1/26/84 from Dircks (NRC) to Speck	12,641	12,960 (Bound in)
SC Exh. 83	Letter dated 2/3/84 from Speck to Petrone	12,641	12,960 (Bound in)
SC Exh. 84	Handwritten, single-page RAC Review document dated 2/28 from Marshall Sanders, Subject: Shoreham	12,641	12,957 (Not offered)
SC Exh. 85	Document dated 3/15/84 from Kowieski to the members of the RAC Committee	12,641	12,957 (Not offered)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
SC Exh. 86	RAC Review document 3/15/84 from Speck to Dircks (NRC)	12,641	12,957 (Not offered)
SC Exh. 87	Chronology on Shoreham and the hostage issue, dated 3/28/84	12,641	12,960 (Denied)
SC Exh. 88	RAC Review document dated 3/15/84 from Kowieski to Marianne Jackson	12,641	12,957 (Not offered)
SC Exh. 89	RAC Review document dated 3/16/84 from Mr. Guiffrida, the director of FEMA, to Mr. Jenkins, Deputy Counsellor to the President	12,641	12,957 (Not offered)
SC Exh. 90	Single-page document entitled "FEMA's Contractors Assisting RAC Chairman"	12,641	12,960 (Bound in)
SC Exh. 91	Copy of the Nomogram with values printed at the top	13,928	(Not offered)
SC Exh. 92	Document entitled "Log of Documents Examined by FEMA During LERO Training Record Audit, 7/24/84"	14,383	14,502 (Bound in)
SC Exh. 93	Three-page excerpt from the Kemeny Commission's report — the cover page and pages 57 and 58 — dealing with credibility	15,168	15,182 (Bound in)
SC Exh. 94	LILCO's scoping estimates regarding class 9 accidents	15,500	15,503 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
MISCELLANEOUS SC LAY-IN'S			
03/29/84	Subpoena <i>Duces Tecum</i> to <i>Newsday</i> , regarding surveys conducted by Dr. Cole for <i>Newsday</i>	5250	5250 (Bound in)
04/05/84	Suffolk County cross-examination plan — Emergency Planning Contentions 28, 29, 30, 31, 32 and 34	6180	6180 (Bound in)
08/21/84	Attachment to an August 20, 1984 letter from Michael Miller to the Board concerning Motions to Strike LILCO's testimony on Contentions 24.O, 74 and 75	14,693	14,693 (Bound in)
08/23/84	8/20/84 Letter from Miller to the Board concerning Motions to Strike LILCO's testimony on Contentions 85 and 88, with one attachment	15,279	15,279 (Bound in)
NEW YORK STATE EXHIBITS			
NY Exh. 1	SCPD Field Report 1053 Number 29 (Supplementary Report #84-24426	3369	3370 (Bound in)
NY Exh. 1*	Map of the EPZ, designating highways in the zone	3697	3697 (Not offered)

*There are two New York State exhibits marked NY Exh. 1.

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
NY Exh. 2	List entitled "Examples of Roads That Should Be Considered for Inclusion in the Evacuation Network"	3818	3845 (Denied)
NY Exh. 3	Letter from David Axelrod, M.D., Commissioner of Health, NYS DPC, to Mr. Frank Mancuso, State Director, Department of Public Safety, dated March 30, 1984	6591	6598 (Bound in)
NY Exh. 4	Copy of an ambulance service certificate granted by the NYS DOH, for T.W.C. Ambulette, Inc. and signed by David Axelrod	6611	6633 (Bound in)
NY Exh. 5	Copy of an ambulance service certificate granted by the NYS DOH, for Mercy Medical Transportation Services, Inc., and signed by David Axelrod	6612	6633 (Bound in)
NY Exh. 6	Run reports from Peconic Ambulance Service, Inc., – inspection report and a listing of violations as reported by the New York State Department of Health Emergency Health Services, dated 6/23/83	6615, 6620	6632 (Denied)
NY Exh. 7	Run reports from Weir-Metro Ambulance Service – inspection report and listing of violations as reported by the New York State Department of Health Emergency Health Services, dated 8/17/83 and 12/5/83	6615, 6621	6632 (Denied)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
NY Exh. 8A thru 8E	Photographs of the power station at Port Jefferson taken by SCPD	7468	7470 (Not bound in)
NY Exh. 9	Document entitled "Descriptive Statement of Omnibus," (pertinent to Roy K. Bus, Inc.)	10,014	10,025 (Bound in)
NY Exh. 10	Document entitled "Descriptive Statement of Omnibus," (pertinent to Better Bus Company)	10,015	10,025 (Bound in)
NY Exh. 11	Letter dated 7/10/84 from Dr. Axelrod to Mr. Daverio regarding the fact that there are no RECS lines operating between the Shoreham nuclear power plant and New York State	13,013	13,741 (Bound in)
NY Exh. 12	Two-page cover letter followed by the American Red Cross Emergency Response Plan regarding mass care shelter and feeding operations	14,845	(Not offered)
NY Exh. 13	Two letters (1/4/84 & 1/3/84). The first letter to Dellaquilla from Coyne and the second letter to Coyne from Thompson. In addition, a phone message, 12/9/83, for Coyne regarding a call from Thompson, of the Red Cross. Concerns mass care shelter and feeding operations by the Red Cross.	15,099	15,099 (Bound in)

Exhibit Number	Description	Identified at Transcript Page	Disposition at Transcript Page
NRC EXHIBITS			
NRC Exh. 1	Professional Qualifications of R.A. Benedict	15,653	15,656 (Bound in)
NRC Exh. 2	Professional Qualifications of M.W. Hodges	15,654	15,656 (Bound in)
NRC Exh. 3	Professional Qualifications of T.R. Quay	15,655	15,656 (Bound in)

APPENDIX C

LIST OF CONTENTIONS

Contentions 1-10: LILCO's Lack of Legal Authority

Preamble to Contentions 1-10

The LILCO Transition Plan specifies that in an emergency, the actions described in Contentions 1 through 10 below may be ordered to be taken by LILCO personnel. Contentions 1 through 10 allege that LILCO personnel do not have the authority to order or to perform those actions.¹ Accordingly, as alleged in these contentions LILCO cannot, as a matter of law, exercise the responsibilities identified in Contentions 1-10, and therefore, contrary to 10 C.F.R. § 50.47(a)(1), its Plan could not and would not be implemented. LILCO's lack of legal authority to perform actions assigned to LILCO under the Transition Plan also results in noncompliance with 10 C.F.R. § 50.47(b)(3) and NUREG-0654 § A.2.6, in addition to other regulatory requirements as set forth in the contentions which follow.

Contention 1

LILCO is prohibited by law from directing traffic. N.Y. Veh. & Traf. Law §§ 1102, 1602 (McKinney); N.Y. Penal Law §§ 190.25(3), 195.05, 240.20(5) (McKinney); N.Y. Transp. Corp. Law § 30 (McKinney). Under the LILCO Plan, LILCO employees designated "traffic guides" are expected to direct or "guide" traffic to ensure that evacuees follow the evacuation routes identified and prescribed by LILCO in the Plan and to "discourage" noncompliance with those routes. (See OPIP 3.6.3, at 6a-7 and Attach. 1 and 4 thereto; Appendix A "Traffic Control," at IV-5 *et seq.*) These portions of the Plan, therefore, are incapable of implementation.

Further, LILCO's lack of authority to direct traffic renders its evacuation time estimates, required under 10 C.F.R. Part 50, Appendix E, § IV, and NUREG-0654 § II.J.8 and Appendix 4, inaccurate. LILCO's evacuation time estimates (Appendix A at V-3, V-8; OPIP 3.6.1, Attach. 2) and the computer model from which they are derived, assume that all persons will use only the prescribed evacuation routes. (See Appendix A at IV-19, V-2.) In fact, however, since LILCO's traffic

¹ See also pages 2-3 of the June 23, 1983 FEMA review of the Transition Plan ("FEMA Report") which also questions LILCO's legal authority.

guides are prohibited by law from directing traffic, LILCO will not be able to ensure that motorists will use only the prescribed routes, rendering the LILCO evacuation time estimates inaccurate. Thus, LILCO does not comply with 10 C.F.R. § 50.47(b)(10), Part 50, Appendix E, § IV, and NUREG-0654 §§ II.J.8, J.9.5, J.10, and Appendix 4. Without LILCO's assumption that evacuees will follow prescribed evacuation routes, the LILCO evacuation time estimates would increase substantially.

Contention 2

LILCO is prohibited by law from blocking roadways, setting up barriers in roadways, and channeling traffic. N.Y. Veh. & Traf. Law § 1114 (McKinney); N.Y. Penal Law §§ 190.25(3), 195.05, 240.20(5) (McKinney); N.Y. Transp. Corp. § 30 (McKinney). Under the LILCO Plan, LILCO employees are expected to implement various traffic control measures, including those listed above, to ensure that evacuees follow the evacuation routes prescribed by LILCO. (Appendix A, § IV.) LILCO's evacuation time estimates assume that traffic control devices such as roadblocks, prescribed turn movements, channelization treatment, one-way roads and blocking lanes on the Long Island Expressway will be implemented and effective in directing and controlling evacuation traffic. (*See id.*) Because LILCO and its "traffic guides" lack legal authority to implement such traffic controls (*see also* FEMA Report at 2-3, 10-11), LILCO cannot rely on the use of traffic control devices to ensure the use of prescribed evacuation routes. As a result, LILCO's evacuation time estimates are unrealistically low and the Plan fails to comply with 10 C.F.R. § 50.47(b)(10), Part 50, Appendix E, § IV, and NUREG-0654 §§ II.J.8, J.9, J.10, and Appendix 4.

Contention 3

LILCO is prohibited by law from posting traffic signs on roadways. N.Y. Veh. & Traf. Law § 1114 (McKinney); N.Y. Penal Law §§ 190.25(3), 195.05, 240.20(5) (McKinney). In addition to its proposed use of signs as traffic control or channelling devices (*see* Contention 2), the LILCO Plan also assumes that "trail blazer" signs will be installed as permanent roadway hardware to direct the public in the use of prescribed evacuation routes in the event of an evacuation. LILCO's evacuation time estimates assume that such signs are installed. (Appendix A at IV-70.) In fact, however, such signs will not be installed by Suffolk County and it is unlawful for LILCO to install such signs. Therefore,

LILCO cannot rely on such signs to ensure the use of prescribed evacuation routes, and its evacuation time estimates are, as a result, unrealistically low. Thus, LILCO fails to comply with 10 C.F.R. § 50.47(b)(10), Part 50, Appendix E, § IV, and NUREG-0654 §§ II.J.8, J.9, J.10, and Appendix 4.

Contention 4

LILCO is prohibited by law from removing obstructions from public roadways, including the towing of private vehicles. N.Y. Penal Law § 165.05 (McKinney). The LILCO Plan provides that “road crews” made up of LILCO employees will remove obstacles from roadways by using LILCO tow trucks and line trucks. (Plan at 4.4-3; OPIP 3.6.3, at 2 and Attach. 2 thereto.) Because LILCO is prohibited by law from towing private vehicles and removing obstacles from public roadways, this aspect of LILCO’s Plan cannot and will not be implemented. As a result, the Plan fails to comply with NUREG-0654 § II.J.10.k.

Contention 5

LILCO is prohibited by law from activating sirens and directing the broadcast and contents of emergency broadcast system (“EBS”) messages to the public. N.Y. Penal Law §§ 190.25(3), 195.05 (McKinney); N.Y. Exec. Law § 20 *et seq.* (McKinney). Under the LILCO Plan, LILCO employees are expected to order that sirens be activated. They are also expected to determine the contents of EBS messages, to determine that an EBS broadcast should be made, and to direct that such broadcast occurs. (See OPIPs 3.3.4 and 3.8.2.) Because LILCO employees are prohibited by law from performing such actions, the LILCO Plan cannot and will not be implemented, and the Plan fails to comply with 10 C.F.R. § 50.47(b)(5) and NUREG-0654 §§ II.E.5 and E.6. Moreover, in assigning such functions to LILCO employees, the Plan fails to comply with 10 C.F.R. Part 50, Appendix E, § IV.D.3.

Contention 6

LILCO is prohibited by law from making decisions and official recommendations to the public as to the appropriate actions necessary to protect the public health and safety, including deciding upon protective actions which will be communicated to the public. N.Y. Penal Law §§ 190.25(3), 195.05 (McKinney); N.Y. Exec. Law § 20 *et seq.* (McKinney). Under the LILCO Plan, all command and control functions, as

well as all management and coordination of the entire emergency response, are to be performed by various LILCO employees or, in the case of the "Radiation Health Coordinator," by an unidentified LILCO "Contractor." (See Plan at 3.1-1; OPIPs 2.1.1, 3.1.1, 3.6.1.) Thus, contrary to 10 C.F.R. Part 50, Appendix E, § IV.A, LILCO employees and contractors rather than "State and/or local officials" are identified as responsible for planning, ordering, controlling and implementing the off-site response including appropriate protective actions. Because LILCO is prohibited by law from performing such functions, its Plan cannot and will not be implemented, and it fails to comply with 10 C.F.R. §§ 50.47(b)(5), 50.47(b)(6), 50.47(b)(10), and NUREG-0654 §§ II.E.5, E.6, E.7, II.G, II.J.9 and J.10.

Contention 7

LILCO is prohibited by law from making decisions and official recommendations to the public concerning protective actions for the ingestion exposure pathway. N.Y. Exec. Law § 20 *et seq.* (McKinney); N.Y. Penal Law § 190.25(3), 195.05 (McKinney). The LILCO Plan provides that various LILCO employees and an unidentified LILCO "Contractor" will be responsible for determining, making to the public, and implementing protective action recommendations for the 50-mile ingestion exposure pathway EPZ. (See Plan, § 3.6; OPIP 3.6.6.) Because LILCO employees and contractors are prohibited by law from performing these actions, the proposed ingestion pathway EPZ protective actions cannot and will not be implemented. Therefore, the Plan fails to comply with 10 C.F.R. §§ 50.47(b)(10), 50.47(c)(2), Part 50, Appendix E, § IV.A.8, and NUREG-0654 § II.J.11.

Contention 8

LILCO is prohibited by law from making decisions and official recommendations to the public concerning recovery and reentry. N.Y. Exec. Law § 20 *et seq.* (McKinney); N.Y. Penal Law § 190.25(3), 195.05 (McKinney). The LILCO Plan proposes that short-term and long-term recovery and reentry operations will be performed by LILCO personnel and contractors following a radiological emergency at Shoreham (Plan at 3.10-1 and 3.10-2; OPIP 3.10.1). LILCO identifies no non-utility entity, with necessary authority, which has agreed to undertake the initiation or implementation of the recovery and reentry processes. Since, under the LILCO Plan, command and control functions are assumed by LILCO, and under New York law, LILCO does not have the authority to perform

recovery and reentry functions, recovery and reentry cannot be initiated or implemented. The Plan thus fails to comply with 10 C.F.R. §§ 50.47(b)(1), 50.47(b)(13), and NUREG-0654 § I.I.M.

Contention 9

LILCO is prohibited by law from dispensing fuel from tank trucks to automobiles along roadsides. Suffolk County Sanitary Code, art. 12; Code of the Town of Brookhaven, ch. 30, art. X. The LILCO Plan provides that LILCO fuel tank trucks will be stationed along evacuation routes to assist motorists who run out of fuel. These trucks will dispense up to 3 gallons of fuel per vehicle to vehicles that have run out of fuel. (Plan, Appendix A at IV-176.) However, LILCO is prohibited by law from distributing fuel to motorists on the roadsides; this aspect of the LILCO Plan cannot and will not be implemented. It is likely that many evacuees will not begin an evacuation with a full tank of gas. Many cars may run out of gas, both inside and outside the EPZ, as a result of extended operation times due to congestion, stop-and-go conditions and time spent sitting in queues. Cars running out of gas, and the probable abandonment of vehicles which will follow, will result in obstructions and blockages on roadways in use during the evacuation. LILCO's evacuation time estimates do not take cars running out of gas and the resulting road obstructions into account. If LILCO cannot effectively prevent or remove such obstacles, its evacuation time estimates will increase. The LILCO Plan thus fails to comply with 10 C.F.R. § 50.47(b)(10), Part 50, Appendix E, § IV, and NUREG-0654 §§ II.J.8, J.9, J.10, and Appendix 4.

Contention 10

LILCO is prohibited by law from performing law enforcement functions at the EOC, at relocation centers, and at the EPZ perimeter. N.Y. Penal Law §§ 190.25(3), 195.05, 240.20(5) (McKinney); N.Y. Transp. Corp. § 30 (McKinney). N.Y. Veh. & Traf. Law §§ 1102, 1602 (McKinney); N.Y. Exec. Law § 20 *et seq.* (McKinney). The LILCO Plan identifies LILCO employees as being responsible, during an emergency, for establishing and maintaining security and access control for the EOC, directing traffic into the relocation centers, establishing and maintaining security at the relocation centers, and establishing and maintaining perimeter/access control to evacuated areas. (OPIP 2.1.1, at 60-61; Plan, Appendix A at IV-8; OPIP 3.6.3, Attach. 4.) Section 50.47(b)(1) of 10 C.F.R. requires LILCO to demonstrate that it "has staff to respond and

to augment its initial response on a continuous basis.” LILCO must also “specify the functions and responsibilities for major elements . . . of emergency response,” including law enforcement response. NUREG-0654 § II.A.2.a. Without the ability to provide security at the EOC and relocation centers, and provide perimeter control, the LILCO Plan and the protective actions contemplated therein could not and would not be implemented. The Plan thus fails to comply with 10 C.F.R. §§ 50.47(b)(1) and 50.47(b)(10), and NUREG-0654 §§ II.A.2.a, II.J.9 and J.10.

Contentions 11-14: Command and Control

Preamble to Contentions 11-14

Part 50, Appendix E, § IV.A of 10 C.F.R. requires emergency plans to describe the organization for coping with radiological emergencies, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee’s emergency organization and identification of the State and/or local officials responsible for planning for, ordering, and controlling appropriate protective actions, including evacuations. In the LILCO Transition Plan, in place of “State and/or local officials,” LILCO employees (including in the case of the “Radiation Health Coordinator,” an unidentified LILCO “Contractor” which, for purposes of these contentions is included in the term “LILCO employees”) are identified as being responsible for planning for, ordering, and controlling the entire offsite emergency response. Thus, all the command and control functions, as well as all management and coordination of the entire emergency response, are to be performed by various LILCO employees. (Plan at 3.1-1; OPIPs 2.1.1, 3.1.1, 3.6.1.) Accordingly, the “offsite authorities responsible for coordinating and implementing offsite emergency measures,” with whom the LILCO onsite emergency coordinator must exchange information (*see* 10 C.F.R. Part 50, Appendix E, § IV.A.2.c), are fellow LILCO employees.

In Contentions 11-14 below, the Intervenor contend that there cannot and will not be offsite emergency preparedness that provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at Shoreham because LILCO employees are not able to exercise effectively the command and control responsibilities necessary to plan for, order, manage, coordinate and control appropriate protective actions. Each of the deficiencies identified in Contentions 11-14 results in noncompliance with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(1), 50.47(b)(3), Part 50, Appendix E, § IV, and NUREG-0654 § II.A.

Contention 11

The LILCO employees in command and control positions under the LILCO Plan may experience a conflict between LILCO's financial and institutional interest and the public's interest, which may substantially hamper their ability to perform the functions assigned to them in a manner that will result in adequate protection of the public. The Intervenor contend that LILCO employees will have a strong incentive to minimize the public's perception of the potential or actual danger involved in a radiological emergency in order to avoid engendering public or LILCO shareholder disapproval of LILCO, or anti-Shoreham sentiment. Thus, for example, they may not recommend an appropriate protective action in a prompt manner because to do so would be contrary to LILCO's financial interest in maintaining a public perception that Shoreham is not a source of danger. LILCO has failed to institute appropriate measures to ensure the independence of LERO personnel. Accordingly, there is no assurance that correct and appropriate command and control decisions will be made by LILCO employees.

Contention 15: LILCO's Lack of Credibility

Preamble to Contention 15

The LILCO Plan is dependent upon LILCO/LERO personnel providing essentially all necessary information and recommendations which are required during an emergency. Contention 15 addresses the question whether LILCO/LERO recommendations for protective actions (and other information provided by LILCO/LERO) will be believed and followed or whether LILCO will be distrusted as a source of information with the result that its protective action recommendations (and other information provided) will not be believed or followed by the public.

Contention 15

Intervenors contend that LILCO is not considered by the public to be a credible source of information. More than 60% of the people in Suffolk County would not trust LILCO officials at all to tell the truth about an accident. *See* Social Data Analysts Survey. Persons are more likely to question, refuse to believe, disobey or ignore orders, recommendations, or information that comes from persons whom they do not believe than that from authorities they trust and consider credible.

Because the public does not perceive LILCO as a credible source of information, protective action recommendations and other information

disseminated by LILCO in an emergency will not be followed or believed by the public. Further, LILCO may be viewed hostilely as the source of the problem in the first place, or skeptically because the public will perceive that it is not in LILCO's financial interest to disclose all pertinent information. (Members of the public will perceive that LILCO will not disclose the seriousness of an accident due to fears of lower ratings in the financial markets, NRC sanctions, or a lower public image than already exists.) Therefore, people will be likely to disregard or disobey protective action recommendations or other emergency instructions disseminated by LILCO during an emergency. Intervenors thus contend that the LILCO Plan cannot and will not be implemented, and accordingly, there can be no finding of compliance with 10 C.F.R. § 50.47. The paragraphs which follow set forth the particular aspects of, or operations contemplated by, the LILCO Plan which cannot be implemented as a result of LILCO's lack of credibility, and the resulting lack of regulatory compliance. [Note that 15.A through 15.G are not separately admitted as contentions, but are "subsumed within the main contention and may be treated as reasons in support thereof." (Bd. Order of 8/19/83.)

Contention 15.A. LILCO employees are assigned the responsibility of command and control over the personnel in the support organizations relied upon in the Plan for emergency response services (ARC, DOE-RAP, ambulance, fire, rescue organizations, local law enforcement agencies, and the U.S. Coast Guard). (OPIP 2.1.1; Plan at 2.2-1, 2.2-2, 2.2-4, 4.2-1.) Intervenors allege that such individuals will share the public perception that LILCO is not a credible source of information. Therefore, it is likely that orders from the LILCO employees in command and control will not be obeyed by the non-LILCO emergency workers relied upon in the Plan. Accordingly, there is no assurance that the portions of the LILCO Plan involving participation of non-LILCO personnel can or will be implemented, and there can be no finding of compliance with 10 C.F.R. § 50.47(a)(1). The likelihood that non-LILCO workers will not obey LILCO command and control orders means that the following aspects of the LILCO Plan cannot and will not be implemented:

- (1) Offsite accident and dose assessment and projection, and recommendations to the LILCO Director of LERO as to what particular protective actions should be recommended to the public, resulting in noncompliance with 10 C.F.R. §§ 50.47(b)(9), 50.47(b)(10), 50.47(c)(2) and NUREG-0654 §§ II.I, II.J.9 and J.10.

- (2) The protective action of evacuation resulting in noncompliance with 10 C.F.R. § 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10.
- (3) Staffing of relocation centers, and the provision of necessary services for evacuees, resulting in noncompliance with 10 C.F.R. §§ 50.47(b)(8), 50.47(b)(10), and NUREG-0654 §§ II.J.10 and J.12.

Contention 15.B. A protective action recommendation of sheltering could not or would not be implemented. Based on a survey of Long Island residents, a substantial number of the people advised to shelter will choose to evacuate instead as a result of their lack of trust in LILCO's interest or ability to properly and objectively determine and recommend actions that are in the best interests of the public. Thus, the protective action of sheltering could not and would not be implemented in violation of 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10.

Contention 15.C. The LILCO Plan provides for early dismissal, sheltering or evacuation/relocation of students in schools within or near the EPZ, depending on the nature and circumstances of an accident at Shoreham. If protective actions are recommended for the public in the EPZ, schools outside the EPZ having children who reside in the EPZ are expected to retain such children at the schools after the end of the school day. (See Plan, Appendix A at II-19 through II-20.) However, under the LILCO Plan, the decision to implement an early dismissal or to shelter, evacuate, relocate or retain students rests with the schools. (See Appendix A at II-19.) The recommendation to dismiss early or to implement any other protective actions will be made, by LILCO, over the EBS radio (Plan at 3.3-4 through 3.6-6; Appendix A at II-19). The school authorities, being members of the public, are likely to share the perception that LILCO is not a credible source of information. Therefore, they may not believe, or follow, the information or recommendations provided to them by LILCO. As a result, there is no assurance that any protective actions for schoolchildren (including sheltering, evacuation, relocation, retaining children after school hours, or early dismissal to permit sheltering or evacuation with parents) can or will be implemented, and there can be no finding of compliance with 10 C.F.R. §§ 50.47(a)(1) or 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10.

Contention 15.D. Assuming that the traffic control measures specified in the LILCO Plan are not prohibited by law (see Contentions 1-4), LILCO's traffic guides will be disobeyed by motorists, as a result of LILCO's lack of credibility. Similarly, LILCO personnel assigned to perform security functions under the LILCO Plan (i.e., performing law en-

forcement functions at the EOC, relocation centers, and at the EPZ perimeter), again assuming they are not prohibited from performing such functions, are unlikely to be trusted or obeyed by the public as a result of LILCO's lack of credibility. In addition, since the emergency will emanate from an incident at LILCO's own facility, the public will be likely to hold LILCO and its personnel responsible for the emergency, which will cause LILCO's employees to be viewed with hostility and suspicion, and will increase the likelihood that orders from LILCO employees will be ignored or disobeyed. As a result, there can be no finding of compliance with 10 C.F.R. Part 50, Appendix E, § IV.A and NUREG-0654 § II.J.8 and Appendix 4, because LILCO's evacuation time estimates are unrealistically low (being based on the assumption that all evacuees will follow the evacuation routes and instructions prescribed by LILCO). The Plan also fails to comply with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10 because there is no assurance that the protective action of evacuation can or will be implemented or that there will be adequate security during an emergency. In addition, the lack of effective perimeter control will result in persons entering the EPZ, and being exposed to radiation, and impeding evacuation from the EPZ.

Contention 15.E. The sample messages from EBS broadcasting which are contained in the Plan (Attach. 3.8.1) identify a LILCO employee (Director of LERO) as the source of the information and the protective action recommendation. Since the public does not consider LILCO to be a credible source of information or advice, instructions from a LILCO employee will not be obeyed. Therefore, these messages will not accomplish their intended purpose of providing clear instruction to the public and there is no compliance with 10 C.F.R. § 50.47(b)(5) and NUREG-0654 §§ II.E.5, E.6 and E.7.

Contention 15.F. LILCO's proposed rumor control point is to be manned by LILCO employees. (Plan at 3.8-5.) This rumor control effort will be ineffective and will fail to comply with NUREG-0654 § II.G.4.c, because it relies on LILCO — a noncredible source of information — as the authoritative source for squelching, explaining or otherwise controlling rumors. Rumors cannot be effectively controlled if the source of control is itself not credible. Thus, the LILCO Plan does not comply with NUREG-0654 § II.G.4.c and 10 C.F.R. §§ 50.47(b)(5) and 50.47(b)(7).

Contention 15.G. LILCO proposes to conduct all public education activities designed to inform the public about Shoreham and about actions to be taken in the event of a Shoreham emergency. (See Plan at 3.8-1 through 3.8-4.) LILCO's lack of credibility renders LILCO incapable of

effectively educating the public on these matters. The public will likely disbelieve, disregard or discount purported educational materials regarding preparations for a radiological emergency at Shoreham, if such materials are received from and/or prepared by LILCO. Thus, the LILCO Plan cannot and does not comply with 10 C.F.R. § 50.47(b)(7) or NUREG-0654 §§ II.G.1 and G.2.

Contentions 16-21: Public Education and Information

Preamble to Contentions 16-21

The NRC's emergency planning regulations require that the public receive information on a periodic basis on the nature and effects of radiation, protective measures which should be taken in the event of a radiological emergency, methods of public notification and other such information. 10 C.F.R. § 50.47(b)(7) and 10 C.F.R. Part 50, Appendix E, § IV.D.2. Public education materials should include written material that is likely to be available in a residence during an emergency, and in addition, measures must be taken to inform transients of the proper action to be taken during a radiological emergency. NUREG-0654 §§ II.G.1 and G.2. Section 50.47(b)(5) of 10 C.F.R. requires that there be means to provide notification and clear instruction to the populace within the plume exposure pathway EPZ and that the content of effective messages to the public must be established. *See also* NUREG-0654 §§ II.E.5 and E.7. It is crucial to any radiological emergency response effort that the public have accurate and truthful knowledge of the nature of the threat, the protective actions available and the effectiveness of such protective actions. Otherwise, public confusion and ignorance will hamper the emergency response and the public will be unable to take protective actions. If information is not provided clearly or is not understood or believed, the public will fail to take appropriate protective actions, resulting in increased exposure, and noncompliance with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10.

Contention 16

LILCO has drafted a public education brochure entitled "Emergency Procedures: Shoreham Nuclear Power Station." The content of LILCO's public information brochure is misleading and incomplete and thus this aspect of the public information program fails to comply with 10 C.F.R. § 50.47(b)(7), 10 C.F.R. Part 50, Appendix E, § IV.D.2, and NUREG-0654 §§ II.G.1 and G.2. In particular:

- E. The LILCO brochure's discussion of radiation effects is limited to natural sources and very low levels of radiation. It does not adequately address the magnitude of doses that the public might receive during a severe accident, such as one requiring EPZ evacuation, nor the health-threatening consequences related to such releases. Such inadequate disclosure of essential facts renders the brochure incredible.
- J. The brochure does not describe what radio stations are participants in the EBS system. *See* FEMA Report at 6, citing non-compliance with NUREG-0654 § II.G.2.
- K. The brochure states (at 9) that "[y]ou will find it easy to get to your relocation center if you travel along the recommended route." This is a mischaracterization of the facts. The suggestion that evacuation will be "easy" makes LILCO's brochure inaccurate, misleading and not credible.
- L. The brochure states (at 9) that the routes recommended to the evacuees will be the "safest and fastest way out of the emergency planning area." This statement is inaccurate, misleading, and renders the brochure not credible. Residents of the EPZ will know that the routes prescribed by LILCO are not the "fastest" way out of the zone.

[Subcontentions 16.K and 16.L were admitted with the stipulation that "[n]o traffic issues are to be relitigated hereunder; these subcontentions are limited to whether statements made about traffic render the brochure 'inaccurate, misleading and not credible.'" (Bd. Order of 3/9/84.)]

- M. The brochure states (at page 9) that evacuees should "[f]ollow the blue and white pathfinder signs which are located on every major road in the 10-mile emergency planning area. They will direct you out of the area." An almost identical statement is on page 8 of the brochure. These statements are false. No such pathfinder signs exist or have been installed. Moreover, residents of the EPZ will know that such signs are not "located on every major road" in the EPZ. The statements render the brochure not credible.

Contention 18

The proposed LILCO posters, telephone book inserts, and EBS messages do not tell the reader what zone he is in nor do they describe the zones in which protective actions must be taken or the prescribed routes to take from those zones. (*See* FEMA Report at 5, *citing* non-compliance with NUREG-0654 § II.E.7.) Therefore, someone who does

not have access to a brochure in the event of an emergency will be unable to identify his or her zone or to follow the prescribed evacuation route out of the zone of danger. Thus, these items are not effective and do not comply with 10 C.F.R. §§ 50.47(b)(5) and 50.47(b)(7) and NUREG-0654 §§ II.E.5, E.6, E.7, II.G.1 and G.2. Further, even if people know the prescribed evacuation routes for the zone in which they live, the LILCO Plan does not assure that if such people are visiting other zones (such as to pick up their children at a school which is in another zone), they will be able to determine quickly and reliably the prescribed routes by which to evacuate from that zone. Thus, the Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10, because protective actions cannot and will not be implemented.

Contention 20

LILCO intends that EBS messages will be broadcast simultaneously by WALK AM and FM. (Plan at 3.3-6.) However, WALK AM does not operate at night. Therefore, those persons without FM radios (especially people in cars) will be unable to receive adequate information in the event a radiological accident occurs at night, contrary to the requirements of 10 C.F.R. § 50.47(b)(5).

Contention 21

The brochure and other printed educational materials which accompany the LILCO Plan will not be read and/or understood by several segments of the population, and the Plan therefore fails to comply with 10 C.F.R. §§ 50.47(b)(5), 50.47(b)(7) and NUREG-0654 §§ II.B.1, II.E.5 and II.J.10.c.

- C. LILCO's materials are written exclusively in English. Similarly, the EBS messages to be transmitted by WALK in the event of an emergency will be delivered exclusively in English. However, data from the 1980 Census show that there are more than 1300 Hispanic residents of the towns of Brookhaven and Riverhead who speak English either poorly or not at all. These people will not understand either LILCO's educational materials or its EBS messages.

Contention 22: Inadequacy of LILCO's Proposed 10-Mile Plume Exposure Pathway Emergency Planning Zone ("EPZ")

Preamble to Contention 22

Section 50.47(a)(1) of 10 C.F.R. prohibits the NRC from issuing an operating license absent a finding that emergency preparedness exists for the offsite area surrounding a nuclear power plant. The Commission must find that the state of emergency preparedness provides "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency." *Id.*

A major source of radiation exposure in the event of a radiological emergency is that received as a result of direct contact with a radioactive plume and/or from inhalation of radioactive gases and particles within the plume. Thus, the NRC requires the development of a plume exposure EPZ around each plant as the basis for planning for a radiological emergency. 10 C.F.R. §§ 50.47(b)(10), 50.47(c)(2) and Part 50, Appendix E, §§ II.N.2 and IV.

"EPZs are defined as the areas for which planning is needed to assure that prompt and effective actions can be taken to protect the public in the event of an accident." NUREG-0654 § I.D.2. The "overall objective" is to provide planning and a state of preparedness that will permit implementation of protective actions if exposure to the public is projected to be above the EPA's Protective Action Guides ("PAGs"). Section 50.47(b)(10) of 10 C.F.R. requires that planning for protective actions must be consistent with Federal guidance such as the PAGs. Under the PAGs, protective actions should be commenced in the event of potential exposure of members of the public in the range of 1 to 5 rems. NUREG-0654 § I.D.1.

Under the NRC's rules, plume exposure EPZs are generally 10 miles in radius. However, the 10-mile size is not an absolute: "[t]he exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries." 10 C.F.R. § 50.47(c)(2). *See also* NUREG-0654 § I.D.2.

Contention 22.D. Section 50.47(c)(2) of 10 C.F.R. provides that two elements essential to defining the configuration of an EPZ are the location of local jurisdictional boundaries and demographic conditions. Thus, it is good emergency planning practice to include, if possible, the entire area of a local municipality within the boundaries of an EPZ. At a

minimum, an EPZ should avoid dividing major population centers within a local municipality. See NUREG-0654 § I.D.a.

LILCO's EPZ fails to meet the criteria of 10 C.F.R. § 50.47(c)(2) and NUREG-0654 because the proposed LILCO EPZ runs through and divides the villages of Port Jefferson and Terryville and the town of Riverhead. The EPZ should be extended to include all of Port Jefferson and Terryville and additional portions of Riverhead (those portions in the area 1-2 miles to the immediate east of the proposed EPZ which contain dense population and Riverhead's business district).

Contention 23: The Evacuation Shadow Phenomenon

Contention 23

Intervenors contend that in the event of an accident at Shoreham, there would be large numbers of persons who would evacuate voluntarily (the "evacuation shadow" phenomenon), even if not ordered to do so. LILCO has failed to take into account adequately the evacuation shadow phenomenon, thus resulting in a failure to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10), 50.47(c)(2), and NUREG-0654 § II.D. The specific deficiencies in the LILCO Plan which result from its failure to take into account the evacuation shadow phenomenon are set forth in detail in ¶¶ A-J, below.

Contention 23.A. A protective action recommendation of sheltering under the LILCO Plan would not and could not be implemented because a substantial number of the people in the 10-mile EPZ who are advised to shelter will choose to evacuate instead. Vehicles provide little if any protection from a passing plume. Thus, even if a sheltering recommendation were made because plume passage were imminent, a substantial number of people would receive little if any protection from the plume. Therefore, a protective action recommendation of sheltering will not constitute an adequate protective measure and the Plan thus fails to comply with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10.

Contention 23.B. Even if an initial announcement regarding a Shoreham emergency indicates that persons in certain portions of the EPZ need not take any protective action, a substantial portion of the population, upon learning of the existence of an emergency at Shoreham, will decide to evacuate. If the event then were to escalate and a sheltering recommendation were then to be made, the voluntary evacuees would be unable to shelter because they would be in transit in their vehicles and sheltering would not be an available protective action. Thus, they would be subject to exposure to the passing radioactive plume. The

LILCO Plan thus fails to provide reasonable assurance that adequate protective measures can and will be taken, in violation of 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10.

Contention 23.C. The LILCO Plan proposes an EPZ consisting of nineteen separate zones. In a radiological emergency requiring evacuation of the EPZ, it is LILCO's strategy to conduct "a systematic area-by-area evacuation downwind of the reactor." (Plan, Appendix A at I-5.) The Plan is unrealistic in expecting to evacuate only certain zones within LILCO's 10-mile EPZ without expecting residents of the bordering zone(s) and probably other zones as well, also to evacuate. People not located in a zone recommended to be evacuated will not wait while their immediate neighbors evacuate in response to a protective action recommendation. This is particularly so for people who live close to the plant. Accordingly, LILCO's plan for staged evacuation of the inner EPZ zones is unworkable and thus not in compliance with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10.

Contention 23.D. Voluntary evacuation will result in a much larger number of people attempting to evacuate (and thus using the limited capacity of the existing road network) than is assumed by LILCO in its evacuation time estimates.⁵ The additional vehicles will create congestion within the EPZ and in the regions just outside the EPZ, which will cause queuing and will impede traffic evacuating from the EPZ. The additional congestion caused by voluntary evacuation will cause adverse health consequences to the public because (a) evacuees from beyond the 10-mile EPZ will impede the evacuation of those within the 10-mile EPZ who are ordered to evacuate, resulting in evacuees receiving health-threatening radiation doses; and (b) those who choose to evacuate will be unable to do so safely and efficiently.

Moreover, while LILCO acknowledges the persons not specifically instructed to evacuate will, in fact, attempt to evacuate (Appendix A at I-5), the LILCO evacuation time estimates ignore the number of vehicles which will be on the roads due to such voluntary evacuation.⁶ The LILCO evacuation time estimates thus are inaccurate for failing to take into account the numbers and locations of people who will evacuate

⁵ The numbers of people expected to evacuate voluntarily, the locations from which they will evacuate, and the circumstances under which they will evacuate are set forth in a survey and studies which the County has provided to all parties. (See "Basis" section of this contention.)

⁶ LILCO has recently provided the County with a new KLD study which attempts to take into account voluntary evacuations from outside the EPZ. The study is not part of the Plan and the County has not had sufficient time to evaluate it completely. As appropriate at a later time, this portion of this contention may be revised to include this KLD study if LILCO's Plan takes it into account.

voluntarily contrary to instructions. If voluntary evacuation were properly taken into account, the LILCO estimates would increase substantially, rendering evacuation an inadequate protective action for many accident scenarios. Thus, the LILCO Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10), Part 50, Appendix E, § IV, and NUREG-0654 §§ II.J.8, J.9, J.10 and Appendix 4.

Contention 23.H. The LILCO Plan fails to provide adequate measures at the EPZ perimeter to control access to evacuated areas, contrary to the requirement of NUREG-0654 § II.J.10.j. As a result, voluntary evacuees from the East End whose chosen evacuation routes may cross the EPZ perimeter, may travel into contaminated areas and receive health-threatening radiation doses and add to congestion within the EPZ. Thus, the Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10.

Basis for Contention 23

There is demonstrated reason to be concerned about the evacuation shadow phenomenon, which is the propensity for people to evacuate from areas perceived to be dangerous, even though such evacuation may not be ordered or recommended. During the TMI accident, large numbers of people evacuated voluntarily. Whereas the TMI evacuation order recommended that 2500 pregnant women and preschool children within 5 miles of the plant leave as a precaution, in fact over 144,000 people left and traveled long distances. The TMI accident thus documented the existence of the evacuation shadow phenomenon. The reasons for voluntary evacuation are several, including the public's fear of a radiological emergency, heightened by its perception that such emergencies are unlike other disasters.

A survey of Long Island residents conducted by Social Data Analysts and reviewed by Drs. James Johnson and Donald Zeigler, Suffolk County consultants, has indicated that in the event of a radiological emergency at Shoreham, the evacuation shadow would be quite large. In fact, voluntary evacuees will outnumber, by many times, the number of persons who will evacuate because they are ordered to do so. For instance, 31,000 families live within 10 miles of the Shoreham plant. If there were a recommendation to evacuate only the 10-mile EPZ around Shoreham, approximately 432,000 families (about half the population of Long Island) would attempt to evacuate. Even if a sheltering recommendation were made only for the population within 5 miles of the plant, approximately 217,000 families would attempt to evacuate.

Contention 24: LILCO's Lack of Agreements with Organizations and Personnel Relied Upon in the Plan

Contention 24

LILCO has failed to obtain agreements from several of the organizations, entities and individuals for performance of services required as part of the offsite response to an emergency pursuant to NUREG-0654, as follows:

Contention 24.B. The Plan does not include any agreements with (1) U.S. Department of Energy-Radiological Assistance Program ("DOE-RAP") employees or (2) any outside consultant that has agreed to fill the LERO position of "Radiation Health Coordinator," which identify the services to be provided, the criteria for their implementation or the arrangements for exchange of information, or which obligate them to perform the functions for which they are relied upon by LILCO. In the absence of such agreements, there can be no assurance that the following functions can or will be implemented: accident or dose assessment or projection, recommendation of protective actions to the LERO Director, radiological monitoring, decontamination, protection and exposure control for the public and LERO workers, ingestion pathway protective action recommendations or implementation, or recovery and reentry functions. Thus there is no compliance with 10 C.F.R. §§ 50.47(b)(9), 50.47(b)(10) and 50.47(b)(11).

Contention 24.E. Under the LILCO Plan, individual schools and school districts are relied upon for implementation of early dismissals, sheltering in school, evacuation/relocation of schoolchildren, and retaining of schoolchildren in schools beyond the end of the school day. (See Appendix A at II-19, II-20), However, LILCO has no agreements, with the schools or school districts, to implement any of these proposed protective measures for schoolchildren. In addition, LILCO has no agreements with nursery schools or parents of children in nursery schools to permit LILCO employees to drive buses transporting their children. (See Appendix A at II-21.) In the absence of such agreements, there is no assurance that any protective actions for schoolchildren can or will be taken.

Contention 24.F. LILCO proposes that all people who do not have access to an automobile at the time of an evacuation order, most invalid and disabled persons residing at home, all schoolchildren, and large numbers of the residents of nursing and adult homes, hospitals and other special facilities will be evacuated by buses. According to LILCO's estimates, 333 forty-passenger buses are required to transport those able-bodied persons without access to cars who would need transportation

out of the EPZ (*see* Appendix A at IV-74b; OPIP 3.6.4). An additional 26 forty-passenger buses will be necessary, according to LILCO, to evacuate most of the homebound residents in the EPZ and a portion of the residents of nursing and adult homes (*see* Appendix A at IV-175). And, LILCO estimates that 14 sixty-passenger buses will be necessary to evacuate nursery schools. (Appendix A at IV-171.) These estimates do not include the number of buses that will be needed to enable all other schools to evacuate their students or the additional unspecified number of buses necessary to evacuate and relocate certain of the approximately 630 patients in hospitals should such evacuation be necessary (*see* Appendix A at II-28, IV-172). However, not even the number of buses estimated by LILCO to be necessary for use by LILCO because:

1. LILCO has no agreements under which such vehicles will be available other than letters of intent to enter into such agreements. (*See* Appendix B.) *See* FEMA Report at 9-10, noting this as a violation of NUREG-0654 § II.J.10.g.
2. Most buses within a reasonable distance of the EPZ are under contract to school districts or other entities and the letters of intent signed by bus companies indicate that any eventual agreements with LILCO would be subject to such preexisting commitments. Therefore, most buses in the area could not be relied upon by LILCO for use in an evacuation, even if LILCO were to enter into agreements concerning such buses.
3. The LILCO Plan assumes that all schools will implement an early dismissal in the event of any emergency in which no protective actions were recommended for the general public. The LILCO Plan also assumes that schools will evacuate and relocate their students to locations outside the EPZ if evacuation is recommended for the general public. If such dismissals or evacuations were to occur, most buses in the vicinity of the EPZ would be required by schools to transport children to their houses.
4. Many buses within a reasonable distance of the EPZ have capacities substantially less than forty passengers.
5. LILCO itself does not possess the number of forty-passenger buses that will be necessary to implement the LILCO Plan.

In the absence of such agreements, LILCO's proposed evacuation of persons without access to cars, the homebound, schoolchildren, and residents of nursing and adult homes and hospitals cannot and will not be implemented.

Contention 24.G. According to LILCO's estimates (*see* Appendix A at IV-175), it will require sufficient ambulances to make 113 ambulance

trips and enough ambulettes to make 209 trips in order to evacuate the nursing and adult homes located in the EPZ and the homebound who reside in the EPZ. An additional number of ambulances and ambulettes will be required to evacuate the approximately 630 patients likely to be in the hospitals within (and just outside) the EPZ. (See Appendix A at IV-172; OPIP 3.6.5.) However, LILCO has no agreements with ambulance companies to provide such equipment in such quantities. (See FEMA Report at 10.) Even the letters of intent to enter into such agreements which are contained in Appendix B do not relate to numbers of ambulances and ambulettes necessary to meet LILCO's own estimates. In the absence of such agreements, LILCO's proposed evacuation of persons in special facilities, hospitals, and the handicapped cannot and will not be implemented.

Contention 24.I. The provisions of the LILCO Plan for evacuating persons without access to automobiles are premised on a system in which some buses pick up evacuees throughout evacuation zones and carry the evacuees to "transfer points." Other buses are expected to take the evacuees from these transfer points to relocation centers. According to the LILCO Plan, a total of 333 buses will be required to carry out this process. LILCO's estimated route times begin and end with the assumed transfer points. (See Appendix A at IV-73 to IV-165; OPIP 3.6.4.)

However, the LILCO Plan does not include agreements with the owners of those designated transfer points not owned by LILCO permitting LILCO to use the facilities relied upon in the Plan as transfer points. In fact, such transfer points are likely to be unavailable for use by LILCO. Moreover, without such transfer points, each bus route would have to terminate at a relocation center rather than at a transfer point, resulting in a substantial increase in the estimated route times. In the absence of such agreements, LILCO's proposed evacuation of people without access to cars cannot and will not be implemented.

Contention 24.J. The LILCO Plan relies upon special facilities, nursery schools, and their employees to perform several functions necessary to a successful evacuation of such facilities according to the LILCO Plan. (See Appendix A at II-28 to II-29, IV-166 to IV-178.) (The facilities involved are the nursing and adult homes and the nursery schools in and near the EPZ, Association for the Help of Retarded Children (AHRC) facilities, United Cerebral Palsy facilities, John T. Mather Memorial Hospital, St. Charles Hospital, Central Suffolk Hospital, Maryhaven Center of Hope facilities, and the BOCES Learning Center.) However, the Plan does not include agreements with the special facilities in the EPZ to implement the evacuation procedures set forth in the

Plan, and thus the proposed evacuation of such facilities cannot and will not be implemented.

Contention 24.K. The LILCO Plan relies upon non-LILCO personnel to drive ambulances and ambulettes and to provide the necessary medical and paramedical support services in the buses, ambulances, and ambulettes to be used in evacuating special facilities and the handicapped. (See Appendix A at IV-166 to IV-168, IV-172 to IV-178.) The LILCO Plan includes no agreements from any such individuals or related entities to perform such services, under LILCO's direction, in the event of an emergency at Shoreham. In the absence of such agreements, LILCO's proposed evacuation of special facilities and the handicapped cannot and will not be implemented. There is also no assurance that contaminated injured persons, or persons injured during the evacuation, will be transported to hospitals for treatment as required by 10 C.F.R. § 50.47(b)(12).

Contention 24.L. The LILCO Plan relies upon unidentified "dispatch locations" to relay communications between LILCO command and control personnel in the EOC, and those emergency response personnel who are affiliated with hospitals or expected to drive ambulances and ambulettes during an emergency. (See Plan at 3.4-3.) The "dispatch locations" are facilities operated by non-LILCO organizations in the course of their day-to-day operations. (*Id.*) Agreements with such organizations and personnel are necessary to ensure their availability to LILCO during an emergency. However, the Plan contains no such agreements. In their absence, there can be no finding of compliance with 10 C.F.R. §§ 50.47(b)(5), 50.47(b)(6), and NUREG-0654 § II.F.

Contention 24.M. The LILCO Plan relies upon school bus drivers for implementation of early school dismissals and evacuation/relocation of schoolchildren. However, LILCO has no agreements with school bus drivers to perform such functions in the event of a radiological emergency at Shoreham. In the absence of such agreements, the protective actions for schoolchildren cannot and will not be implemented. [Admitted "with the clarification that the agreements alleged to be missing hereunder are agreements with companies or institutions, not with individual school bus drivers." (Bd. Order of 8/19/83.)]

Contention 24.N. The LILCO Plan relies on the availability of non-LILCO facilities and medical institutions as relocation and reception centers for evacuees. (See Plan at 4.2-1; OPIP 4.2.1; Appendix A at IV-166 to IV-174.) However, LILCO has no agreements with the owners of the proposed identified facilities which provide that the facilities will be available as relocation centers in the event of a radiological emergency

at Shoreham. See FEMA Report at 10 (noncompliance with NUREG-0654 § II.J.10.h). In addition, the Plan does not even identify, much less include agreements with, the facilities to be used as relocation or reception centers for schoolchildren, patients in hospitals, handicapped individuals, or residents of any special facilities other than United Cerebral Palsy of Greater Suffolk, Inc. (Appendix A at IV-166 to IV-174). In the absence of such agreements, the protective action of evacuation cannot and will not be implemented.

Contention 24.O. The Plan designates Suffolk County Community College as the relocation center to be used by evacuees from eight of the nineteen zones in the EPZ (zones A-E, H-J). LILCO estimates the population of these zones to be 18,599 (26,574 in the summer). (See Plan, Appendix A at IV-75 to IV-162.) Suffolk County Community College is an entity of the Suffolk County government. LILCO has no agreement with Suffolk County to use Suffolk County Community College as a relocation center. Furthermore, pursuant to Suffolk County Resolution No. 456-1982 and Resolution No. 111-1983, the Suffolk County Community College will not be available for use in implementing the LILCO Plan. Therefore, there is *no* relocation center designated for a significant portion of the anticipated evacuees. Thus, the proposed evacuation of zones A-E and H-J cannot and will not be implemented.

Contention 24.P. LILCO relies upon the ARC to provide services, including medical and counselling services, at relocation centers. (Plan at 2.2-1, 2.2-2, 3.6-7 and 4.2-1.) However, LILCO has no agreement with the ARC to provide such services. In the absence of such agreements, LILCO's proposed protective action of evacuation cannot and will not be implemented.

Contention 24.R. The ingestion exposure pathway EPZ includes portions of the State of Connecticut. LILCO has no agreement with the State of Connecticut under which the State agrees to plan for, recommend or implement protective actions for the portions of the ingestion exposure pathway EPZ that are in Connecticut. In the absence of such an agreement, protective actions for the entire ingestion exposure pathway EPZ cannot and will not be implemented. Thus, there can be no finding of compliance with 10 C.F.R. § 50.47(c)(2).

Contention 24.S. LILCO is required to provide site-specific emergency response training and periodic retraining for those offsite emergency organizations who may be called upon to provide assistance in the event of an emergency, including personnel responsible for accident assessment, police, security and fire-fighting personnel, first aid and rescue personnel, local support services personnel, and medical support personnel. 10 C.F.R. § 50.47(b)(15); NUREG-0654 §§ II.O.1.a, II.O.4.b, d, f,

g and h. In addition, 10 C.F.R. § 50.47(b)(14) and NUREG-0654 § II.N require that there be periodic drills and exercises of emergency response capabilities. LILCO has no agreements with offsite response organizations, or individual workers, to attend LILCO training sessions or to participate in drills or exercises. Such agreements are necessary because unlike its own personnel, LILCO cannot require non-LILCO personnel to receive training, or to participate in drills or exercises. In the absence of such agreements, there is no assurance that an adequate number of properly trained emergency workers will be available to respond effectively to an emergency at Shoreham, in violation of 10 C.F.R. §§ 50.47(b)(14) and 50.47(b)(15), Part 50, Appendix E, § IV.F, and NUREG-0654 §§ II.O.1.a, O.1.b, and II.N. In the absence of trained non-LILCO emergency workers, no aspect of the LILCO Plan can or will be implemented.

Contention 24.T. Under the LILCO Plan, the U.S. Coast Guard is relied upon to provide public notification services for the general public on the waters within the 10-mile EPZ and to restrict access to the EPZ during a radiological emergency at Shoreham. (Plan at 2.2-2.) Since much of the EPZ covers Long Island Sound, prompt notification of boaters and swimmers is important, particularly since the wind often blows offshore. However, LILCO has no agreement with the U.S. Coast Guard to perform the notification functions required under the Plan. In the absence of such an agreement, a portion of the population in the EPZ will not receive notice of an emergency, and persons inside and outside the EPZ may receive substantial doses of harmful radiation. Thus, there can be no finding of compliance with 10 C.F.R. §§ 50.47(b)(5), 50.47(b)(10) and NUREG-0654 §§ II.E.5 and E.6.

Contention 25: Role Conflict of Emergency Workers

Preamble to Contention 25

Emergency workers relied upon by LILCO will have conflicting duties in the event of an emergency. On the one hand, they will be obligated or expected to perform some emergency function under the LILCO Plan; on the other hand, they will be obligated by preexisting family or occupational relationships, to attend to other matters such as the safety of their spouses, children, or other family members. Role conflict for emergency workers was a documented problem at TMI, especially concerning medical personnel; behavior surveys conducted by Suffolk County demonstrate that this will be a problem in a Shoreham emergency as well. Role conflict thus creates the possibility that significant numbers of emergency personnel will look to the needs of their families or others for which

they have responsibility (including themselves) before they report (if at all) to their designated emergency response positions or otherwise respond to a request by LILCO for assistance. This factor will be exacerbated by the fact that many emergency personnel will be asked to respond from a relatively safe area outside the EPZ to a more dangerous area within the EPZ.

Contention 25

Intervenors contend that the LILCO Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(1), and 50.47(b)(3), because the Plan fails to address the problem of emergency worker role conflict. Intervenors contend that a substantial number of the emergency workers relied upon under the LILCO Plan will resolve such conflicts by attending to their other obligations prior to, or in lieu of performing the emergency functions assigned to them by LILCO. In the absence of such workers, the LILCO Plan cannot and will not be implemented, and there can be no finding of compliance with 10 C.F.R. §§ 50.47(a)(1), 50.47(b), and NUREG-0654 § II. The emergency workers likely to experience role conflict, the type of conflict, and the effect of such conflict upon the implementability of the LILCO Plan are set forth in ¶¶ A-F below.

Contention 25.A. The LILCO Plan is premised on the belief that LILCO personnel in command and control positions, as well as those assigned to perform other emergency response functions, will be willing to report promptly for duty in the event of a radiological emergency. Intervenors contend that LILCO employees located outside the EPZ at the time of an emergency will be reluctant to leave a relatively safe area outside the EPZ to enter a more dangerous area within the EPZ to exercise command and control, supervisory, or other emergency responsibilities. Other LILCO employees, including those located in the EPZ, or whose families are located in the EPZ, will also be reluctant to report for emergency duty without first having attended to the safety of their own families. The "Emergency Worker Tracker System," which LILCO asserts will "ensure that the immediate families of all LILCO-employed emergency workers are provided for throughout the incident" (Plan at 2.1-7 and 2.1-8), has not even been developed yet, and therefore cannot be relied upon by LILCO to eliminate role conflict of LILCO personnel. Thus, Intervenors contend that LILCO has failed to ensure that LILCO-employed emergency workers will in fact report promptly to perform emergency responsibilities and thus the LILCO Plan is not capable of implementation.

Contention 25.B. The LILCO Plan fails to take into account the role conflict that is likely to be experienced by BNL personnel upon whom LILCO exclusively relies for all offsite accident and dose assessment and projection functions, and for all command, control and coordination functions related to offsite accident assessment and the decision to recommend particular protective actions to the LILCO Director of LERO. Such BNL personnel are likely to have families located in or near the EPZ and therefore are likely to attend to the safety of their families prior to, or in lieu of, reporting for emergency duty. Without BNL personnel, neither offsite accident and dose assessment and projection, nor recommendation of protective actions will be performed.

Contention 25.C. The LILCO Plan fails to take into account the role conflict that will be experienced by school bus drivers. In fact, a substantial number of school bus drivers are likely to attend to the safety of their own families before they report (if they report at all) to perform the bus driving duties which LILCO assumes will be performed. Role conflict of school bus drivers will mean that neither school buses nor school bus drivers will be available to implement the LILCO Plan. Without an adequate number of buses or bus drivers, LILCO will be incapable of implementing the following protective actions:

1. early dismissal of schools (necessary under the LILCO Plan to permit schoolchildren to be sheltered or to evacuate with their parents);
2. evacuation of schools;
3. evacuation of persons without access to cars; and,
4. evacuation of persons in special facilities.

Contention 25.D. The LILCO Plan fails to take into account the role conflict that is likely to be experienced by teachers, other school employees, and crossing guards. In fact, a substantial number of such personnel are likely to attend to the safety of their own families rather than remaining at the schools or at their posts in the event of an emergency. Accordingly, there is no assurance under the LILCO Plan adequate personnel will be available to supervise children, including those required to walk home, during the early dismissal process, during school evacuations, or in the event that children are sheltered in the schools. As a result, the following protective actions could not and would not be implemented:

1. early dismissal of schools;
2. sheltering of schoolchildren in schools; and
3. evacuation of schools.

Contention 25.E. The LILCO Plan fails to take into account the role conflict that is likely to be experienced by (a) the non-LILCO personnel who, under the LILCO Plan, are expected to drive ambulances or

rescue vehicles and to provide the necessary medical and paramedical support services in the buses, ambulances, railroad cars and airplanes to be used in evacuating special facilities and handicapped persons at home; or (b) Long Island Railroad (LIRR) personnel, private airplane crews and employees of an unnamed lumber company who, under the LILCO Plan, are expected to perform substantial and essential roles in the proposed evacuation of special facilities and the handicapped. (See Appendix A at IV-185 to IV-192.) A substantial number of such individuals will attend to the safety of their own families prior to, or in lieu of reporting to perform emergency services. Without such personnel, the following actions could not and would not be implemented:

1. evacuation of special facilities;
2. evacuation of handicapped persons at home; and,
3. transport of contaminated injured persons, or persons injured during an evacuation, to hospitals for treatment.

Contention 25.F. The LILCO Plan fails to take into account the role conflict that is likely to be experienced by the non-LILCO volunteers who are expected, under the LILCO Plan, to staff the relocation centers. LILCO identifies the ARC as the lead agency responsible for the total operation of the relocation centers. (Plan at 2.2-1, 3.6-7 and 4.2-1.) LILCO also relies on the ARC for other specific actions in the relocation centers, such as medical and counseling support. (Plan at 4.2-1.) The Salvation Army also is designated as assisting the ARC. (Plan at 2.2-1.) The LILCO Plan also asserts that LILCO will rely on groups such as churches, industries, and select volunteers, to provide additional services. (Plan at 4.2-1.) The relocation centers will not be adequately staffed, however, because the ARC personnel and other volunteers relied upon by LILCO are likely to attend to the safety of their own families prior to or in lieu of reporting to perform emergency duties. Without such personnel, the relocation centers will not be available or functioning when needed.

Contention 26: Notification of Emergency Response Personnel

Preamble to Contention 26

Section 50.47(b)(5) of 10 C.F.R. requires that an offsite emergency plan include procedures for notification of State and local response organizations and of emergency personnel. *See also* 10 C.F.R. Part 50, Appendix E, § IV.C. Procedures must be established regarding the bases for notification of response organizations, including means for verification of messages, and for alerting, notifying, and mobilizing emergency response personnel. NUREG-0654 § II.E.1 and E.2. Moreover, there

must be the capability of notifying these emergency personnel "within 15 minutes after declaring an emergency." 10 C.F.R. Part 50, Appendix E, § IV.D.3. LILCO is required to establish primary and backup means of communications with local response organizations, to ensure that these communications systems are compatible with one another, and to ensure that there will be 24-hour-per-day notification to, and activation of, the local emergency response network. NUREG-0654 § II.F.1.

Without prompt and reliable notification of emergency personnel, there will be delays in mobilizing them and in implementing command and control decisions regarding protective actions for the public. See NUREG-0654 § II.F.1.e. Prompt and reliable notification of emergency personnel depends upon an adequate, dependable and workable communications system.

Contention 26

Intervenors contend that the LILCO communications system and procedures for notifying emergency response personnel fail to provide assurance that there will be prompt and reliable notification to such personnel. As a result, the Plan fails to comply with 10 C.F.R. §§ 50.47(b)(5), 50.47(b)(6) and NUREG-0654 §§ II.E and II.F. Without prompt and reliable notification of emergency response personnel, necessary workers cannot and will not be promptly mobilized, and no aspect of the LILCO Plan, or the protective actions contemplated thereunder can or will be implemented, in violation of 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(8), 50.47(b)(9), and 50.47(b)(10), and NUREG-0654 §§ II.H.4, II.I, II.J.9 and J.10. The specific deficiencies in LILCO's system for notifying emergency workers are set forth in ¶¶ A-E below.

Contention 26.A. The LILCO Plan designates the LILCO Customer Service Office (Hicksville) as the primary notification point of the LERO, responsible for receiving initial and followup notifications of an emergency from the plant, verifying authenticity and content of information contained in the notification messages, and notifying key emergency response personnel. (See Plan at 3.3-1.) In addition, Customer Service personnel may be responsible for manually verifying emergency worker pager notifications and compiling staffing lists (see, e.g., OPIP 3.3.2, at 13) and for attempting to contact by telephone all emergency response personnel who do not acknowledge receipt of pager notification (see, e.g., OPIP 3.3.2, at 6). The number of emergency personnel to be contacted increases with the severity of the emergency. (See Plan at 3.3-1

through 3.3-4; Figs. 3.3.2, 3.3.3 and 3.3.4.) However, LILCO's Customer Service Office is not capable of serving as the primary notification point of the LERO for the following reasons:

1. Although the LILCO Plan does not indicate the number of personnel assigned to the Customer Service Office, or the training and equipment available to those personnel, LILCO has informally advised Suffolk County that there will only be two operators on duty during the 8-hour midnight shift. In addition, the Plan makes no provision for backup for the on-duty dispatcher(s) in the LILCO Customer Service Office (*see* Plan at 3.3-1), other than to instruct the on-duty operator(s) to call out additional Customer Service personnel "in accordance with established restoration procedures" on an "as needed" basis (*see, e.g.*, OPIP 3.3.2, at 2), and to advise the Hicksville Customer Service operator(s) that, in the event of failure of the LILCO paging system, assistance in executing manual call-outs of emergency response personnel may be requested from the LILCO Customer Service staffs in the Hewlett and Brentwood offices (*see* OPIP 3.3.2, at 16-17). However, there is no indication in the Plan of the number of personnel who could or would respond "in accordance with established restoration procedures." Nor is there any indication of how quickly such personnel could respond. Indeed, the Plan does not even describe LILCO's restoration procedures or what is meant by calling out personnel on an "as-needed" basis. Similarly, with respect to seeking assistance from the Hewlett and Brentwood offices, the LILCO Plan does not indicate the number of personnel assigned to those offices, whether the offices are staffed on a 24-hour basis, or the training and equipment available to those personnel. Thus, there is no assurance that staffing of the Hicksville Customer Service Office will be sufficient to ensure that the necessary notification functions can be performed.
2. The Plan does not indicate that there will be adequate equipment available to Customer Service personnel to permit the necessary notification in a timely manner, i.e., within 15 minutes after an emergency is declared. *See* 10 C.F.R. Part 50, Appendix E, § IV.D.3.

As a result, LILCO's provisions for receiving initial notification of an emergency, verifying the information received, and notifying emergency response personnel are deficient and provide no assurance that emergency personnel will be alerted, notified and/or mobilized.

Contention 26.C. The LILCO Plan provides for notification of “key” emergency response personnel by pager. (Plan at 3.3-2 through 3.3-4 and 3.4-5.) According to LILCO, these key personnel “will not leave the LILCO service territory or New York City while on call,” and they are to arrange for coverage by alternates during times when they cannot be on call. (See OPIP 3.3.2, at 14-15.) Notwithstanding LILCO’s assertion, however, there is no assurance that key emergency response personnel can reliably be contacted through the LILCO paging system due to distance limitations on transmission, the fact that batteries for the pagers may run down and not be charged or replaced or tested on a regular basis, and unavailability of the individuals equipped with pagers (for example, because of illness or travel out of the paging area). In addition, although the LILCO Plan provides that emergency personnel equipped with pagers are to call in to LILCO’s “automated verification system” upon receipt of notification (see Plan at 3.4-5), the Plan does not adequately describe this system or how it works. (See OPIP 3.3.2, at 12-13.) The limited information provided by LILCO about the system and how it works does not permit a determination that there will be adequate means for LILCO to determine whether emergency personnel in fact receive paged messages/notifications. Nor is there any requirement in the Plan for confirmation of messages by contacted personnel. The Plan only provides that emergency personnel are to respond according to the code displayed on their pagers, regardless of whether verification can or cannot be made. (See OPIP 3.3.2, at 14.) Since verification under the Plan is only verification that emergency personnel have received some paged message, the response to the message may not be the response intended and appropriate (e.g., due to pager malfunction, emergency personnel may be notified to go to standby status, rather than to report). As a result, there is no assurance under the LILCO Plan that key emergency response personnel will be promptly alerted, notified and mobilized.

Contention 26.D. The LILCO Plan provides for key emergency response personnel, after having been contacted through the LILCO paging system, to notify, in turn, other emergency response personnel by telephone. The number of personnel to be contacted increases with the severity of the emergency. (See OPIP 3.3.2.) However, some emergency response personnel will not be near telephones (such as meter readers and other LILCO employees who may be in the process of performing their normal job functions, or persons who are not at home), will be using their telephones or, for other reasons, will not be able to be contacted. In addition, it will take a substantial amount of

time to place the number of telephone calls necessary to reach the required number of emergency response personnel. (See, e.g., OPIP 3.3.2, Attach. 5.) Thus, under the LILCO Plan there is no assurance that there will be prompt notification and mobilization of emergency response personnel.

Contention 26.E. The LILCO Plan has no procedures that assure prompt notification of non-LILCO emergency support organizations and personnel, namely, hospitals, reception and relocation centers, bus companies, and ambulance companies. Presumably, commercial telephones will be used to attempt to contact these organizations and personnel. While there are procedures for notifying other non-LILCO emergency support organizations, namely, the Brookhaven Area Office (which will, in turn, notify DOE-RAP personnel), the U.S. Coast Guard, the Federal Aviation Administration, and the New York Telephone Company (see OPIP 3.3.2, Attach. 4), notification of these entities is to be by way of commercial telephones, which under the LILCO Plan are assumed to be available. There is, however, no assurance that the necessary personnel will be capable of being contacted by telephone since they may not be near telephones or may be using their telephones. Further, these same problems make ineffective LILCO's reliance on the Federal Telephone System as a backup means for contacting the Brookhaven Area Office, the U.S. Coast Guard, and the Federal Aviation Administration (see OPIP 3.2.2, Attach. 4). Moreover, under the LILCO Plan there is no provision for verification of messages to non-LILCO emergency support organizations, as required by NUREG-0654 § II.E.1. Further, with the exception of the Brookhaven Area Office, the New York Telephone Company, the U.S. Coast Guard, and the Federal Aviation Administration (which are notified if an Alert is declared by LILCO), the LILCO Plan apparently contemplates notification of non-LILCO emergency support organizations only if a Site Area or General Emergency has been declared by LILCO. (See Plan, Fig. 3.3.4.) Thus, there is no assurance that there will be timely notification to the support organizations relied upon by LILCO (see Plan at 2.2-1 and Fig. 2.2.1), and there can be no finding that the LILCO Plan can or will be implemented.

Contention 27: Mobilization of Emergency Response Personnel

Preamble to Contention 27

Once offsite emergency response personnel are notified of an emergency and instructed as to their assigned functions,⁸ necessary emergency actions cannot be taken by those workers (and therefore many recommended protective actions cannot be taken by the public) until the response personnel report to their assigned locations, obtain the equipment or vehicles they will require to perform their assigned roles, and report to their emergency posts or dispatch locations. The activities that take place between the determination that particular offsite emergency response personnel should be notified and the reporting of such personnel, with necessary equipment, to the locations where emergency functions will be performed, are referred to herein as "mobilization" activities.

Contention 27

LILCO assumes that LILCO and non-LILCO employees will be available to implement command and control directives. However, the emergency response work force upon which the Plan relies will not be promptly available to perform the duties and emergency response functions assigned to them under the LILCO Plan due to extended mobilization times. Although the LILCO Plan fails to provide estimated notification or mobilization times for emergency response personnel (*see, e.g.,* NUREG-0654 § II.C.1), Intervenors contend, based on surveys of emergency mobilization of the Suffolk County Police Department, that LERO mobilization will take at least several hours. In some cases, detailed in ¶¶ A through F below, mobilization will take even longer because after having been notified of an emergency, workers will have to travel substantial distances, in congested traffic, and will have to obtain necessary equipment, before they report to their assigned posts to perform emergency functions. As a result of the extended mobilization times, the LILCO Plan, and the protective actions contemplated therein, cannot and will not be implemented in a timely manner necessary to provide adequate protection to the public. The Plan thus fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(1), 50.47(b)(3), 50.47(b)(8), 50.47(b)(9), and 50.47(b)(10) and NUREG-0654 §§ II.E.2, II.F.1.e,

⁸ See Contention 26 which sets forth the reasons prompt notification will not occur under the LILCO Plan.

II.H.4, and II.I. The reasons for extended mobilization times are stated in ¶¶ A through F below.

- A. Many emergency response personnel, particularly those employed by LILCO, live and/or work substantial distances from the EPZ or other emergency services locations.
- B. Emergency response personnel will have to travel through congested traffic resulting from public mobilization and evacuation travel, in order to get from their locations upon notification to their initial reporting locations.
- C. Many emergency response personnel must report first to a "staging area" or "dispatch location" and then to an assigned post (*see* OPIP 3.3.3), which will require additional travel through congested traffic. Furthermore, once at the staging areas LERO workers with field assignments will have to pick up personnel dosimetry and receive briefings before they leave for their posts, and many LERO workers, such as traffic guides and route alert drivers, will also have to obtain and install in their vehicles equipment such as mobile radios and public address systems. (OPIPs 3.3.4, 3.6.3, 3.6.4.) [Only the impact, if any, of these activities on mobilization time at staging areas will be considered (Bd. Order of 2/3/84).]
- D. Many emergency response personnel must travel from their notification locations to other locations to obtain equipment or vehicles after reporting to staging or dispatch locations. Thus, road crews must obtain tow trucks and other equipment from LILCO storage locations which are spread throughout Suffolk and Nassau Counties (OPIP 3.6.3); fuel truck drivers must obtain fuel trucks, go to storage tanks, and fill the trucks with fuel (OPIP 3.6.3); route alert drivers must obtain vehicles and mount loudspeakers on them (Plan at 3.3-4; OPIP 3.3.4); bus drivers must be transported from staging areas to bus garages, gain access to the buses, and prepare the buses for use (e.g., by obtaining gasoline and checking oil (*see* OPIP 3.6.4, at 10)). In addition, procedures for locating necessary equipment, such as buses and trucks, will require time and will further delay the efforts of response personnel to obtain such equipment. (*See* OPIP 3.6.4.)
- E. Emergency response personnel must travel from staging or dispatch locations, through congested traffic, to reach the posts where they are to begin to perform their emergency functions.
- F. Many emergency response personnel (e.g., traffic guides, bus drivers, and ambulance companies) are not contacted or ex-

pected to report to field locations until the Site or General Emergency Level, as suggested in the Plan (*see* Plan, Figs. 3.3.2, 3.3.3, 3.3.4). Mobilization times for such workers will be even more extended because the level of traffic congestion encountered by them will be substantially greater.

Contentions 28-34: Communications Among Emergency Response Personnel

Preamble to Contentions 28-34

Section 50.47(b)(6) of 10 C.F.R. requires that an offsite plan must provide for "prompt communications among principal response organizations to emergency personnel and to the public." Without prompt and reliable means of communications among emergency personnel once they begin to respond to the emergency, there can be no assurance that necessary and appropriate emergency measures, including those necessary to implement protective action recommendations, can and will be taken as required by 10 C.F.R. § 50.47(a)(1).

Intervenors contend that LILCO does not provide for adequate, dependable and workable communications among emergency personnel following notification, and therefore there can be no finding of compliance with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(6), 50.47(b)(8), and 50.47(b)(10), and NUREG-0654 §§ II.E.2, II.F, II.H.4, II.J.9 and J.10. The specific deficiencies, each of which leads to this conclusion, are set forth in Contentions 28-34.

Contention 28

No radio or dedicated telephone links to any Federal agencies are described in the LILCO Plan. Thus, the Plan fails to provide adequate and reliable means of communications with the Federal emergency response organizations relied upon in the Plan (i.e., FEMA, the U.S. Coast Guard, and the Federal Aviation Administration), as required by NUREG-0654 § II.F.1.c. (*See* FEMA Report at 5.)

Contention 29

The LILCO Plan does not specify the number of emergency personnel that will be assigned responsibility for manning communications equipment at the EOC, staging areas, transfer points, ambulance dispatch stations, or other communications posts. Further, the Plan does not provide for trained repair technicians capable of keeping communications equip-

ment operational. As a result, there is no assurance that LILCO's communications system can or will be operated in the event of an emergency.

Contention 30

The LILCO Plan fails to demonstrate that there will be sufficient and adequate communications equipment to ensure effective communications among LILCO field emergency personnel, including those expected to perform security functions. The Plan provides that all field personnel, or a member of each crew, and each staging area, bus transfer point, and ambulance dispatch station will be provided with mobile radios. (See Plan at 3.4-3.) With mobile radios, communication will only be possible if the field personnel are in their vehicles. Moreover, mobile radios operate on battery power, and the vehicles must be running, or the ignition switched on, for the radios to operate. Batteries are effective for only a limited time, but the Plan makes no provision for assuring that vehicle batteries are not run down and remain charged. Thus, there is no assurance that transmission and reception of radio messages will be possible. In addition, the LILCO Plan fails to take into account the fact that persons other than emergency response personnel (i.e., the public) will have access to the radio frequencies to be used by such personnel. Further, the LILCO Plan relies in part upon simplex radio frequencies, which limit the range of the field radios. As a result, many emergency field personnel will be unable to hear other field personnel who attempt to communicate on the same frequency. It is essential that field workers be able to communicate with co-workers having similar or related functions. For example, LILCO's traffic guides must be able to communicate information to other traffic guides in order to coordinate traffic control strategy and to be aware of what traffic conditions may be coming. LILCO's traffic guides, however, will not have that capability because they will not have adequate radio equipment or frequencies. The result of such attempted traffic control without adequate means for coordination will result in increased rather than decreased traffic congestion, and extended evacuation times. Other field workers who are unable to communicate information to co-workers performing similar or related functions will be similarly unable to perform their assigned roles effectively or properly.

Contention 31

With the exception of dedicated telephone lines between the staging area coordinators and the EOC emergency response coordinators, there

is no backup communications system for the LILCO Emergency Radio System, which is intended to provide communications between emergency response coordinators at the EOC and field emergency response personnel, including field survey teams, traffic guides, road crew and evacuation route spotters, staging area coordinators, transfer point coordinators, and ambulance dispatch locations. (See Plan at 3.4-3.) Although the LILCO Plan does not indicate the number of frequencies which comprise LILCO's Emergency Radio System, LILCO has advised Suffolk County that there are six frequencies and four radio channels available to LILCO. The amount of radio traffic anticipated for an emergency at Shoreham could not be adequately handled by these six frequencies. However, the Plan has no provision for any backup frequencies to those six which comprise the Emergency Radio System, in violation of 10 C.F.R. Part 50, Appendix E, § IV.E.9 and NUREG-0654 § II.F.1. Moreover, each category of field workers will be able to use only a single frequency or channel (two sets of frequencies are paired). Accordingly, if problems develop on that one frequency or channel, communications will be impossible for all workers in that category. In the absence of backup systems, there is no assurance that recommended and appropriate emergency actions can or will be implemented, since command and control instructions may not be communicated to personnel in the field, and the status of the emergency response may not be communicated to those in command and control.

Contention 32

Under the LILCO Plan, communications between traffic guides and bus transfer points and the EOC response coordinators will be relayed through the LILCO staging areas; thus these field personnel will be unable to communicate directly with their respective response coordinators at the EOC. (Plan at 3.4-3.) This lack of direct communications will result in the delay of implementation of emergency actions.

Contention 33

The LILCO Plan fails to demonstrate that there are any direct communications between DOE-RAP monitoring teams and the EOC.

Contention 34

The LILCO Plan relies on existing radios in hospitals and in private ambulance dispatch locations and vehicles for communications between

LILCO command and control personnel and other LILCO emergency workers and these response organizations and their personnel. (Plan at 3.4-3.) This proposal fails to ensure adequate communications among response personnel because:

- A. The LILCO Emergency Radio System will not be compatible with the radio communications equipment used in day-to-day operations by hospitals and by ambulance vehicles.
- B. The LILCO system will not have direct access to the radio frequencies used by hospitals and by ambulance vehicles.
- C. LILCO has advised Suffolk County that the EOC will not be equipped with private ambulance vehicle, Emergency Medical Services, or hospital frequencies. Therefore, LILCO proposes to relay communications between the EOC and ambulance vehicles and hospitals through private ambulance dispatch locations. In this regard, the LILCO Plan provides that one of the LILCO Emergency Radio System frequencies is dedicated for radio communications between the EOC and private ambulance dispatch locations, road crews, and evacuation route spotters. (See Plan at 3.4-3.) Assuming dispatch locations are in fact available to LILCO, LILCO's proposal precludes direct communications between LILCO personnel and non-LILCO emergency response personnel in the field, which will delay the implementation of emergency actions. In addition, LILCO has advised Suffolk County that fire/rescue organizations (i.e., fire departments and fire/rescue vehicles) are not part of LERO, even though they are relied upon for "their normal response functions during an emergency." (Plan at 2.2-4.) Thus, there is no assurance that "a coordinated communication link for fixed and mobile medical support facilities exists," as required by NUREG-0654 § II.F.2.

Contentions 35-44: Training of Emergency Workers

Preamble to Contentions 35-44

Section 50.47(b)(15) of 10 C.F.R. requires that radiological emergency response training be provided to those who may be called on to assist in an emergency. In addition, 10 C.F.R. § 50.47(b)(14) requires that periodic exercises be conducted to evaluate major portions of emergency response capabilities, periodic drills be conducted to develop and maintain key skills, and that deficiencies identified as a result of exercises or drills be corrected. *See also* 10 C.F.R. Part 50, Appendix E, § IV.F.

Under the LILCO Plan, in order to provide training “to those who may be called on to assist in an emergency,” LILCO must ensure that both its own personnel and the personnel of non-LILCO emergency response organizations are adequately trained, and that they participate in drills and exercises that meet the requirements of the regulations. See NUREG-0654 §§ II.N and II.O. Intervenor alleges in Contentions 35-44 that LILCO’s Plan fails to demonstrate that adequate training can and will be provided to emergency response personnel.¹⁰

Contention 39

LILCO’s Plan fails to deal effectively with the problem of attrition. As a result, LILCO cannot demonstrate that adequate numbers of trained support organization personnel will be available to respond to an emergency at Shoreham and thus cannot demonstrate compliance with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(15), 10 C.F.R. Part 50, Appendix E, § IV.F, and NUREG-0654 § II.O.1.

- A. With respect to LILCO personnel, the Plan relies on quarterly general training and semi-annual job-specific training to qualify new LERO members for positions opened through attrition. (Plan at 5.1-7, 5.1-8; OPIP 5.1.1, at 6-7.) Such training for new members is insufficient, because it does not assure that trained LILCO employees will be available to fill positions in LERO as the need arises. As a result, there is no assurance that LERO will be fully staffed with trained personnel on a continuous basis. To ensure compliance with 10 C.F.R. § 50.47(b)(15), 10 C.F.R. Part 50, Appendix E, § IV.F, and NUREG-0654 § II.O.1, LILCO must demonstrate that all personnel are trained in their designated emergency response organization positions. Thus, LILCO should make satisfactory completion of its emergency response training program a prerequisite to the hiring of personnel who will be assigned emergency response duties.
- B. With respect to all non-LILCO personnel, except Coast Guard and ambulance personnel, the Plan ignores the issue of attrition. (OPIP 5.1.1, § 5.1.3.2 and Attach. 1.) And, with respect to the Coast Guard and ambulance companies, LILCO will attempt to counteract the effects of attrition only if notified by

¹⁰ LILCO has advised Suffolk County that training materials are still under development. When those materials are developed and produced for the County’s review, the County may revise these contentions. More specific contentions cannot be formulated at this time, given the lack of the LILCO training materials.

one of these groups that understaffing exists. (Plan at 5.1-6; OPIP 5.1.1, § 5.1.3.3.) However, the Coast Guard and ambulance companies are under no obligation to maintain necessary staffing for LERO, to notify LILCO of "understaffing," or otherwise to assure LILCO's compliance with 10 C.F.R. § 50.47(b)(15), 10 C.F.R. Part 50, Appendix E, § IV.F, and NUREG-0654 § II.O.1. Therefore, there is no assurance that LILCO will not know whether personnel in any non-LILCO emergency response support organizations who might have been trained at one time by LILCO remain with their respective organizations, and thus remain available to respond to an emergency at Shoreham. Thus, there is no assurance that any non-LILCO support organizations will be sufficiently staffed with adequately trained emergency response personnel.

Contention 40

There is no assurance that LILCO personnel can adequately perform the emergency functions and duties they are assigned under the LILCO Plan. The Plan calls upon LILCO personnel to perform emergency functions which, in most instances, are unrelated to their LILCO job functions. For example, LILCO meter readers are to serve as Traffic Guides (OPIP 2.1.1, at 30), Customer Relations personnel are to serve as Evacuation Route Spotters (*id.* at 37), LILCO maintenance foremen and mechanics are to serve as Radiological Monitoring personnel (*id.* at 18), and various designers, planners and analysts are to serve as Security Personnel (*id.* at 61-64). There is no assurance that LILCO training will compensate for this lack of job-related experience, especially when the tasks to be performed may be accompanied by high levels of stress and fatigue involving life-threatening situations. Training alone cannot prepare people for the actual stress and trauma that accompany emergency conditions. Experience is also essential.¹¹ Moreover, training that is not regularly applied or used will be ineffective. Thus, even if their initial training were adequate, LILCO personnel will forget what was learned during that training. Following their training, LILCO personnel will be expected to perform their regular job functions, which have no relation to their emergency roles, rather than applying or using their emergency training. This will minimize any benefits gained through the emergency training, especially since general classroom training, exercises, and

¹¹ For example, doctors and police officers are required to intern as residents and to serve as rookie police officers before their training is completed.

almost all drills are only repeated on an annual basis, job-specific classroom training is only repeated on a semi-annual basis, and there are no incentives for LILCO personnel to learn or to retain the emergency training provided to them. Accordingly, LILCO cannot demonstrate compliance with 10 C.F.R. § 50.47(b)(15), or that the emergency functions and duties assigned to LILCO personnel under the Plan can or will be implemented, as required by 10 C.F.R. § 50.47(a)(1).

Contention 41

All necessary emergency personnel must be trained adequately in the proper use of the communications equipment relied upon in the LILCO Plan. Such training must include instruction in the proper use of radio frequencies, the range of coverage available for each frequency, and proper radio discipline. The LILCO Plan, however, does not provide such training. The Plan provides for a “communications drill” that is designed primarily to test equipment. (Plan at 5.2-1; OPIP 3.4.1.) Only persons in those selected LERO positions designated as “communicators” will participate in this drill. (Plan at 5.2-2, 5.2-2a.) In addition, it is clear from the Plan and drill scenarios that other than the workers assigned to remain at the EOC, ENC, and staging areas, LERO workers will receive essentially no practical communications training, and that even the workers assigned to the EOC, ENC, and staging areas will not receive enough. Thus, there is no assurance that LILCO’s Plan satisfies the requirements of 10 C.F.R. § 50.47(b)(15) or that emergency response personnel will be prepared and adequately trained to initiate and receive communications, as required by 10 C.F.R. § 50.47(b)(6) and NUREG-0654 § II.F.

Contention 44

The LILCO Plan fails to demonstrate that drills and exercises will adequately test the training of emergency response personnel so as to ensure that personnel are familiar with, and capable of performing, their duties under the Plan as required by 10 C.F.R. § 50.47(b)(14), 10 C.F.R. Part 50, Appendix E, § IV.F, and NUREG-0654 § II.N. Specifically:

- D. The provisions of the Plan for quarterly testing of communications with Federal emergency response organizations and States within the ingestion pathway do not provide for testing whether the content of messages is understood by emergency response personnel. NUREG-0654 § II.N.2.a. (*See* FEMA Report at 13.)

- E. The Plan fails to describe how exercises and drills are to be carried out to allow “free play for decisionmaking.” NUREG-0654 § II.N.3. (See FEMA Report at 14.)
- F. Although the LILCO Plan asserts that “official observers from Federal, State or local governments will be on hand to evaluate and critique [an] annual exercise” (Plan at 5.2-4), there is no indication in the Plan that any such entities have agreed to send observers as required by NUREG-0654 § II.N.4. (See FEMA Report at 14.) In addition, although the Plan describes a proposed procedure for evaluating observer and participant comments, post-exercise/drill critiques will be performed primarily by LILCO, and evaluation of critiques and decisions as to necessary actions will be made by LILCO personnel. (Plan at 5.2-4; OPIP 5.1.1, at 10c-10h.) NUREG-0654 § II.N.5. (See FEMA Report at 14.) LILCO, however, will not be able to critique adequately its own Plan, including the exercises or drills conducted under the Plan, or to evaluate and/or act upon such critiques due to its lack of expertise and objectivity. Thus, deficiencies in the LILCO Plan and implementing procedures may not be identified or corrected.

Contentions 45-51: Accident and Dose Assessment and Projection

Preamble to Contentions 45-51

Section 50.47(b)(9) of 10 C.F.R. requires offsite plans to provide that:

Adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use.

See also 10 C.F.R. Part 50, Appendix E, § IV.B. Similarly, NUREG-0654 § II.I.8 requires the identification of an appropriate organization which:

shall provide methods, equipment and expertise to make rapid assessments of the actual or potential magnitude and locations of any radiological hazards through liquid or gaseous release pathways. This shall include activation, notification means, field team composition, transportation, communication, monitoring equipment and estimated deployment times.

Intervenors contend that the LILCO Plan fails to comply with these requirements for the reasons set forth in Contentions 45-51.

Contention 45

The LILCO Plan appears to rely exclusively on (a) DOE-RAP personnel, and (b) personnel from an unidentified "outside consultant," for offsite accident and dose assessment and projection, as well as for all command, control and coordination functions related to offsite accident assessment and projection and the decision to recommend particular plume exposure and ingestion pathway protective actions to the LILCO Director of LERO (i.e., the Radiation Health Coordinator, RAP Team Captain, Dose Assessment Function, Environmental Survey Function, and Offsite Survey Teams). (Plan, § 3.5.B, Fig. 3.5.2; OPIPs 2.1.1, 3.5.1, 3.5.2, 3.5.3 and 3.6.6.) The Plan does not identify by name, title or qualification the DOE-RAP or other outside consultant personnel who are expected to perform offsite accident and dose assessment functions and thus fails to comply with NUREG-0654 § II.A.2.a.

Contention 46

The Plan does not identify an individual from DOE-RAP or from an "outside consultant" who will be responsible for assuring continuity of technical, administrative and material resources. In addition, there is no assurance that DOE-RAP or the unidentified outside consultant who is to provide personnel to fill the position of "Radiation Health Coordinator" is capable of providing prompt or continuous services (24-hour) for a protracted period. Thus the Plan fails to comply with NUREG-0654 §§ II.A.4 and II.C.1.b. Indeed, the Plan states that "approximately eight persons" will perform the duties assigned in the Plan to DOE-RAP (Plan at 2.2-3); there is no indication of how many individuals are available to act as "Radiation Health Coordinator." Even if the initial staffing for offsite monitoring and dose assessment were assumed to be adequate, there is no provision for augmentation of initial staffing on a continuous basis as required under 10 C.F.R. § 50.47(b)(1) and NUREG-0654 §§ II.A.1.e and A.4.

Contention 49

The nomogram which relates iodine to total fission products for the calculation of thyroid dose (OPIP 3.5.2, Attach. 11) is not realistic. Thus, there is no assurance that this procedure will provide reliable data for use in making protective action decisions. Accordingly, there is no compliance with 10 C.F.R. § 50.47(b)(9).

Contentions 55-59: Notification to the Public

Preamble to Contentions 55-59

Section 50.47(b)(5) of 10 C.F.R. requires that means be established to provide early notification and clear instruction to the populace within the plume exposure pathway EPZ. The public notification system should be capable of essentially completing the initial notification of the public in the plume exposure pathway EPZ "within about 15 minutes." 10 C.F.R. Part 50, Appendix E, § IV.D.3. (*See also* NUREG-0654 § II.E.6 and Appendix 3 thereto.)

Intervenors contend that under LILCO's Plan, there is no assurance that the public will receive notification of an emergency within 15 minutes, and as a result, there is no assurance that adequate protective actions can or will be implemented, as required by 10 C.F.R. § 50.47(a)(1) and NUREG-0654 §§ II.J.9 and J.10. The specific deficiencies in the LILCO Plan are set forth in Contentions 55-59.

Contention 55

Under the LILCO Plan, a system of eighty-nine fixed sirens will be used to alert the public to an emergency at the Shoreham plant. (Plan at 3.4-6.) However, as a result of the deficiencies noted in Contention 26, LILCO will be unable to contact its key command and control personnel in a timely manner, thus potentially delaying the decision to activate the siren system, in violation of 10 C.F.R. § 50.47(b)(5), Part 50, Appendix E, § IV.D.3, and NUREG-0654 § II.E.6 and Appendix 3.

Contention 56

The LILCO Plan does not provide adequate backup in the event of failure of the LILCO siren system. LILCO relies upon public address systems or loudspeakers, mounted on LILCO vehicles driven by "Route Alert Drivers," to provide backup to the sirens. (Plan at 3.3-4 and 3.4-6; OPIP 3.3.4, at 4.) However, the proposal to drive vehicles equipped with loudspeakers through the nonactivated siren areas to alert the public is impractical, unworkable, and will not provide notification within 15 minutes as required by NUREG-0654, Appendix 3. (*See* Contention 27.) In addition, some persons will not hear the broadcast message (such as persons with impaired hearing, persons outside the EPZ), and other persons will not understand the broadcast message (such as children, and non-English-speaking persons). Route alert drivers are also required to abandon a route if dosimetry readings exceed

specified levels. (OPIP 3.3.4, Attach. 1.) Accordingly, there is no assurance that persons in the EPZ will be promptly notified of an emergency, and entire segments of the population may never be alerted at all, in violation of 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(5), Part 50, Appendix E, § IV.D.3, and NUREG-0654 § II.E.6 and Appendix 3.

Contention 57

The LILCO Plan provides that special facilities and organizations with a large number of personnel (such as schools, hospitals, nursing homes, handicapped facilities, and major employers) will be equipped with a tone alert radio which, upon activation by the EBS signal from WALK radio, is to broadcast automatically the emergency message. (Plan at 3.3-4, 3.4-6 and OPIP 3.4.1, Attach. 1.) However, since notification would coincide with notification to the general public, these special facilities and organizations would not have any additional alerting or preparation time (for evacuation, sheltering, or implementation of other protective actions). Moreover, the tone alert radios depend upon the EBS signal broadcasting from WALK radio station. Should the EBS signal originate from other stations, the radios would not activate and there would not be automatic transmission of the EBS message. Further, WALK radio does not broadcast on its AM frequency 24 hours per day. Thus, there is no assurance that tone alert radios will provide adequate notification of an emergency to special facilities and other organizations within the EPZ, in violation of 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(5), Part 50, Appendix E, § IV.D, and NUREG-0654 §§ II.E.5, E.6, and Appendix 3.

Contention 58

Under the LILCO Plan, the proposed evacuation of special facilities (such as schools, handicapped facilities, nursing/adult homes, and hospitals) and the handicapped at home requires the Public Schools Coordinator, Private Schools Coordinator, Health Facilities Coordinator and the Home Coordinator, working under the direction of the Special Facilities Evacuation Coordinator, to verify by telephone that the special facilities and individuals are aware of the need to evacuate and to determine their specific needs for assistance. (OPIP 3.6.5.) This does not provide an adequate, workable or dependable means of timely notification of or communication with these people, because the process of contacting them will take too long, persons to be contacted may not be near telephones, and handicapped persons may be unable to communicate by telephone.

Thus, the Plan fails to comply with 10 C.F.R. §§ 50.47(b)(5) and 50.47(b)(6), Part 50, Appendix E, § IV.D.3, and NUREG-0654 §§ II.E.1, E.2, E.5, E.6, and Appendix 3.

Contention 59

Under the LILCO Plan, the U.S. Coast Guard is relied upon to provide public notification to the general public on the waters within the 10-mile EPZ. (Plan at 2.2-2.) However, the Coast Guard does not have the capability of notifying the public within 15 minutes and thus the LILCO Plan fails to comply with 10 C.F.R. §§ 50.47(b)(5), 50.47(b)(6), Part 50, Appendix E, § IV.D and NUREG-0654 §§ II.E.5, E.6 and Appendix 3.

Contentions 60-83: Protective Actions

Preamble to Contentions 60-83

Section 50.47(a)(1) of 10 C.F.R. requires a finding of reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. In addition, 10 C.F.R. § 50.47(b)(10) requires the development of a range of protective actions for the public; guidelines for the choice of protective actions must be consistent with Federal guidance. Such guidance includes the Manual of Protective Action Guides (“PAGs”) (EPA-520/1-75-001), which sets forth the threshold projected dose levels at which protective actions are to be commenced. The PAGs are embraced in NUREG-0654 §§ II.J.7 and J.9, and are referenced in the LILCO Plan in § 3.6, and OPIP 3.6.1. NUREG-0654, in §§ II.J.9 and J.10, requires that there be established “a capability for implementing protective measures based upon protective action guides and other criteria.” (Emphasis added.)

In Contentions 60-83, Intervenors contend that LILCO’s Plan does not provide reasonable assurance that adequate protective measures can and will be implemented to protect the population from the potential health hazards of an accident at Shoreham. Thus, (a) there is no reasonable assurance that the measures proposed in the LILCO Plan would, if taken, provide adequate protection from the potential consequences of an emergency at Shoreham; and (b) there is no reasonable assurance that the proposed measures could or would in fact be taken in the event of an emergency.

Contentions 60-62: Sheltering

Further Preamble to Contentions 60-62

The LILCO Plan provides that the protective action of sheltering may be recommended (Plan at 3.6-5), and that it is “the preferred protective action if sufficient protection is offered by sheltering, or if no additional benefit is gained by evacuation.” (OPIP 3.6.1, § 3.2.) Intervenors contend that as to the proposed protective action of sheltering, the LILCO Plan fails to comply with 10 C.F.R. § 50.47(a)(1) and NUREG-0654 § II.J.9, because there is no assurance that sheltering, as a protective action, could or would be effectively implemented in the event of an emergency in a manner which would protect the public. Indeed, the facts indicate that many people will refuse to shelter and will, instead, choose to evacuate,¹⁴ and that many other persons, as a practical matter, will be unable to shelter. Thus, sheltering cannot be viewed as an adequate protective action, as LILCO appears to believe, for the reasons set forth in SC Contentions 60-62.

Contention 60

At page 3.6-5 of the LILCO Plan, LILCO states:

Th[e] protective action [of selective sheltering] may be ordered at projected doses below the accepted PAGs to minimize radioactive exposure, particularly to pregnant women and children.

The Sheltering option may be recommended as an effective option for individuals who could not be safely evacuated. This would include individuals who have been designated medically unable to withstand the physical stress of an evacuation, as well as those individuals who require constant, sophisticated medical attention.

The Plan fails to set forth guidelines to be used by command and control personnel: (a) in choosing to recommend the protective action of selective sheltering; or (b) in determining the individuals who should or would be subject to such a recommendation. Rather, as quoted above, the Plan contains only generalized statements which, in fact, provide no guidance at all. In addition, there are no procedures which indicate the means by which such a recommendation would or could be implemented. The Plan thus fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10.

¹⁴ See Contention 23: The Evacuation Shadow Phenomenon, for further discussion of this matter.

Contention 61

Intervenors contend that a protective action recommendation of sheltering would not or could not be implemented. Specifically, a substantial number of the people who might be advised to shelter, as a practical matter, will be unable to do so because:

- A. A large number of the homes and other structures in the EPZ are constructed of wood and have no basements. According to LILCO's shielding factors (Plan, Table 3.6.5), the protection offered by such shelter is limited, at most, to a reduction in dose of only 10% from that received with no shelter. As a practical matter, persons with access to such structures have little "shelter" available, and thus sheltering should not be considered as a protective action for these persons.
- B. Persons who are traveling in their cars or other vehicles at the time of a sheltering recommendation may not be able to reach shelter fast enough to obtain any protection from a release of radioactive fission products. Vehicles offer essentially no protection from radioactive doses.
- C.1. According to the Plan, if sheltering is recommended for the general public, schools in the EPZ are expected to shelter children in schools. (Appendix A at II-20; *see also* OPIP 3.8.2, at 19, 21.) However, the Plan fails to indicate how, if at all, such an order could or would be implemented by the schools. Contrary to the assumption in the LILCO Plan (*see* OPIP 3.6.5, at 10a), most school officials have not performed "preplanning" that makes them capable of implementing a sheltering recommendation. Therefore, the Plan provides no assurance that sheltering could or would be implemented for children in schools.

Many schools in the EPZ have no basements or other areas suitable for sheltering large numbers of children. Moreover, the Plan contains no information concerning sheltering capacities or shielding factors for schools, in violation of NUREG-0654 § II.J.10.m. Therefore, the Plan provides no information upon which those in command and control could determine whether sheltering is an appropriate protective action for children in schools, in violation of 10 C.F.R. § 50.47(b)(10).

In addition, the Plan states that if schools have initiated early dismissals, LILCO will not recommend to the schools that any other protective actions, including sheltering, be taken, even if such a recommendation is made for the general public. (*See* OPIP 3.8.2, at 5.) Thus, if LILCO were to recommend that schools institute an early dismissal, and school authorities were to follow that recommendation, schoolchildren would

not have access to shelter for hours (*see* SC Contention 69), even though a sheltering recommendation could be in effect for the rest of the EPZ population.

- D. Transients who are on beaches, in parks or in other outdoor recreation areas will have no access to shelter. Contrary to the requirement of NUREG-0654 § II.J.10.a, the Plan fails to identify public sheltering areas. (*See* FEMA Report at 8.)
- E. Persons who are in boats in the EPZ will have no access to shelter.

Moreover, even if people were willing and able to follow a sheltering recommendation, there is no assurance that taking such action would provide any significant dose savings and thus prevent persons in the EPZ from receiving health-threatening doses for the following reasons:

- G. Many other homes in the EPZ, even if they provide more shielding than a wood house, will only reduce doses about 50%. In a severe accident, a 50% dose reduction will still result in health-threatening doses.
- H. According to LILCO, the average shielding factor available in the EPZ is 0.7, which means that, on the average, those who follow a sheltering recommendation will nonetheless receive 70% of the dose they would receive from the plume if they were outside the shelter.
- I. The cloud doses resulting from a release of radioactive fission products from the Shoreham plant could be so substantial that even taking into account the 30% average dose reduction provided by shelter in the EPZ, persons who follow a sheltering recommendation could still receive doses that would cause adverse health effects.¹⁵

Thus, sheltering is not an adequate protective action in the event of an emergency at Shoreham, and the Plan, therefore, fails to comply with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10), and NUREG-0654 § II.J.9.

Contentions 63-77: Evacuation

Contention 63

The LILCO Plan states at page 3.6-6:

Selective Evacuation may be implemented to evacuate from the affected area of the plume exposure EPZ members of the general public who might have a low tolerance

¹⁵ *See* Contention 22 discussion of the site-specific consequences of an accident at Shoreham.

to radiation exposure. Specifically, this would include pregnant women and children 12 years and under.

The Plan fails to set forth guidelines to be used by command and control personnel: (a) in choosing to recommend the protective action of selective evacuation; or (b) in determining, identifying and locating the individuals who should be subject to such a recommendation. In addition, there are no procedures which indicate the means by which such a recommendation could or would be implemented. The Plan thus fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10.

Contention 64

The LILCO Plan proposes an EPZ consisting of nineteen separate zones. In the event of a radiological emergency at Shoreham requiring evacuation of the EPZ, it is LILCO's intended strategy to evacuate all zones within 2 miles of the Shoreham plant, but only a portion of those zones outside of the 2-mile radius. (See OPIP 3.6.1, Attach. 2.) LILCO's Plan, however, fails to account for the fact that the wind shifts quickly on Long Island, with average wind speeds of approximately 10 miles per hour. Under such conditions, a shift in wind direction could quickly direct the plume over an area that was not in the original plume pathway, and thus not included in the initial evacuation order, before that area could be evacuated.

Intervenors contend that given wind conditions on Long Island, in the event any evacuation due to a radiological emergency is required, LILCO must evacuate at least a radius of 5 to 7 miles around the plant. Any partial evacuation of only certain zones within a 5- to 7-mile radius would expose the population of the nearby unevacuated zones to the risk of a sudden wind shift and consequent health-threatening exposure to radiation. Under these conditions, the LILCO evacuation plan fails to constitute an adequate protective action, as required by 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10).

Contention 65: Evacuation Time Estimates

Further Preamble to Contention 65

Section IV of Appendix E to 10 C.F.R. Part 50 requires that license applicants "provide an analysis of the time required to evacuate and for taking other protective actions for various sectors and distances within

the plume exposure pathway EPZ for transient and permanent populations.” (See also NUREG-0654 § II.J.8 and Appendix 4.) Accurate estimates of the time necessary to evacuate the Shoreham EPZ (or portions thereof) are essential to evaluating the evacuation route system. In particular, such estimates must be accurate and reliable so that command and control personnel who are considering what protective actions might be ordered for particular persons can estimate whether, given projected release and dispersion of health-threatening fission products from the Shoreham plant, evacuation can be accomplished before such dispersion takes place. (See 10 C.F.R. § 50.47(b)(10); NUREG-0654 § II.J.10.m.) A decision to order evacuation, if based on inaccurate evacuation time estimates, could result in evacuees being trapped in queues or slow-moving traffic inside or outside the EPZ, thus exposing them to a release of fission products from the Shoreham plant.

LILCO has submitted evacuation time estimates for the 10-mile EPZ, which estimates are contained in Appendix A, at V-3, and OPIP 3.6.1, Attach. 4.¹⁶ LILCO estimates that the time for evacuation will vary from about 2 to 2½ hours for only the inner EPZ sectors, to a maximum of approximately 6 hours for evacuation of the entire EPZ under adverse weather conditions.

Contention 65

Intervenors contend that LILCO’s evacuation time estimates are inaccurate, unreliable and, in fact, should be far longer. LILCO’s evacuation time estimates are so underestimated that under the LILCO Plan an evacuation may be ordered which realistically cannot be completed prior to release and dispersion of fission products from the Shoreham plant. Evacuees will be caught in queues or delayed in heavily congested traffic within the EPZ. Under many accident conditions, there will be a dispersal of radioactive materials while such traffic conditions still exist, resulting in unacceptable health-threatening exposure to the evacuees. The automobiles of the evacuees will offer essentially no protection from the plume.

The specific deficiencies in LILCO’s estimates and further bases for this contention are set forth in ¶¶ A-H below. [Admitted with the clarification that the deficiencies to be considered under Contention 65 are limited to those contained in the subparts. (Bd. Order of 8/19/83.)]

¹⁶ The FEMA Report at 11-12 notes that the time estimates are inadequate in part because the estimates in OPIP 3.6.1 are incomparable to those in Appendix A.

Contention 65.A. The LILCO evacuation time estimates ignore or underestimate the time required for people to mobilize and ready themselves for evacuation. The LILCO estimates in Appendix A include only the time involved in the actual evacuation trip out of the EPZ. (Appendix A, Table XIV.) LILCO assumes in OPIP 3.6.1 that complete mobilization of the public will take about 20 minutes after receiving notification, which grossly underestimates the time it will take for mobilization, especially during working hours. In fact, it will likely take at least from 1 to more than 3 hours for people to mobilize before they can begin to evacuate. The mobilization time will be required because:

1. Following activation of the prompt notification system, it will take time for people to become aware of the emergency, to become informed of the recommended protective actions and to determine their own course of action.
2. Where possible, most families will seek to evacuate as a unit. Specifically, working parents will leave work and drive to schools and/or home to pick up their children prior to evacuating. There will also be travel to and from various locations as family groups are assembled from work locations, relatives' homes, day care centers, and the like. Mobilization time must include time for the travel necessary to assemble family groups. In addition, families with schoolchildren who do not pick up their children themselves, will delay the start of their evacuation until all their children have returned home. Given the length of time necessary to implement early dismissals (*see* Contention 69), mobilization times could be increased significantly by this fact.
3. It will take time for the evacuees to gather necessary provisions before evacuating. (*See* "Emergency Procedures: Shoreham Nuclear Power Station" at 8.) In addition, some persons will seek to go to banks, stores and other such facilities for money and provisions.
4. Travel within the EPZ during the mobilization period (work/home, home/school, to banks and stores, etc.) prior to commencing evacuation will result in heavy traffic congestion which will lengthen the time necessary to complete mobilization travel.

Contention 65.B. Heavy traffic congestion from mobilization traffic, due to both high demand and conflicting traffic flow (i.e., some traffic flow in directions different than prescribed evacuation directions), will lengthen evacuation times. LILCO's evacuation time estimates do not appear to take this cause of congestion and resulting evacuation delay

into consideration. Thus the LILCO estimates are inaccurate for this additional reason.

Contention 65.C. The LILCO traffic control plan, as described in Appendix A, even if assumed to be lawful and capable of being implemented, will, in fact, constitute an additional source of congestion which has been ignored in LILCO's evacuation time estimates. If such congestion were taken into account, the LILCO estimates would increase substantially. The Plan will cause additional congestion for the following reasons:

1. LILCO's estimates assume that its traffic guides will screen all motorists moving in a direction contrary to its prescribed traffic flow to determine whether each person has "good reason" for going in that direction. (Appendix A at IV-83; *see also* IV-8.) Thus, a traffic guide presumably would stop or otherwise delay all such motorists, question them, and attempt to persuade or order them not to go in their intended directions if their reasons for doing so were judged not to be sufficient. This screening process will impede traffic flow, resulting in congestion and further increasing the evacuation time estimates. It will also require more traffic guides than LILCO has designated for each traffic post.
2. LILCO's attempted use of traffic controls may cause aggressive behavior on the part of those attempting to take protective actions. This aggressive behavior will stem in part from fear of a radiological emergency (which is perceived by the population to be different from other emergencies) and in part from confrontations that will result when motorists wish to travel contrary to the directions of the LILCO traffic guide, or are stopped by guides for screening. Conflicts between motorists and traffic guides will result in traffic blockages, confusion, accidents and possibly injuries, all of which will increase congestion.
3. Because under the LILCO Plan neither LILCO's traffic guides nor any other LERO personnel will alter traffic signal lights, traffic guides may attempt to implement a control strategy counter to the direction given by the signals. (*See* FEMA Report at 10, *citing* noncompliance with NUREG-0654 § II.J.10.j.) Such simultaneous and potentially contradictory instructions to motorists will cause confusion and congestion, thus further delaying traffic movement. (*Id.*)
4. In some cases, LILCO's prescribed routes direct motorists to travel contrary to their perceptions of the most expeditious

way out of the EPZ. (See, e.g., Post described in Appendix A at IV-56.) This will cause confusion and anxiety on the part of the motorists and confrontations with traffic guides.

Contention 65.D. The LILCO time estimates assume that “[n]o major vehicle breakdown or other types of incidents [will] occur which block major routes for an extended time.” (Appendix A at V-2.) This assumption is unrealistic and leads to an underestimation of the time required for evacuation. Examples of factors which increase congestion and thus increase time estimates, and which should have been included in LILCO’s estimates, include:

1. Anticipated traffic accidents and automobile breakdowns, including running out of gas (for example, the Suffolk County police responded in 1982 to 10,000 incidents such as accidents and breakdowns on the Suffolk County portion of the Long Island Expressway, thus indicating the potential for this factor to influence severely evacuation times);
2. The absence of shoulders on some primary or secondary routes which will be used during an evacuation;
3. Road construction/repair work which can be assumed to be ongoing at any time; and
4. Abandonment of vehicles under emergency conditions.

Contention 65.E. The LILCO evacuation time estimates do not take into account the additional congestion to be encountered by evacuating motorists that will result from the evacuation and early dismissals of schools and the evacuation of those in special facilities and the handicapped. Such evacuations and dismissals will involve the use of large numbers of buses, ambulances and trains which will be traveling in all directions through the EPZ, on prescribed evacuation routes and other roads, making frequent stops. If the impact of special evacuations were taken into account, the LILCO time estimates for evacuating motorists would increase substantially.

Contention 65.F. Behavior research demonstrates that stress and anxiety induced by a radiological emergency at Shoreham will diminish driving skills and awareness, and impede the processing of information necessary for a driver to make decisions and drive properly. The geography of Long Island, with its narrow, limited land area, may create a feeling of being “closed in,” which may increase the likelihood of poor driver behavior. Decreased driving skills and driver awareness will cause confusion, congestion and accidents and, if properly taken into account, would increase LILCO’s evacuation times. LILCO, however, has failed to take these factors into account in its evacuation time estimates.

Contention 65.G. The LILCO Plan does not include evacuation time estimates for evacuation of those with special needs who cannot rely on private transportation, such as schoolchildren, persons without access to cars, persons in health care or other special facilities, and the handicapped. (See FEMA Report at 11, *citing* noncompliance with NUREG-0654 § II.J.10.1 and Appendix 4, at 4-9 to 4-10.) The individuals in charge of making protective action recommendations must know how long it will take to evacuate these portions of the population. The Plan thus fails to comply with 10 C.F.R. Part 50, Appendix E, § IV, and NUREG-0654 § II.J.8 and Appendix 4.

Contention 65.H. The LILCO Plan (OPIP 3.6.3) provides for two evacuation route spotters to report information to the EOC regarding traffic congestion on evacuation routes. (Contrary to the requirement of NUREG-0654 § II.A.2.a, the LILCO employees expected to fill these positions are not identified by job title in the Plan. See OPIP 2.1.1, at 32.) Without the ability to spot congested areas effectively, LILCO will be unable to implement appropriate measures for evacuees to avoid such congestion, resulting in increased evacuation times. LILCO's route spotters will be ineffective because:

1. LILCO has not provided enough route spotters to cover the evacuation routes. (See FEMA Report at 11.)
2. The LILCO route spotters will be unable to move expeditiously through heavily congested traffic, especially since the evacuating motorists will not defer to LERO vehicles operating without police sirens or flashers. (*Id.*)

Contention 66: Removal of Obstacles from the Roadway and Provisions for Fuel

Contention 66

NUREG-0654 § II.J.10.k requires that an offsite plan provide “[i]dentification of and means for dealing with potential impediments . . . to use of evacuation routes, and contingency measures.”

In the event of a radiological emergency at Shoreham and subsequent evacuation (recommended and/or voluntary), it is likely that there will be many instances of automobile accidents and vehicle breakdowns caused by the large number of vehicles on the road, stop-and-go conditions, overheating while idling in queues, driver inattention, failure to obey the rules of the road and other such conditions. In addition, it is likely that many evacuees will not begin the evacuation with a full tank of gas. Many cars may run out of gas, both inside and outside the EPZ, as a result of extended operation times due to congestion, stop-and-go

conditions and time spent sitting in queues. Such occurrences, along with abandonment of vehicles and construction which may be in progress at the time an evacuation is ordered, will result in obstructions and blockages on roadways in use during the evacuation. Taking such occurrences into account would cause evacuation time estimates to increase. (See Contention 65.) In addition, it is essential that such obstacles be removed in a timely manner so that evacuation times will not increase even more due to substantial periods of reduced roadway capacity. Under the LILCO Plan, removal of obstacles will be performed by LILCO road crews using twelve LILCO tow trucks and line trucks. Gasoline will be provided by LILCO fuel trucks which are to be dispatched to seven specific locations. (See Plan at 4.4-3; Appendix A at IV-176; OPIP 3.6.3, at 46a-46b.)

Intervenors contend that the LILCO Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10) and NUREG-0654 § II.J, because LILCO will be unable to provide for obstacles to be removed from the roads, or to provide adequate fuel supplies for evacuees for the following reasons:

- A. LILCO does not have an adequate number of tow trucks to enable LILCO personnel to remove all potential road obstructions. (See FEMA Report at 11, *citing* noncompliance with NUREG-0654 § II.J.10.k.)
- B. The tow truck deployment points proposed by LILCO are not located so as to allow rapid dispatch of the tow trucks to the aid of disabled vehicles. In addition, once they have been dispatched to an obstruction location, the tow trucks and other LILCO equipment will only be able to move as fast as the traffic flow, which will be extremely slow. Therefore, they will be unable to respond to the site of an obstruction in an expeditious manner.
- C. LILCO's Plan makes no provision for the evacuation of persons whose cars break down or are in accidents.
- D. The LILCO Plan does not provide for snow removal. (See FEMA Report at 11, *citing* noncompliance with NUREG-0654 § II.J.10.k.) Rather, the Plan assumes that "snow removal will be provided by local organizations in their normal fashion during an emergency." (Plan at 2.2-5.) This assumption is unwarranted. LILCO has no agreements with local jurisdictions or other entities within and around the EPZ to provide snow removal services during an emergency, nor can it assure that local personnel assigned to snow removal duties will perform

those functions during an emergency, for the reasons cited in Contentions 15, 25 and 27.

- F. The seven fixed sites chosen for fuel distribution will be able to service only a small portion of the evacuating population. Therefore, the fuel needs of many evacuees will be unmet. Furthermore, no provisions have been made to handle queues at fuel allocation sites which may back up into evacuating traffic, thus causing further congestion and delays.

Contention 67: Evacuation of Persons Without Access to Automobiles

Contention 67

LILCO assumes that in the event an evacuation is ordered, most members of the population will attempt to leave using their personal vehicles. However, a substantial portion of the population in the EPZ does not own or have access to an automobile. LILCO proposes that people who do not have access to an automobile at the time of an evacuation order will be evacuated by buses running special evacuation routes, with bus stops purportedly no more than ½ mile from each such person's home. (Plan at 3.6-6; Appendix A at III-35 and III-36, IV-76 to IV-163; OPIP 3.6.4.) However, LILCO's proposal cannot be implemented, and LILCO's proposed evacuation of people without access to cars would not provide adequate protection for such people, because the evacuation would take too long. As a result of the time necessary to complete the evacuation, persons may be exposed to health-threatening radiation doses. Thus, the LILCO Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10) and NUREG-0654 §§ II.J.9 and J.10. Specifically:

Contention 67.A. According to LILCO's estimates, approximately 333 forty-passenger buses are required to transport those able-bodied persons who would need transportation out of the EPZ (*see* Appendix A at IV-74b; OPIP 3.6.4.) In fact, however, LILCO will either need more than 333 buses or those buses will have to make many more runs than anticipated by LILCO because LILCO has substantially underestimated the number of people who will need such transportation:

1. LILCO underestimates the significant number of people who belong to households with automobiles, but who may not have access to such vehicles because at the time of an evacuation order, the vehicles are in use by another member of the household. LILCO's proposal for evacuating persons without access to transportation must include adequate methods of evacuating

the members of vehicle-owning households who may not have access to a car. LILCO's estimates of the number of buses required do not adequately take such people into account.

2. LILCO's estimates also fail to take into account those persons who rely on public transportation to get into the EPZ but who, in the event of an emergency, may not be able to rely on such means to evacuate.
3. LILCO assumes that its route buses will be filled to 75% capacity; however, there is no basis for this assumption. In fact, the route bus capacity factors are likely to be significantly lower than 75%, which will result in a need for many more buses to evacuate people without access to cars.

Contention 67.C. The staggered departures and multiple bus runs necessary under LILCO's plan to evacuate the people in each zone (Appendix A at IV-76 to IV-163; OPIP 3.6.4, at II-32), even using LILCO's estimates of the number of people likely to need such evacuation, will result in evacuation travel times far longer than those set forth in Appendix A at 8a. Specifically, the LILCO Plan provides that the bus routes will terminate at designated "transfer points" with each bus in many cases required to make more than one run. As noted in *Contention 67.D*, several transfer points are in the EPZ. Transfer buses will transport the evacuees from the transfer points to relocation centers. LILCO's estimated route times begin and end with the assumed transfer points. (See Appendix A at IV-76 to IV-163, V-8a; OPIP 3.6.4.) LILCO's estimated evacuation times, however, assume that route buses will be dispatched from transfer points and return to the transfer points at specific intervals (or "headways") and that there will be little or no waiting at the transfer points for buses to the relocation centers. Furthermore, the last transfer buses are assumed to clear the EPZ 15 minutes after leaving the transfer points. (Appendix A at V-7.) These assumptions are erroneous, however, since they do not consider the severe traffic congestion that will exist, for reasons set forth in *Contention 65*, at the same time that the route and transfer buses are attempting to make their trips. Thus, the route times for each route bus will be longer than estimated by LILCO. In addition, it is likely to take far longer than 15 minutes for the last transfer buses to clear the EPZ after leaving the transfer points.

Contention 67.D. The eleven new transfer points designated by LILCO do not appear to have adequate structures which could provide shelter from adverse radiological or weather conditions for evacuees while they are waiting to be transferred to relocation centers. Furthermore, four of the eleven transfer points are inside the EPZ and one is

on the EPZ boundary. In addition, of the remaining six transfer points, three are located approximately ½ mile or less beyond the EPZ boundary, one is approximately 1 mile from the EPZ boundary and two are approximately 2½ miles beyond the boundary. Under the LILCO Plan, people are likely to be kept waiting for substantial time periods, because of delays, congestion, etc., before they are transported from transfer points to relocation centers. Leaving people at the eight transfer points within or very close to the EPZ will not provide protection for them. Leaving them at the other three transfer points, all less than 5 miles beyond the EPZ boundary, conflicts with the intent of NUREG-0654 § II.J.10.h, and could result in these people also receiving health-threatening radiation doses.

Contentions 68-71: Evacuation of Schoolchildren

Further Preamble to Contentions 68-71

The LILCO Plan proposes that if schools are in session upon the declaration of an Alert or Site Area emergency in which no protective actions are recommended for the general public, schools are expected to implement their early dismissal plans. (Appendix A at II-20.) If an evacuation, or a combination of sheltering and evacuation were recommended for the general public while schools were in session, the schools in the EPZ are expected to evacuate children to “predesignated reception centers.” If any protective actions are recommended for the general public, schools outside the EPZ which have students living in the EPZ, according to LILCO, “will retain those students at the school when the school day ends.” (*Id.*) For the reasons set forth in Contentions 68-71, the LILCO Plan does not provide an adequate and implementable means of evacuating schoolchildren, and thus fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10.

Contention 68

The LILCO Plan fails to specify the bases upon which LILCO would continue to make a protective action recommendation of early dismissal (as opposed to sheltering or evacuation) to schools if they had initiated an early dismissal, even if other protective actions were being recommended for the general public (OPIP 3.8.2, at 5), and thus does not comply with 10 C.F.R. § 50.47(b)(10) and NUREG-0654 § II.J.10.m.

Contention 69

LILCO appears to assume that its recommendation, at the time no protective actions are recommended for the general public, that schools implement an early dismissal, will result in children being protected in the event of a subsequent protective action recommendation of sheltering or evacuation because children could thereby shelter or evacuate with their parents. (See Appendix A at II-20; OPIP 3.8.2, at 5.) In fact, there is no assurance that early dismissal will provide children with adequate protection from health-threatening radiation doses, and therefore the Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10, for the following reasons:

Contention 69.B. The LILCO Plan does not incorporate or provide any essential details of early dismissal plans for the schools or school districts in or near the EPZ. It is thus impossible to tell whether such plans for a Shoreham emergency actually exist or, if they do, the extent to which they are compatible with the LILCO Plan.

Contention 69.C. Early dismissal will not result in the timely arrival of children at their homes so they can be protected by their parents because:

1. Even under nonemergency conditions it takes hours to implement early dismissals due to the time required to make the necessary decision, to mobilize the necessary personnel and vehicles, and to perform the necessary number of bus runs. Under emergency conditions, the time required to accomplish an early dismissal is likely to be substantially greater, due particularly to congested road conditions and role conflict experienced by bus drivers and other personnel in authority. In addition, early dismissal policies rely upon large numbers of children walking home distances of up to 2 to 3 miles, which can take a substantial amount of time.
2. Under the LILCO Plan, schools will receive notification of an emergency at the same time as the rest of the public (by means of tone alert radios activated by the EBS announcement (see Plan at 3.3-4; Appendix A at II-19)). Therefore early dismissal traffic, including those children expected to walk home, will encounter early evacuation and mobilization traffic.

Contention 69.D. The Plan does not provide for prior notification of parents if early dismissal is going to occur. According to surveys, between 30% and 40% of the schoolchildren within the plume EPZ return from school to an empty home because both parents hold daytime jobs (or, in the case of single-parent families, the sole parent holds a daytime

job). As a result, many children will be sent home to empty houses, and may be uncared for during the emergency.

Contention 69.E. The Plan fails to provide a means of dealing with an escalation of the emergency (and accompanying need to recommend protective actions of sheltering or evacuation) that may occur during the lengthy process of early dismissal. Indeed, the LILCO Plan provides that once schools initiate early dismissal, LILCO will not inform the schools of subsequent sheltering or evacuation protective action recommendations. (OPIP 3.8.2, at 5.) Thus, in the event of such an escalation, children are likely to be stranded in schools, or *en route* to their homes (walking or on buses), without available shelter, means of evacuation or other protection. Children would thus be exposed to health-threatening radiation doses.

Contention 70

Although the LILCO Plan states that schools will be advised to evacuate if evacuation or a combination of sheltering and evacuation is recommended for the general public, the Plan does not identify relocation centers for, or the means or procedures to evacuate, any of the schools. (Appendix A at II-20.) Thus, the LILCO Plan has no provision concerning how its proposed evacuation and relocation of children, or the safe reuniting of children with their families, could or would be implemented. And, contrary to LILCO's assumption, there is no evidence in the Plan that school officials have conducted "preplanning" for a Shoreham emergency. (See OPIP 3.6.5, at 10a.) Intervenors contend that in failing to provide for an implementable evacuation of the schoolchildren in the school districts in the EPZ the LILCO Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(10), and NUREG-0654 §§ II.J.9 and J.10.

Contention 71

Intervenors contend that the Plan's proposed evacuation of schoolchildren (Appendix A at II-19 to II-21; OPIP 3.6.5) could not and would not be implemented for the following reasons:

Contention 71.A. Assuming the availability of relocation centers for evacuated nursery school children (the Plan fails to identify any such centers), under the LILCO Plan, a timely evacuation of the nursery schools in the EPZ (see Appendix A at II-20, II-21; OPIP 3.6.5) could not be implemented because:

1. Even if LILCO had agreements with companies to provide a sufficient number of buses and agreements with schools or parents permitting children to ride in buses being driven by LILCO employees in an evacuation of nursery schools (see Contention 24), many of the buses in fact would not be accessible to LILCO employees because they would be in the custody of the normal school bus drivers, or the buses would be located substantial distances away.
2. The LILCO Plan has no provision for supervision of children at schools, on buses or at relocation centers.

Contention 71.B. An evacuation of nursery and other schools, even if buses and bus drivers were available (see Contention 24), would take too long and children would not be adequately protected from health-threatening radiation doses because:

1. Evacuating buses would encounter congestion from other mobilization and evacuation traffic, and thus would be substantially delayed in traveling from schools to relocation centers (the Plan fails to identify any such relocation centers).
2. Normal school dismissals require substantial numbers of multiple bus runs as well as staggered dismissal times. In the event of an evacuation, an even larger number of multiple bus runs (requiring several hours) would be necessary to transport all children out of the EPZ.

Contention 72

The LILCO Plan proposes to evacuate all hospitals, nursing homes and other special health care facilities in the EPZ, using buses, ambulances, and ambulettes. (Plan, Appendix A at II-28 to II-29, IV-166 to IV-168, IV-172 to IV-178; OPIP 3.6.5.) This aspect of the Plan cannot be implemented; accordingly, people in special facilities will not be adequately protected in the event of an emergency and the LILCO Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(3), 50.47(b)(8), 50.47(b)(10) and NUREG-0654 §§ II.A.3, II.C and II.J for the following reasons:

Contention 72.A. Assuming the necessary vehicles were available to LILCO and were mobilized, the time necessary, following mobilization, to accomplish the proposed evacuation of special facilities will be too long to provide adequate protection from health-threatening radiation doses. Evacuation will take too long as a result of: the large number of trips necessary to transport persons individually to relocation centers;

the other mobilization and evacuation traffic congestion which the evacuation vehicles will encounter; and the time necessary to load and unload passengers from ambulances. Thus, the Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10).

Contention 72.C. The Plan fails to identify any relocation or reception centers for persons evacuated from any hospitals, nursing homes, or other special health care facilities other than the United Cerebral Palsy of Greater Suffolk Inc.

Contention 72.D. The LILCO Plan recognizes that under certain circumstances the evacuation of John T. Mather Memorial, St. Charles and Central Suffolk Hospitals might be necessary, and that LILCO may recommend such an evacuation. (Appendix A at II-28, IV-172; OPIP 3.6.5, at 8.) However, the Plan fails to specify adequately or accurately the circumstances that would necessitate an evacuation of the hospitals, and does not include adequate procedures to permit the person in command and control to make an accurate determination as to whether or not such an evacuation is needed. Thus, the Plan fails to comply with NUREG-0654 § II.J.10.m and 10 C.F.R. § 50.47(b)(10).

Contention 72.E. Instead of planning to provide adequate protection to hospital patients in the event of such an evacuation, the LILCO Plan simply provides that "LERO will evacuate these facilities using an *ad hoc* expansion of transportation resources that are presently committed to other aspects of evacuation." (Appendix A at II-28, IV-172.) Apparently, this *ad hoc* plan will not be developed until an emergency actually occurs. (See Appendix A at II-28, II-172, II-173.) The *ad hoc* plan will utilize the vehicles assigned to implement the evacuation of other segments of the population, but such vehicles will be supplied for the purpose of evacuating hospital patients only "on an as available basis," and only "as the rest of the affected population evacuation nears completion." (Appendix A at IV-173.) Thus, there is no assurance that adequate protective measures could or would be taken for hospital patients and LILCO has thus failed to satisfy the requirements of 10 C.F.R. §§ 50.47(a)(1) and 50.47(b)(10), and NUREG-0654 § II.J.10.d.

Contention 73: Handicapped People at Home

Contention 73

The LILCO Plan proposes to use ambulances to evacuate handicapped people who are not in special facilities. (OPIP 3.6.5.) Intervenors contend that this aspect of the LILCO Plan cannot be implemented in a timely manner and therefore will not provide adequate protection to handicapped persons in the EPZ. Thus, this aspect of the Plan fails to

comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(1), 50.47(b)(3) and 50.47(b)(10), and NUREG-0654 §§ II.A.3, II.C.4 and II.J, as specified in ¶¶ A and B below.

Contention 73.A. All handicapped persons in need of special evacuation services will not be known to LILCO and therefore will not be evacuated in the event of an emergency. The preregistration system proposed by LILCO (Plan, Appendix A at II-18; *see also* Information Brochure), will not result in identification of a substantial number of persons who may need assistance in order to evacuate because:

1. Many people who will require assistance will not return the postcards to LILCO because they do not: (a) perceive themselves to be handicapped; (b) desire to be identified as handicapped; (c) understand the reason or need to return the cards; (d) remember to return the cards; and/or (e) desire to rely on LILCO assistance in the event of an emergency.
2. There is no provision for verifying the completeness of the LILCO listing to be compiled from the returned postcards.
3. There is no provision for regularly updating the listing.

Contention 73.B. The LILCO Plan does not provide for the assistance and equipment necessary to accomplish an evacuation of handicapped persons at home, and thus fail to comply with 10 C.F.R. §§ 50.47(b)(1), 50.47(b)(3), 50.47(b)(5), 50.47(b)(8), and NUREG-0654 §§ II.A.3, II.C.4, II.E and II.J. Specifically:

1. The only provision for notifying nondeaf handicapped individuals of a pending evacuation is by means of a telephone call from the LILCO Home Coordinator. (OPIP 3.6.5.) This is an inadequate and ineffective means of notifying many handicapped individuals such as those who are bedridden, unable to get to a telephone or unable to communicate on a telephone, and thus LILCO fails to comply with 10 C.F.R. § 50.47(b)(5) and NUREG-0654 §§ II.E.5 and E.6. (*See* FEMA Report at 9.)
3. One LILCO employee — the Home Coordinator — is responsible for contacting all the handicapped persons and identifying and contacting all reception centers (none of which are identified in the Plan). (OPIP 3.6.5, § 5.1.2.) While OPIP 3.6.5 provides that the Home Coordinator should “[d]raw on Communications and Administrative Support personnel to assist in this effort,” there is no indication that such personnel will be available. Thus, there is no assurance that disabled persons will be notified promptly enough to permit timely evacuation.
4. The proposed evacuation would take far too long, and as a result, handicapped people would be likely to receive health-

threatening doses of radiation because evacuating vehicles would encounter congestion from other mobilization and evacuation traffic, and thus would be substantially delayed in traveling to the homes of handicapped individuals, and to relocation centers.

5. The LILCO Plan calls for the deaf to be alerted of an accident, and advised of the appropriate protective action, by LILCO route alert drivers who are expected to drive to the home of each deaf resident within the EPZ (OPIP 3.6.5). This proposed notification will not be timely, however, since route alert drivers will be delayed by mobilization and evacuation traffic. Furthermore, even disregarding expected traffic conditions, there is no assurance that enough route alert drivers will be assigned to this function to enable LILCO to carry out such notification promptly.

Contentions 74-77: Relocation Centers

Further Preamble to Contentions 74-77

An offsite emergency plan must include means of relocating evacuees and must provide for relocation centers located at least 5 miles and preferably 10 miles beyond the EPZ. NUREG-0654 §§ II.J.10.g and J.10.h. Such relocation centers are essential to provide food and shelter to those evacuees who have no alternative places to stay and also to provide radiological monitoring and decontamination for evacuees and their vehicles. The relocation centers must have sufficient personnel and equipment to monitor evacuees within a 12-hour period. NUREG-0654 § II.J.12.

The LILCO Plan calls for the establishment of relocation centers outside the EPZ at the following facilities (Plan at 4.2-1; OPIP 4.2.1):

- Suffolk County Community College (primary)
- BOCES Islip Occupational Center (primary)
- State University of New York at Stony Brook (primary)
- State University of New York at Farmingdale (backup)
- St. Joseph's College, Patchogue (backup)

The Intervenor contend that LILCO will be unable to provide adequate relocation centers and services for evacuees, and thus the Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(8), 50.47(b)(10), and NUREG-0654 § II.J. The specific deficiencies which lead to this conclusion are set forth in Contentions 74-77.

Contention 74

Two of the three primary relocation centers designated by LILCO are well within 20 miles from the Shoreham site. Both Suffolk County Community College and the State University of New York at Stony Brook are only 3 miles from the plume EPZ boundary, contrary to the requirement of NUREG-0654 § II.J.10.h.

Contention 75

The LILCO Plan provides no estimates of the number of evacuees who may require shelter in a relocation center, and the Plan fails to demonstrate that each such facility has adequate space, toilet and shower facilities, food and food preparation areas, drinking water, sleeping accommodations and other necessary facilities. Accordingly, there is no assurance that the relocation centers designated by LILCO will be sufficient in capacity to provide necessary services for the number of evacuees that will require them. Thus, LILCO fails to comply with NUREG-0654 §§ II.J.10.g and J.12.

Contention 77

The equipment used by LILCO to measure thyroid contamination at relocation centers — RM 14 with HP270 probe — (see OPIP 3.9.2) will be incapable of differentiating the required signal from background readings. The instrument's most sensitive scale (0-500 counts per minute (cpm)) is insufficiently sensitive for the accurate measurement of 150 cpm or 0.13 mrem/hr (the threshold for requiring hospital care) in the presence of background readings which are likely to be elevated above the 50-cpm maximum (10-15 cpm nominal) assumed by LILCO. (OPIP 3.9.2 and Plan at 3.9-4.) In addition, the Plan provides no information or instruction on how to make a measurement if the background reading exceeds 50 cpm. Accordingly, the LILCO Plan fails to comply with NUREG-0654 § II.J.12.

Contentions 78-83: Food, Milk, Water and Livestock Control

Further Preamble to Contentions 78-83

Section 50.47(b)(10) of 10 C.F.R. requires that protective actions for the ingestion exposure pathway EPZ "appropriate to the locale" be in place. The ingestion exposure pathway generally covers an area approximately 50 miles in radius. 10 C.F.R. § 50.47(c)(2). Plans for the inges-

tion pathway are required to "focus on such actions as are appropriate to protect the food ingestion pathway." *Id.* The purpose of these requirements is to protect the public from consumption of contaminated foodstuffs. NUREG-0654 § II.J.11.

Contention 81

The Plan contains insufficient procedures or other means of implementing the protective actions set forth in OPIP 3.6.6. Thus, LILCO has not developed adequate plans for the 50-mile ingestion exposure pathway, and there is no compliance with 10 C.F.R. §§ 50.47(a)(1), 50.47(b)(1), 50.47(b)(3), 50.47(b)(10), 50.47(c)(2), and NUREG-0654 § II.J.11. Specifically:

Contention 81.A. The Plan does not provide adequate procedures or guidance governing the disposition of contaminated lactating dairy animals, or the treatment of uncontaminated lactating dairy animals should uncontaminated stored feed not be available. Thus, there is no assurance that the milk or meat products of these animals will be kept from public consumption.

Contention 81.B. The Plan calls for withholding contaminated milk from the market to allow radioactive decay of short-lived radionuclides but does not call for its disposal or continued withholding after the decay period. (OPIP 3.6.6, Attach. 7, at 1.) The Plan provides no standards for determining what constitutes an adequate "decay period" or for identifying short-lived radioisotopes, nor does it contain any provisions for dealing with long-lived isotopes which would pose a serious health consequence to the public. In addition, the Plan does not state: (1) how the withholding of contaminated milk would be achieved; (2) how the prolonged storage and special pasturization of milk would be achieved; (3) how the diversion of the production of fluid milk would be achieved; or (4) how the introduction of milk supplies into commerce would be prevented.

Contention 81.C. The Plan calls for washing contaminated fruit and vegetables and milling and polishing contaminated grains (OPIP 3.6.6, Attach. 7, at 1a). However, the Plan contains no procedures for disposing of the wash water or residue, which could pose a serious potential for adverse health consequences. In addition, the Plan does not state: (1) how the removal of surface contamination from fruits and vegetables by washing, etc., would be achieved; (2) how the milling and polishing of contaminated grains would be achieved; or (3) how the many informal local farm stands can be found and controlled.

Contention 81.D. The Plan contains no maps showing key land use data, watersheds, water supply intakes and treatment plants and reservoirs. Nor does it state: (1) how and from where alternative drinking water supplies would be made available; or (2) how affected wells would be identified and isolated and reservoirs secured.

Contention 81.E. The Plan does not state: (1) how the diet of all residents and visitors is to be restricted; (2) who will pay for condemnation and under what procedures condemnation will be executed; or (3) how exports of agricultural products and ducks from Suffolk County to other parts of the country can be controlled or prevented.

Contention 81.F. The Plan does not provide for personnel, facilities, equipment or even a communications network to implement any of the actions listed in subparts A through E.

Contentions 84-91: Recovery and Reentry

Preamble to Contentions 84-91

The LILCO Plan proposes that short-term and long-term recovery and reentry operations will be performed by LILCO personnel following a radiological emergency at Shoreham (Plan at 3.10-1 and 3.10-2; OPIP 3.10.1). For the reasons specified in Contentions 84-91, Intervenor contend that contrary to the emergency planning standards of 10 C.F.R. § 50.47(b)(13) and NUREG-0654 § II.M, the LILCO Plan fails to include general plans for recovery and reentry, including the development of necessary procedures and methods that are capable of being implemented.

Contention 85

The LILCO Plan at 3.10-1 states that after site conditions are controlled the Director of Local Response will appoint a Recovery Action Committee which "will plan and implement actions for the restoration of the affected areas to their pre-emergency conditions." (*Id.*) The LILCO Plan thus provides merely that planning for recovery and reentry will commence after the appointment of the Recovery Action Committee; at this time, no such plan exists. This is contrary to the requirement of 10 C.F.R. § 50.47(b)(13) that "[g]eneral plans for recovery and reentry *are* developed," (emphasis added), and NUREG-0654 § II.M.

Contention 88

OPIP 3.10.1 sets forth "Acceptable Surface Contamination Levels" in units of disintegrations per minute. The Plan does not include a method for converting such information into radiation doses to the public (e.g., person-rem). The Plan also 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. The Plan calls for cost-benefit analysis based on \$1000/person-rem during temporary reentry (OPIP 3.10.1, at 5), but provides no guidance on how to analyze a situation in order to be able to apply this criterion. Thus the Plan fails to comply with 10 C.F.R. § 50.47(b)(13) and NUREG-0654 §§ II.I.10 and II.M.1.

Contention 92: State Emergency Plan

Contention 92

There is no New York State emergency plan to deal with an emergency at the Shoreham plant before this Board. (See Plan, Attach. 1.4.2.) In addition, the LILCO Plan fails to provide for coordination of LILCO's emergency response with that of the State of New York (assuming, *arguendo*, such a response would be forthcoming). (See FEMA Report at 1.) In the absence of a State emergency plan for Shoreham, there can be no finding of compliance with 10 C.F.R. §§ 50.47(a)(2), 50.47(b), or NUREG-0654 §§ I.E, I.F, I.H or II.¹⁷

Contentions 93-96: Loss of Offsite Power

Preamble to Contentions 93-96

The LILCO Plan must provide an adequate response for even "the worst possible accident, regardless of its extremely low likelihood." NUREG-0654 § I.D, at 7. This includes a loss of offsite power, which would not be unlikely in conjunction with a severe accident at Shoreham. The LILCO Plan, however, contains no measures for dealing with such a circumstance, and thus does not provide for the protection of the public health and safety, for the reasons set forth in Contentions 93-96 below.

¹⁷ In LBP-83-22, 17 NRC 608, 643 (1983), the ASLB mentioned that contentions would be appropriate concerning lack of coordination between the LILCO Plan and the State plan. As noted in this contention, however, there is no State plan before the Board. Thus, there is in fact noncompliance with all the NUREG-0654 planning requirements which pertain to the State. The County has not alleged separate contentions as to each of these, it being considered sufficient to note merely the lack of any State plan.

Contention 93

Section 50.47(b)(8) of 10 C.F.R. requires the emergency response organization to establish “adequate facilities” to maintain the emergency response. *See also* NUREG-0654 § II.H. The LILCO Plan fails to satisfy this requirement by failing to allow for the possibility of a loss of offsite power. Specifically:

- A. The LILCO Plan does not indicate that the EOC has a backup power supply nor does it provide for the management of the emergency response from another location. In the event of a loss of offsite power the EOC would become inoperable and LERO would become unable to implement an emergency response.
- B. The LILCO Plan does not indicate that backup power supplies have been established for staging areas, bus transfer points, receiving hospitals, or relocation centers. In the event of a loss of offsite power, these facilities would become inoperable.

Contention 94

Section 50.47(b)(5) of 10 C.F.R. and NUREG-0654 § II.E.2 require that emergency plans provide for the prompt notification of response personnel. *See also* 10 C.F.R. Part 50, Appendix E, §§ IV.C and IV.D. Notification channels must remain open on a 24-hour basis. NUREG-0654 §§ II.F.1.a. The LILCO Plan violates this requirement by not allowing for the possibility of a loss of offsite power. Specifically:

- A. The LILCO Plan does not indicate that the LILCO Customer Service Office has a backup power supply. In the event of a loss of offsite power, the LILCO Customer Service Office will become inoperable. Thus, the SNPS Control Room will be unable to notify LERO and initiate the emergency response process. *See* LILCO Plan, § 3.3.
- B. The LILCO Plan does not indicate that the EOC has a backup power supply. In the event of a loss of offsite power, the EOC will become inoperable, and LERO will be unable to notify emergency personnel in the field.

Contention 95

Section 50.47(b)(5) of 10 C.F.R. requires every emergency plan to provide for early notification and clear instruction to those within the plume EPZ. These requirements are distinct: the public must be given an early alert signal *and* a followup instructional message. *See*

NUREG-0654, Appendix 3, § B(2)(a). The LILCO Plan violates these requirements by failing to take account of the possibility of a loss of off-site power. Specifically:

Contention 95.A. LILCO relies on a system of sirens for providing an immediate alert to the public. See LILCO Plan at 3.3-4; OPIP 3.3.4. However, the LILCO Plan does not indicate that the sirens have a backup power supply. Therefore, in the event of a loss of offsite power, the sirens will not function.

Contention 95.D. LILCO relies on tone alert radios to provide the extra evacuation time required by large facilities such as factories and schools. See LILCO Plan at 3.3-4, 3.3-5. The tone alert radios will evidently operate on AC power rather than on batteries. Therefore, in the event of a loss of offsite power, the tone alert radios would not function.

Contention 95.E. Emergency plans must provide formal means for dissemination of information to the public through the news media. See NUREG-0654 § II.G.3 and 10 C.F.R. § 50.47(b)(7). LILCO relies on the establishment of an Emergency News Center to satisfy this requirement. See OPIP 3.8.1. However, the LILCO Plan does not indicate that the Emergency News Center has a backup power supply or that a backup news facility has been established. Therefore, in the event of a loss of offsite power, the Emergency News Center will become inoperable and LILCO's public notification duties will not be satisfied.

Contention 96

Section 50.47(b)(10) of 10 C.F.R. requires each emergency plan to provide for protective actions which protect the public health and safety in the event of an accident. NUREG-0654 § II.J.9 requires a demonstration that the protective actions within a plan are capable of being implemented. The LILCO Plan does not satisfy these requirements because it fails to take account of the possibility of a loss of offsite power. Specifically:

Contention 96.A. Assuming that an evacuation of the plume EPZ were determined to be the appropriate protective action, the LILCO Plan relies heavily on the services of private firms such as ambulance services, LILCO Plan, § 3.7, and bus companies, OPIP 3.6.4. However, in the event of a loss of offsite power these firms and facilities would become inoperable and close. LERO would thus become unable to utilize those services.

Contention 96.B. Assuming that an evacuation of the plume EPZ were determined to be the appropriate protective action, LERO would be responsible for evacuating scores of hospitals, nursing homes, and

facilities for the handicapped. However, the LILCO Plan does not indicate that these facilities have backup power supplies. In the event of a loss of offsite power, evacuation of these facilities would be either impossible or far more difficult and time-consuming than indicated in the LILCO Plan.

Without functioning elevators, nonambulatory persons could be moved only with extreme difficulty, if at all. Without lighting, nighttime evacuation of these facilities would be all but impossible. Without functioning medical equipment, management would attempt some form of limited evacuation on its own. In any case, this potential circumstance is not taken into account in the LILCO Plan.

Contention 96.C. Assuming that evacuation of the plume EPZ were determined to be the appropriate protective action, the successful implementation of such an action would depend on the functioning of systems and facilities that would in fact be inoperable in the absence of offsite power. These include: residential lighting, public streetlights, traffic signals, and service stations. The LILCO Plan does not indicate that any of these facilities and systems have backup power supplies. Therefore, in the event of a loss of offsite power, the Plan would not provide for the protection of the public health and safety.

SOC Contention 97: Bad Weather

SOC Contention 97

The LILCO Plan is inadequate because it fails to take account of the possibility that a severe accident at Shoreham might occur in tandem with severe adverse weather, i.e., heavy snow. This deficiency violates the applicable standards in several respects.

Contention 97.B. Pursuant to 10 C.F.R. § 50.47(b)(10) the LILCO Plan must designate a range of protective actions appropriate to a variety of circumstances. *See also* NUREG-0654 § II.J.9. This includes unfavorable weather. Yet the LILCO Plan's procedures for evacuation completely disregard the possibility of the existence of deep snow. SOC contends that the evacuation procedures outlined in the LILCO Plan would not work during a heavy snowfall, for the following reasons:

1. Key LERO personnel would be unable to travel to the EOC, as required by the LILCO Plan at 3.3;
2. Neither traffic guides, road crews, evacuation route spotters, ambulance drivers nor staging area coordinators would be able to travel to the staging areas, as required by OPIP 3.3.3 and 3.6.3;

3. Even if the persons listed in (2) above were to reach the staging areas, they would be unable to travel to their assigned posts/routes, as required by OPIP 3.6.3;
4. Bus drivers and shuttle operators would be unable to travel to staging areas, as required by OPIP 3.6.4 and, in any case, would be unable to complete their assigned trips;
5. relocation center staff would be unable to travel to the relocation centers; and
6. Members of the public would be unable to evacuate their homes or places of work.

Contention 98

The LILCO Plan states that emergency response training and periodic retraining "will be offered" to organizations, such as schools, hospitals, nursing homes, adult homes and other special facilities, which may be called upon to "take actions during an incident" at the Shoreham plant. (See Plan at 5.1-6.) However, the Plan fails to demonstrate that such training and retraining will, in fact, be provided, nor is there any description of the training that "will be offered." Further, the Plan fails to demonstrate that training and/or periodic retraining will be provided to the personnel of emergency response organizations which are relied upon by LILCO to provide essential support services during an emergency, including the U.S. Coast Guard, DOR-RAP, the American Red Cross, and ambulance personnel. Therefore, the LILCO Plan does not comply with 10 C.F.R. § 50.47(b)(15), 10 C.F.R. Part 50, Appendix E, § IV.F, and NUREG-0654 § II.O. Because the Plan provides no assurance that the persons necessary to implement the LILCO Plan will be timely and adequately trained, there can be no assurance that the protective measures described in the Plan can or will be taken in the event of an emergency, in violation of 10 C.F.R. § 50.47(a)(1).

Contention 99

In violation of 10 C.F.R. § 50.47(b)(15), 10 C.F.R. Part 50, Appendix E, § IV.F, and NUREG-0654 § II.O, the training provided by LILCO to emergency response personnel (both LILCO and non-LILCO) is inadequate and, as a result, in the event of a radiological emergency such personnel will neither understand nor be able to perform properly the functions assigned to them under the LILCO Plan. There is, therefore, no assurance that adequate protective measures can and will be taken in the event of a radiological emergency at Shoreham, as required by 10 C.F.R.

§ 50.47(a)(1). The specific deficiencies in LILCO's training program, each of which contributes to the overall inadequacy of the training proposed by LILCO, are set forth below.

- C. LILCO's classroom training sessions have been conducted by individuals who are neither experienced in, nor knowledgeable about, the subject areas they are assigned to teach. In addition, the teachers are not experienced or trained in teaching methods.
- G. The LILCO training program provides insufficient information concerning *how* trainees are to perform the specific duties and responsibilities assigned to them under the LILCO Plan. Instead, the "training" consists primarily of descriptive statements of job titles, job duties, and chains of command.

Contention 100

In violation of 10 C.F.R. § 50.47(b)(15), 10 C.F.R. Part 50, Appendix E, § IV.F and NUREG-0654 § II.O, the LILCO drill and exercise programs are inadequate and do not prepare or train LERO personnel to perform properly or effectively their assigned functions under the LILCO Plan. As a result, there is no assurance that adequate protective measures can and will be implemented in the event of a radiological accident at Shoreham, in violation of 10 C.F.R. § 50.47(a)(1). The specific deficiencies in LILCO's drill and exercise programs are as follows:

- B. During drills, LERO field personnel trainees are not accompanied to their posts by instructors. Therefore, whatever activities they may have performed during the so-called "drill" have not been supervised, observed, evaluated, graded, or critiqued. This renders the "field drills" meaningless as "training."
- D. Contrary to the requirements of 10 C.F.R. Part 50, Appendix E, § IV.F, and NUREG-0654 § II.O.2, most LERO trainees are not required to perform their LERO jobs during training drills. For example, traffic guides did not direct traffic, and bus drivers did not drive buses over bus routes. Thus, LILCO's drill program has not provided LERO personnel with an opportunity to practice their emergency duties and responsibilities.
- G. The LILCO drills contain no terminal performance standards, and, consequently, there are no objective, observable criteria to be used by instructors in evaluating the performance of individual trainees.

Strike Issues Admitted by the Board *Sua Sponte*

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."

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**John H Frye, III, Chairman
Dr. Harry Foreman
Gustave A. Linenberger**

In the Matter of

**Docket No. 50-70-OLR
(ASLBP No. 85-407-01-LR)**

**GENERAL ELECTRIC COMPANY
(GETR Vallecitos)**

April 23, 1985

**MEMORANDUM AND ORDER
(Dismissing Proceeding)**

On April 15, 1985, the parties filed a joint stipulation and request for dismissal of this proceeding. The stipulation recites that General Electric Co. (GE) will withdraw its application for a renewal of its operating license for the GETR and seek instead authorization to possess but not to operate that facility. Additionally, GE will provide the intervenor, Mr. Jack Turk, 60 days written notice prior to the filing of any subsequent application to operate the facility.

In view of GE's commitments, Mr. Turk withdraws all his admitted contentions and his concerns centered on the Morgan Hill earthquake without prejudice to the admission of himself as a party in any subsequent proceeding to assert his contentions and concerns should GE again seek permission to operate the GETR.

The parties note that there are no matters in dispute among them and request that we approve their stipulation and dismiss this proceeding.

The stipulation is signed by counsel for GE and NRC Staff and by Mr. Jack Turk.

In consideration of the foregoing, it is, this 23rd day of April 1985, ORDERED

1. The parties' stipulation of April 15, 1985, is approved; and
2. This proceeding is dismissed.

It is so ordered.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

John H Frye, III, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland
April 23, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION

Harold R. Denton, Director

In the Matter of

Docket No. 50-293
(10 C.F.R. § 2.206)

BOSTON EDISON COMPANY
(Pilgrim Nuclear Power Station)

April 5, 1985

The Director of the Office of Nuclear Reactor Regulation denies the petition of Mr. John F. Doherty asserting that there were a number of alleged deficiencies at the Pilgrim Station of the Boston Edison Company associated with equipment qualification that represented a hazard to continued safe operation of the facility. Petitioner sought issuance to the Licensee of an order to show cause why the license for the Pilgrim facility should not be revoked or suspended due to the alleged deficiencies.

**TECHNICAL ISSUE DISCUSSED: ENVIRONMENTAL
QUALIFICATION OF ELECTRICAL EQUIPMENT**

The Licensee's program for environmental qualification of electrical equipment complies with the requirements of 10 C.F.R. § 50.49. Proposed resolutions for each of the environmental deficiencies identified are acceptable. Continued operation of the facility until implementation of the program is complete will not result in undue risk to the public health and safety.

DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206

INTRODUCTION

On October 20, 1984, John F. Doherty (Petitioner) filed his Petition/Request for Show Cause Order (Petition) with the Director of the Office of Nuclear Reactor Regulation. The Petition asserted that there were a number of alleged deficiencies at the Pilgrim Station of the Boston Edison Company (Licensee) associated with equipment qualification that represent a hazard to continued safe operation of the facility. The Petition identified twenty-four items of alleged deficient equipment based upon review of a Technical Evaluation Report (TER) for the Pilgrim Station performed by Franklin Research Center (FRC), the Licensee's reply to that report, and an NRC letter to the Licensee dated May 11, 1983. The Petition requested that I institute a proceeding under 10 C.F.R. § 2.202 to suspend or revoke the operating license for the Pilgrim Station by serving on the Licensee an order to show cause why the operating license should not be revoked or suspended due to the alleged deficiencies in equipment qualification. On November 29, 1984, I acknowledged receipt of the Petition and informed the Petitioner that I would issue a formal decision with regard to it in the reasonably near future. My decision in this matter follows.¹

DISCUSSION

Petitioner's basis for requesting action is a listing of twenty-four items concerning the adequacy of equipment qualification. Twenty-three of these items refer to electrical equipment identified by the Franklin Research Center in its TER for the Pilgrim Station, whereas the remaining item (#10 of the Petition) concerns mechanical equipment. It is important to recognize that the FRC study to which the Petitioner refers was one initiated by the Nuclear Regulatory Commission itself to assist it in assessing the adequacy of the Licensee's electrical equipment environmental qualification program at the Pilgrim facility. The TER provided

¹ This Decision also responds to the Commission's direction in promulgating its final rule on environmental qualification of electric equipment (49 Fed. Reg. 45,571 (Nov. 19, 1984)) that the Director of Nuclear Reactor Regulation review pursuant to 10 C.F.R. § 2.206 the plant-specific comments received by the Commission in response to the notice of proposed rulemaking (49 Fed. Reg. 8445 (Mar. 7, 1984)). The plant-specific comments included those filed by Mr. Doherty on May 9, 1984, and August 10, 1984. As those comments raise the same matters identified in the October 20, 1984 Petition of Mr. Doherty, this Decision is also responsive to them.

to the Staff by FRC is dated January 19, 1983, and it has been specifically addressed by both the Licensee and the NRC Staff.²

On February 8, 1979, the NRC Office of Inspection and Enforcement issued IE Bulletin 79-01, "Environmental Qualification of Class 1E Equipment." This Bulletin, together with IE Circular 78-08 (issued on May 31, 1978) requested affected licensees, including this Licensee, to perform reviews to assess the adequacy of their environmental qualification programs. The NRC Staff's review of this area was discussed in a Safety Evaluation (SE) dated June 3, 1981, which included further requests for information from the Licensee. Following the submittal of additional information by the Licensee on September 11, 1981, February 8, 1982, and March 2, 1982, the Staff asked FRC to evaluate that information in order to (1) identify all cases where the Licensee's response did not resolve the significant qualification issues, (2) evaluate the Licensee's qualification documentation in accordance with established criteria to determine which equipment had adequate documentation and which did not, and (3) evaluate the Licensee's qualification documentation for safety-related electrical equipment located in harsh environments consistent with TMI "Lessons Learned" implementation. A TER, dated January 19, 1983, was prepared by FRC to document its evaluation. It is this document to which the Petition makes reference. A second SE was subsequently prepared by the NRC Staff and issued to the Licensee on April 13, 1983, with the FRC TER as an attachment.³ This TER identified a number of electrical equipment environmental qualification deficiencies and the SE concurred with the bases and findings of the TER. Based on these findings, the Staff requested the Licensee to provide its plans for qualification or replacement of certain items and justifications for continued operation in the near term.

A meeting was held with the Licensee on May 22, 1984, in order to discuss the Licensee's proposed method of resolving the environmental qualification deficiencies identified in the 1983 Safety Evaluation and FRC TER. During this meeting with the Licensee, a proposed resolution for each of these deficiencies was discussed and the NRC Staff found the Licensee's approach for resolving them acceptable. The approach described by the Licensee for addressing and resolving the identified defi-

² The background associated with the NRC Staff's review of the Licensee's equipment qualification program for the Pilgrim Station is provided in Attachment 1, Safety Evaluation, Office of Nuclear Reactor Regulation, Pilgrim Station, Docket No. 50-293 (hereinafter referred to as the Pilgrim SE).

³ Safety Evaluation for Environmental Qualification of Safety-Related Electrical Equipment, Docket No. 50-293, April 13, 1983, with Technical Evaluation Report entitled "Review of Licensee's Resolution of Outstanding Issues from NRC Equipment Environmental Qualification Safety Evaluation Reports (F-11 and B-60), Boston Edison Company, Pilgrim Station Unit 1," Franklin Research Center, January 19, 1983.

ciencies included replacing equipment, performing additional analyses, utilizing additional qualification documentation beyond that reviewed by FRC, obtaining additional qualification documentation, or determining that some equipment was outside the scope of 10 C.F.R. § 50.49 and therefore not required to be environmentally qualified. The discussions also included the Licensee's general methodology for compliance with § 50.49 and justification for continued operation with those equipment items for which environmental qualification was not yet complete.⁴

Subsequent to the May 22, 1984 meeting, the Licensee provided further information for resolution of the identified deficiencies by its letters dated July 9, August 3 and September 24, 1984, and January 21 and 29, 1985. With its review of these submittals, the NRC Staff has now completed its evaluation of the acceptability of the Licensee's electrical equipment environmental qualification program, including the type of documentation the Licensee indicated it has retained. The Staff's findings are found in the attached Pilgrim SE dated March 26, 1985. Based on this evaluation, the Staff has reached the following conclusions with respect to the electrical equipment items identified in the Petition and the FRC TER:

- I. Documentation has been assembled by the Licensee which should show that the following equipment items are environmentally qualified:

Petition No.	TER No.	Description
1 (partial) ⁵	117	Rockbestos Cable in the Noble Gas Monitoring System
2	142	Fenwall Model 17002 Temperature Switches
4	171	Barton 288 DPIS Switches

⁴ A final rule on environmental qualification of electric equipment important to safety became effective on February 22, 1983 (48 Fed. Reg. 2729). This rule, 10 C.F.R. § 50.49, specifies the requirements of electrical equipment important to safety located in a harsh environment. Effective November 19, 1984, this rule was amended to remove the June 30, 1982 deadline for environmental qualification of electric equipment imposed by previous Commission order and established a new date for final environmental qualification of electric equipment (49 Fed. Reg. 45,571). (This issue is pending review in the D.C. Circuit Court of Appeals.) Accordingly, March 31, 1985, was established as the new deadline for the Pilgrim Station. However, on January 29, 1985, the Licensee requested an extension of this deadline until November 30, 1985. The request was found justified and the extension was, therefore, granted on March 28, 1985.

⁵ The notation "partial" for an item identified in the Petition signifies that the particular item has been resolved in a combination of ways, the sum of which is satisfactory resolution of the item.

Petition No.	TER No.	Description
5	166	Fenwall Model 17002 Temperature Switches
8 (partial)	183, 188, 201	Barksdale Pressure Switches B2T
12	81	Target Rock Solenoid Valves for Automatic Depressurization System
14	93	General Electric Motors for Standby Gas Treatment System
20	249	General Electric Safety Injection Cable Model 57279
21	98	Technology for Energy Accelerometers for Safety/Relief Valves
22	139, 143, 159, 160, 164, 166	Fenwall Model 1700240 Temperature Switches
24	127, 128, 129	General Electric Penetrations

II. The following equipment items have been replaced with equipment which the Licensee has stated is qualified:

Petition No.	TER No.	Description
15	220	General Electric Flow Transmitters
23 (partial)	254, 255	NAMCO EA740 Position Switches

III. For the following equipment items, which have not yet been completely qualified, the approach described by the Licensee for resolving the identified deficiencies includes replacing equipment, performing additional analyses, and utilizing/obtaining additional qualification documentation. This approach is acceptable. For each of these items, the Licensee has provided an acceptable justification for continued operation (JCO) until environmental qualification has been completed:

Petition No.	TER No.	Description
7	176, 180	Barton 289A Pressure Switches
8 (partial)	194	Barksdale B2T Pressure Switches

Petition No.	TER No.	Description
9	10, 12, 13	Limitorque SMB-3 Motor Operators for Core Spray Injection
13	88	Cutler Hammer Motor Control Center
17	210 thru 214	Yarway 4418C Level Switches
18 (partial)	226, 227	Yarway 4418EC Level Switches
19	232	Robertshaw SL702 Level Switches

IV. The following equipment items have been identified by the Licensee as outside the scope of 10 C.F.R. § 50.49 and, therefore, not required to be environmentally qualified:

Petition No.	TER No.	Description
1 (partial)	114, 115, 116	Rockbestos Cables in Noble Gas Monitoring System
3	150	Comsip Design Hydrogen Analyzer
6	125	Conax Electrical Penetrations
11	51	ASCO HVA Solenoid Valves
18 (partial)	224, 225	Yarway 4418EC Level Switches
23 (partial)	148	NAMCO EA740 Position Switches

As indicated above, all but one of the items raised by the Petitioner have been addressed by the Licensee in the course of fulfilling the requirements of § 50.49. In the attached Pilgrim SE, the NRC Staff has documented its review and evaluation of the Licensee's electrical equipment environmental qualification program, including the proposed resolutions for qualification deficiencies and justifications given for continued operation of the plant during resolution of the deficiencies. The result of that evaluation was that the Staff found the Licensee's qualification program acceptable. Prior to reaching such a conclusion with respect to the environmental qualification programs at several other plants, the Staff has performed audits of their documentation. This was because the Staff had concerns regarding the acceptability of the programs being implemented by the associated licensees. However, the Staff does not have a similar concern for the Pilgrim facility and believes it is reasonable to conclude that the considerable efforts expended by the Boston Edison

Company have substantially enhanced the status of environmental qualification of the electrical equipment at the Pilgrim Station.

However, a follow-on implementation review will be performed by personnel in NRC Region I as part of the Staff's overall effort to monitor implementation of all licensees' EQ programs. A schedule has not yet been established for the Pilgrim implementation review. The primary objective of this review will be to verify that the Licensee's files contain the appropriate analyses and other necessary documentation to support the Licensee's conclusion that the equipment is properly qualified. The inspections will also provide reasonable assurance that the Licensee's program for surveillance and maintenance of environmentally qualified equipment is adequate to assure that this equipment is maintained in the as-analyzed or as-tested condition. The method used for tracking periodic replacement parts, and implementation of the Licensee's commitments and actions, e.g., regarding replacement of equipment, will also be verified.

In the remaining item, #10 of the Petition, the Petitioner expressed concern "that the automatic depressurization system (ADS) accumulators have not been verified environmentally qualified for harsh environments in that they may not be certain to be leak proof." The Petitioner drew this implication from NRC's letter dated May 11, 1983, to the Licensee requesting further information relative to the qualification of accumulators on the ADS valves.

With respect to leakage, the accumulators must withstand a hostile environment and maintain enough inventory of air or nitrogen to cycle the ADS valves for an adequate period of time following an accident. In response to NRC's request, the Licensee provided design details in a letter dated July 29, 1983, and stated that the ADS accumulator components are seismically qualified and that harsh environments in the drywell do not adversely affect the leakage rate of components in the ADS. The Licensee stated also that the nonmetallic portions of the mechanical components (i.e., the soft seating materials in the check valves) are able to withstand the drywell harsh environment. Solenoid valves SV 203-3 AD are the only ADS electrical components and these have been environmentally qualified, as indicated in Part I of the table above for Petitioner's item #12. Based on this information, the Staff agrees with the Licensee that the harsh environment and/or a seismic event should not lead to an increase in leakage and, therefore, will not adversely affect the capability of the accumulators to perform as required. However, performance of accumulators is a generic issue (NUREG-0737, Item II.K.3.28), for which NRC has not yet completed its review for the Pilgrim Station.

CONCLUSION

In summary, the NRC Staff has reviewed each of the items relied upon by the Petitioner in his request for institution of show cause proceedings. The FRC TER dated January 19, 1983 and NRC's letter to the Licensee dated March 11, 1983, which were utilized by the Petitioner as the basis for the requested action, do indicate various environmental qualification deficiencies. Those deficiencies were identified by the FRC and the NRC Staff in reviewing the information available at that time. Thus, the Petitioner has not raised any environmental qualification issues of which the Staff was unaware.

Since the TER was issued, the Licensee has provided considerable additional information regarding the identified electrical equipment deficiencies and has proposed a resolution of each of them that has been found acceptable by the Staff. The attached Pilgrim SE dated March 26, 1985, documents the Staff's review which concludes that the Licensee's electrical equipment qualification program complies with the requirements of 10 C.F.R. § 50.49, that the proposed resolutions for each of the environmental qualification deficiencies identified in the FRC TER are acceptable, and that continued operation until implementation of Licensee's environmental qualification program is complete will not result in undue risk to the public health and safety. Furthermore, the additional information received from the Licensee indicates that the harsh environment in the drywell and/or a seismic event would not lead to an increase in leakage from the ADS accumulators. The Staff will be continuing to monitor the Licensee's progress in implementing its environmental qualification program. Consequently, I conclude that the overall state of equipment qualification of the Pilgrim facility is adequate to assure the public health and safety. Accordingly, I decline to take the action requested by the Petitioner.

Petitioner's request for action pursuant to 10 C.F.R. § 2.206 is denied. As provided by 10 C.F.R. § 2.206(c), a copy of this decision will be filed with the Secretary for the Commission's review.

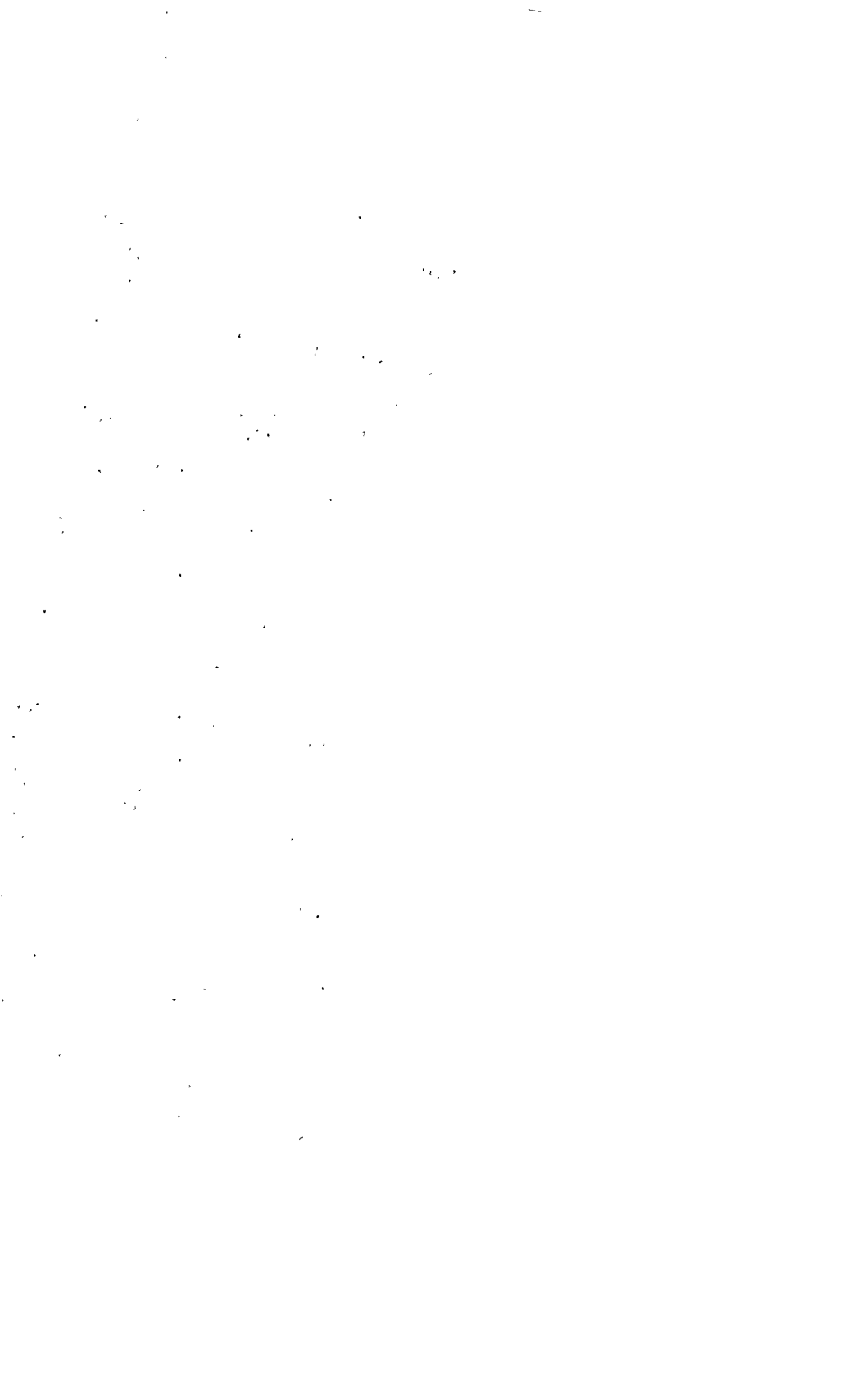
Harold R. Denton, Director
Office of Nuclear Reactor
Regulation

Attachment: Safety Evaluation

Dated at Bethesda, Maryland,
this 5th day of April 1985.

[The Attachment has been omitted from this publication, but may be found in the NRC Public Document Room, 1717 H Street, NW, Washington, DC 20555.]

CLI-85-10 was inadvertently omitted from the February 1985 issuances and not assigned a CLI number until June. Therefore, this order can be found at 21 NRC 1569.



CASE NAME INDEX

BOSTON EDISON COMPANY

REQUEST FOR SHOW CAUSE ORDER; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206;
Docket No. 50-293; DD-85-5, 21 NRC 1033 (1985)

CAROLINA POWER & LIGHT COMPANY and NORTH CAROLINA EASTERN MUNICIPAL POWER AGENCY

OPERATING LICENSE; PARTIAL INITIAL DECISION ON ENVIRONMENTAL
CONTENTIONS; Docket No. 50-400-OL (ASLBP No. 82-472-03-OL); LBP-85-5, 21 NRC 410
(1985)

CLEVELAND ELECTRIC ILLUMINATING COMPANY, et al.

OPERATING LICENSE; DECISION; Docket Nos. 50-440-OL, 50-441-OL; ALAB-802, 21 NRC
490 (1985)

OPERATING LICENSE; MEMORANDUM AND ORDER; Docket Nos. 50-440-OL, 50-441-OL;
ALAB-805, 21 NRC 596 (1985)

COMMONWEALTH EDISON COMPANY

IMMEDIATE ACTION REQUEST; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; Docket
No. 50-295; DD-85-2, 21 NRC 270 (1985)

OPERATING LICENSE; MEMORANDUM AND ORDER ADMITTING ROEM ET AL.
AMENDED QUALITY ASSURANCE CONTENTION; Docket Nos. 50-456, 50-457;
LBP-85-20, 21 NRC 1732 (1985)

OPERATING LICENSE; SPECIAL PREHEARING CONFERENCE ORDER; Docket Nos. 50-456,
50-457; LBP-85-11, 21 NRC 609 (1985)

CONSOLIDATED EDISON COMPANY OF NEW YORK

SPECIAL PROCEEDING; DECISION; Docket No. 50-247-SP; CLI-85-6, 21 NRC 1043 (1985)

CONSUMERS POWER COMPANY

OPERATING LICENSE AMENDMENT; MEMORANDUM AND ORDER; Docket No.
50-155-OLA (Spent Fuel Pool Modification); ALAB-795, 21 NRC 1 (1985)

OPERATING LICENSE/ENFORCEMENT; PARTIAL INITIAL DECISION; Docket Nos.
50-329-OL&OM, 50-330-OL&OM (ASLBP Nos. 78-389-03-OL, 80-429-02-SP); LBP-85-2, 21
NRC 24 (1985)

DUKE POWER COMPANY, et al.

REQUEST FOR ENFORCEMENT ACTION; DIRECTOR'S DECISION UNDER 10 C.F.R.
§ 2.206; Docket Nos. 50-413, 50-414; DD-85-9, 21 NRC 1759 (1985)

GENERAL ELECTRIC COMPANY

OPERATING LICENSE RENEWAL; MEMORANDUM AND ORDER; Docket No. 50-70-OLR
(ASLBP No. 83-481-01-OLR); LBP-85-4, 21 NRC 399 (1985); LBP-85-13, 21 NRC 1031 (1985)

GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION

PETITION FOR RELIEF; MEMORANDUM AND ORDER; Docket Nos. 50-289, 50-320, 50-219
(Petition for Relief Under 10 C.F.R. § 2.206); CLI-85-4, 21 NRC 561 (1985)

REQUEST FOR ACTION; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; Docket Nos.
50-289, 50-320, 50-219; DD-85-1, 21 NRC 263 (1985)

HOUSTON LIGHTING & POWER COMPANY, et al.

OPERATING LICENSE; DECISION; Docket Nos. 50-498-OL, 50-499-OL; ALAB-799, 21 NRC
360 (1985)

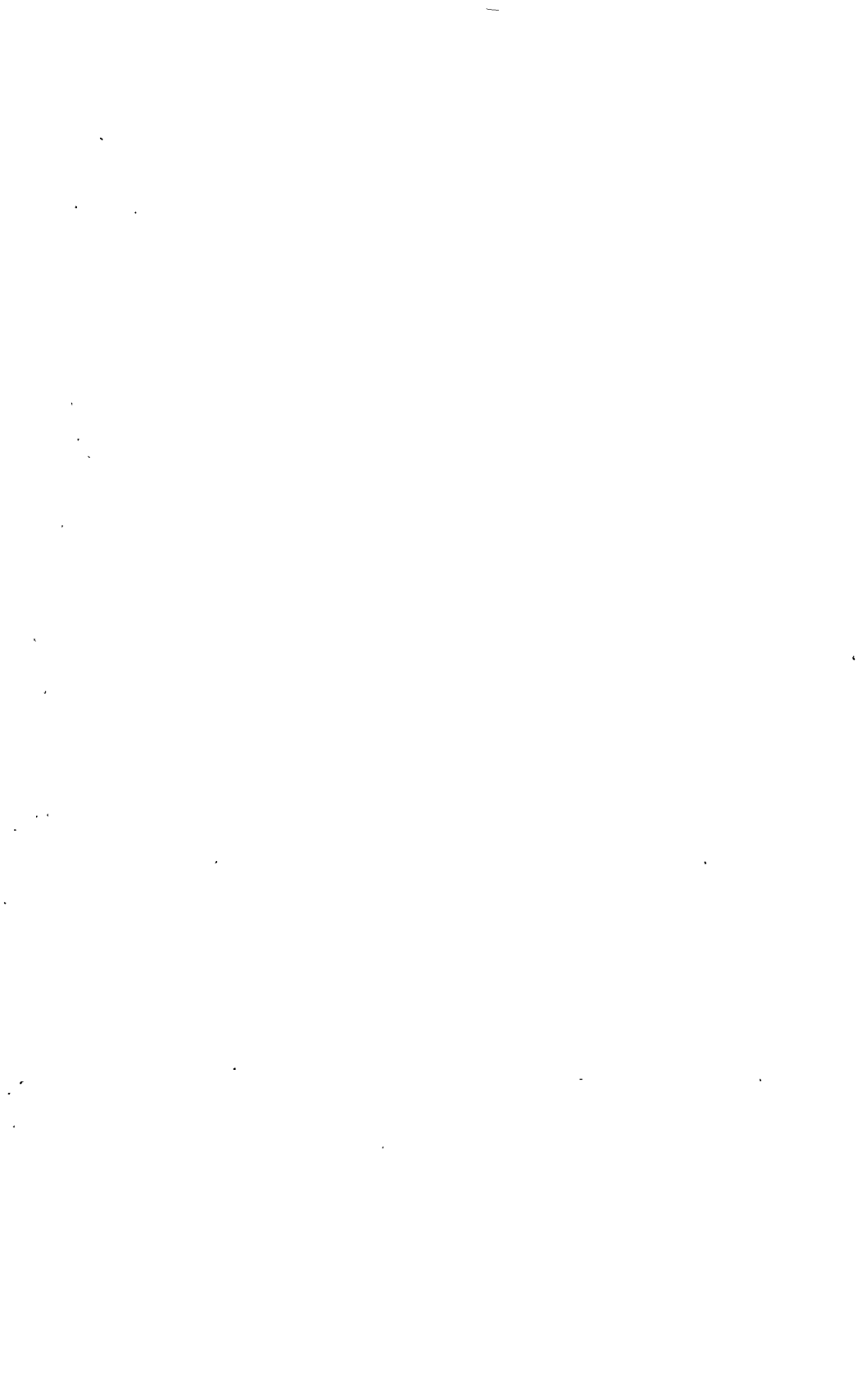
OPERATING LICENSE; MEMORANDUM; Docket Nos. STN 50-498-OL, STN 50-499-OL
(ASLBP No. 79-421-07-OL); LBP-85-8, 21 NRC 516 (1985)

CASE NAME INDEX

- OPERATING LICENSE; MEMORANDUM AND ORDER; Docket Nos. STN 50-498-OL, STN 50-499-OL (ASLBP No. 79-421-07-OL); LBP-85-6, 21 NRC 447 (1985); LBP-85-9, 21 NRC 524 (1985); LBP-85-19, 21 NRC 1707 (1985)
- KANSAS GAS & ELECTRIC COMPANY, et al.**
OPERATING LICENSE; DECISION; Docket No. 50-482-OL; ALAB-798, 21 NRC 357 (1985)
- KERR-McGEE CHEMICAL CORPORATION**
MATERIALS LICENSE; MEMORANDUM AND ORDER; Docket No. 40-2061-ML (ASLBP No. 83-495-01-ML); LBP-85-1, 21 NRC 11 (1985); LBP-85-3, 21 NRC 244 (1985)
- LONG ISLAND LIGHTING COMPANY**
OPERATING LICENSE; DECISION; Docket No. 50-322-OL-4 (Low Power); ALAB-800, 21 NRC 386 (1985)
- OPERATING LICENSE; MEMORANDUM AND ORDER; Docket No. 50-322-OL-4 (Low Power); CLI-85-1, 21 NRC 275 (1985)
- OPERATING LICENSE; MEMORANDUM AND ORDER; Docket No. 50-322-OL; ALAB-810, 21 NRC 1616 (1985)
- OPERATING LICENSE; ORDER; Docket No. 50-322-OL-4; CLI-85-12, 21 NRC 1587 (1985)
- OPERATING LICENSE; PARTIAL INITIAL DECISION ON EMERGENCY DIESEL GENERATORS; Docket No. 50-322-OL; LBP-85-18, 21 NRC 1637 (1985)
- OPERATING LICENSE; PARTIAL INITIAL DECISION ON EMERGENCY PLANNING; Docket No. 50-322-OL-3; LBP-85-12, 21 NRC 644 (1985)
- LOUISIANA POWER & LIGHT COMPANY**
OPERATING LICENSE; DECISION; Docket No. 50-382-OL; ALAB-803, 21 NRC 575 (1985)
- OPERATING LICENSE; MEMORANDUM AND ORDER; Docket No. 50-382-OL; ALAB-797, 21 NRC 6 (1985); ALAB-801, 21 NRC 479 (1985); CLI-85-3, 21 NRC 471 (1985)
- MAINE YANKEE ATOMIC POWER COMPANY**
REQUEST FOR ACTION; FINAL DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; Docket No. 50-309; DD-85-6, 21 NRC 1547 (1985)
- METROPOLITAN EDISON COMPANY, et al.**
OPERATING LICENSE AMENDMENT; DECISION; Docket No. 50-289-OLA (Steam Generator Repair); ALAB-807, 21 NRC 1195 (1985)
- SPECIAL PROCEEDING; LICENSING BOARD RESPONSE TO CLI-85-2; Docket No. 50-289-SP (Restart); LBP-85-10, 21 NRC 603 (1985)
- SPECIAL PROCEEDING; MEMORANDUM AND ORDER APPROVING PLAN FOR REVISING LICENSED-OPERATOR TRAINING PROGRAM; Docket No. 50-289-SP (ASLBP No. 79-429-09-SP) (Restart Remand on Management-Training); LBP-85-21, 21 NRC 1751 (1985)
- SPECIAL PROCEEDING; MEMORANDUM AND ORDER; Docket No. 50-289-SP (Restart); CLI-85-2, 21 NRC 282 (1985); CLI-85-5, 21 NRC 566 (1985); CLI-85-8, 21 NRC 1111 (1985); CLI-85-9, 21 NRC 1118 (1985)
- SPECIAL PROCEEDING; ORDER; Docket No. 50-289-SP (Restart); CLI-85-7, 21 NRC 1104 (1985)
- SPECIAL PROCEEDING; PARTIAL INITIAL DECISION ON THE REMANDED ISSUE OF LICENSED-OPERATOR TRAINING AT TMI-1; Docket No. 50-289-SP (ASLBP No. 79-429-09-SP) (Restart Remand on Management-Training); LBP-85-15, 21 NRC 1409 (1985)
- NATURAL RESOURCES DEFENSE COUNCIL, INC.**
WASTE DISPOSAL RULEMAKING; DENIAL OF PETITION FOR RULEMAKING; Docket No. PRM-20-7; DPRM-85-2, 21 NRC 1781 (1985)
- NUCLEAR RADIATION CONSULTANTS**
BYPRODUCT MATERIALS RULEMAKING; DENIAL OF PETITION FOR RULEMAKING; Docket No. PRM-35-5; DPRM-85-1, 21 NRC 1777 (1985)
- PACIFIC GAS AND ELECTRIC COMPANY**
OPERATING LICENSE; DECISION; Docket Nos. 50-275-OL, 50-323-OL; ALAB-811, 21 NRC 1622 (1985)
- PHILADELPHIA ELECTRIC COMPANY**
OPERATING LICENSE; DECISION; Docket Nos. 50-352-OL, 50-353-OL; ALAB-804, 21 NRC 587 (1985); ALAB-806, 21 NRC 1183 (1985); ALAB-809, 21 NRC 1605 (1985)

CASE NAME INDEX

- OPERATING LICENSE; MEMORANDUM AND ORDER; Docket Nos. 50-352-OL, 50-353-OL; ALAB-808, 21 NRC 1595 (1985); CLI-85-11, 21 NRC 1585 (1985)
- OPERATING LICENSE; THIRD PARTIAL INITIAL DECISION ON OFFSITE EMERGENCY PLANNING; Docket Nos. 50-352-OL, 50-353-OL; LBP-85-14, 21 NRC 1219 (1985)
- REQUEST FOR ACTION; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; Docket Nos. 50-352, 50-353; DD-85-8, 21 NRC 1561 (1985)
- PORTLAND GENERAL ELECTRIC COMPANY, et al.
OPERATING LICENSE AMENDMENT; MEMORANDUM AND ORDER; Docket No. 50-344-OLA; ALAB-796, 21 NRC 4 (1985)
- POWER AUTHORITY OF THE STATE OF NEW YORK
SPECIAL PROCEEDING; DECISION; Docket No. 50-286-SP; CLI-85-6, 21 NRC 1043 (1985)
- PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al.
REQUEST FOR ACTION; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; Docket Nos. 50-443, 50-444; DD-85-3, 21 NRC 533 (1985)
- PUBLIC SERVICE ELECTRIC AND GAS COMPANY, et al.
OPERATING LICENSE; ORDER TERMINATING PROCEEDING; Docket No. 50-354-OL; LBP-85-6A, 21 NRC 468 (1985)
- SOUTHERN CALIFORNIA EDISON COMPANY, et al.
OPERATING LICENSE SUSPENSION; DENIAL OF REQUEST FOR HEARING AND REQUEST FOR STAY; Docket No. 50-206; CLI-85-10, 21 NRC 1569 (1985)
- TEXAS UTILITIES ELECTRIC COMPANY, et al.
OPERATING LICENSE; MEMORANDUM; Docket Nos. 50-445-OL&OL-2, 50-446-OL&OL-2 (ASLBP No. 79-430-06-OL); LBP-85-17, 21 NRC 1544 (1985)
OPERATING LICENSE; MEMORANDUM AND ORDER; Docket Nos. 50-445-OL&OL-2, 50-446-OL&OL-2 (ASLBP No. 79-430-06-OL); LBP-85-16, 21 NRC 1539 (1985)
- THE DETROIT EDISON COMPANY, et al.
REQUEST FOR ACTION; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; Docket No. 50-341; DD-85-4, 21 NRC 546 (1985)
- UNION ELECTRIC COMPANY
REQUEST FOR LICENSE SUSPENSION; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; Docket No. 50-483; DD-85-7, 21 NRC 1552 (1985)
- UNITED STATES DEPARTMENT OF ENERGY, PROJECT MANAGEMENT CORPORATION, TENNESSEE VALLEY AUTHORITY
CONSTRUCTION PERMIT; MEMORANDUM AND ORDER GRANTING APPLICANTS' MOTION TO DISMISS PROCEEDING; Docket No. 50-537-CP (ASLBP No. 75-291-12-CP); LBP-85-7, 21 NRC 507 (1985)



LEGAL CITATIONS INDEX CASES

- Air Line Pilots Ass'n, International v. CAB*, 458 F.2d 846 (D.C. Cir. 1972), cert. denied, 420 U.S. 972 (1975)
Commission obligation to lift effectiveness of shutdown order following resolution of concerns; CLI-85-9, 21 NRC 1124, 1151 (1985)
- Alabama Power Co. (Joseph M. Farley Nuclear Plant, Units 1 and 2)*, ALAB-182, 7 AEC 210, 211-16 (1974), rev'd on other grounds, CLI-74-12, 7 AEC 203 (1974)
applicability of collateral estoppel to NRC proceedings; LBP-85-11, 21 NRC 620 (1985)
- Alabama Power Co. (Joseph M. Farley Nuclear Plant, Units 1 and 2)*, ALAB-182, 7 AEC 210, 212-16, remanded on other grounds, CLI-74-12, 7 AEC 203 (1974)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC 404 n.7 (1985)
- Alabama Power Co. (Joseph M. Farley Nuclear Plant Units 1 and 2)*, ALAB-182, 7 AEC 210, 216-17 (1974)
consideration of merits of a contention in determining its admissibility; ALAB-806, 21 NRC 1193 n.39 (1985)
- Alabama Power Co. (Joseph M. Farley Nuclear Plant, Units 1 and 2)*, CLI-74-12, 7 AEC 203 (1974)
cause for relitigation of an issue; LBP-85-11, 21 NRC 619 (1985)
- Alaska v. Andrus*, 580 F.2d 405 (D.C. Cir.), vacated in part on other grounds sub nom. *Western Oil and Gas Ass'n v. Alaska*, 439 U.S. 922 (1978)
need for license suspension pending environmental review of restart of nuclear power plant; CLI-85-10, 21 NRC 1576 n.9 (1985)
- Alessi v. Raybestos-Manhattan, Inc.*, 451 U.S. 504, 522, 68 L. Ed. 2d 402 (1981)
policy regarding federal preemption of State laws; LBP-85-12, 21 NRC 902 (1985)
- Atchison v. Brown & Root, Inc.*, 82-ERA-9 (June 10, 1983) (filing of nonconformance report is protected), vacated and remanded sub nom. *Brown & Root, Inc. v. Donovan*, 747 F.2d 1029 (5th Cir. 1984)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1764 n.3 (1985)
- Atlantic Research Corp.*, CLI-80-7, 11 NRC 413, 421 (1980)
propriety of imposing civil penalties for violations of employee discrimination regulations; DD-85-9, 21 NRC 1773 n.9 (1985)
- Austin v. Loftsgaarden*, 675 F.2d 168, 180 (8th Cir. 1982)
Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1236 (1985)
- Baltimore Electric and Gas Co. v. Natural Resources Defense Council*, 103 S. Ct. 2246 (1983)
litigability of Table S-3 values in individual licensing proceedings; LBP-85-5, 21 NRC 429 (1985)
- Bellotti v. NRC*, 725 F.2d 1380, 1382, 1383 (D.C. Cir. 1983)
determining what hearing rights accrue with license amendments; CLI-85-10, 21 NRC 1581, 1582 (1985)
- Board of Regents v. Roth*, 408 U.S. 564, 573 (1972)
circumstances affecting an individual's liberty interest; CLI-85-2, 21 NRC 316 (1985)
- Board of Regents v. Roth*, 408 U.S. 564, 577 (1972)
description of an individual's property interest for purpose of determining entitlement to a hearing; CLI-85-2, 21 NRC 317 (1985)

LEGAL CITATIONS INDEX

CASES

- Boston Edison Co. (Pilgrim Nuclear Generating Station, Unit 2), ALAB-479, 7 NRC 774 (1978)
cure for deficiencies in Final Environmental Statements; LBP-85-3, 21 NRC 252 (1985)
- BPI v. AEC, 502 F.2d 424 (D.C. Cir. 1974)
requirements for admission of contentions; ALAB-804, 21 NRC 590, 591 n.5 (1985)
- Brown & Root, Inc. v. Donovan, 747 F.2d 1029 (5th Cir. 1984)
application of employee protection rules in NRC proceedings; DD-85-9, 21 NRC 1762 (1985)
interpretation of protected activities for quality control inspectors; DD-85-9, 21 NRC 1765 (1985)
- Cafeteria and Restaurant Workers Union v. McElroy, 367 U.S. 886 (1961)
employment actions not affecting an individual's property interest; CLI-85-2, 21 NRC 317 (1985)
- Capers v. Long Island R.R., 429 F. Supp. 1359 (S.D.N.Y.), aff'd sub nom. Harris v. Long Island R.R.,
573 F.2d 1291 (1977)
employment actions not affecting an individual's liberty interest; CLI-85-2, 21 NRC 316 (1985)
- Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Power Station), ALAB-305, 3 NRC 8, 9
(1976)
right of intervenors to adjudicatory resolution of environmental or safety questions; ALAB-799,
21 NRC 382 n.97 (1985)
- Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Power Station, Unit 1), ALAB-727, 17
NRC 760, 770-71 (1983)
limitation on number of bus runs required to evacuate schoolchildren during radiological
emergency; LBP-85-12, 21 NRC 873 (1985)
- Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Power Station, Unit 1), ALAB-727, 17
NRC 760, 772-73 (1983)
willingness of volunteers to perform their duties in an emergency; LBP-85-14, 21 NRC 1306,
1325 (1985)
- Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Power Station, Unit 1), CLI-82-20, 16
NRC 109 (1982), reconsideration denied, CLI-83-4, 17 NRC 75 (1983)
factors considered by Licensing Board in deciding whether to invoke its sua sponte review
authority; LBP-85-8, 21 NRC 519 (1985)
- City of Rochester v. U.S. Postal Service, 541 F.2d 967, 972 (2d Cir. 1976)
need to consider broader implications of individual deficiencies; LBP-85-6, 21 NRC 460 (1985)
- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), ALAB-736, 18 NRC
165 (1983)
appeals from orders disposing of some of an intervenor's contentions; ALAB-807, 21 NRC 1198
n.3 (1985)
- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), ALAB-805, 21 NRC
596, 601 (1985)
preclusion of Commission financial assistance to intervenors to pay for expert witnesses;
ALAB-807, 21 NRC 1212 n.92 (1985)
- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-24, 14 NRC
175, 182 (1981)
supporting evidence necessary when contention is initially filed; LBP-85-11, 21 NRC 617 (1985)
- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-24, 14 NRC
175, 184 (1981)
guidelines for determining admissibility of contentions; LBP-85-11, 21 NRC 617 (1985)
- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-24, 14 NRC
175, 199-200 (1981)
application of collateral estoppel to prevent intervenor who was not a party to construction permit
proceeding from relitigating issue at operating license stage; LBP-85-11, 21 NRC 622 (1985)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC
404 n.7 (1985)
- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-35, 14 NRC
682, 687-88 (1981)
consolidation of contentions LBP-85-14, 21 NRC 1234 n.31 (1985)

LEGAL CITATIONS INDEX

CASES

- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), LBP-83-52, 18 NRC 256, 258 (1983)
significant factor in determining timeliness of motion to reopen a record; LBP-85-19, 21 NRC 1723 (1985)
- Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), LBP-83-75, 18 NRC 1254 (1983)
factors considered by Licensing Board in deciding whether to invoke its sua sponte review authority; LBP-85-8, 21 NRC 519 (1985)
- Commonwealth Edison Co. (Braidwood Station, Units 1 and 2), LBP-75-1, 8 AEC 1197, 1200-01, 1203, 1226-27 (1975)
scope of site suitability findings for purpose of obtaining limited work authorization; LBP-85-11, 21 NRC 621-22 (1985)
- Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2), ALAB-770, 19 NRC 1163, 1168-69 (1984)
cause for Staff deferral of determination on application for permanent onsite storage of mill tailings; LBP-85-3, 21 NRC 250 (1985)
- Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2), ALAB-770, 19 NRC 1163, 1169 (1984)
finding required for denial of a license; ALAB-799, 21 NRC 374 n.36 (1985)
- Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2), ALAB-793, 20 NRC 1591, 1619 n.133 (1984)
treatment of inadequately supported brief; ALAB-799, 21 NRC 381 n.88 (1985)
- Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2), LBP-80-30, 12 NRC 683, 687 (1980)
means for providing sufficient basis for contention at pleading stage; LBP-85-20, 21 NRC 1740 (1985)
purpose of specificity requirement for contentions; LBP-85-20, 21 NRC 1742 (1985)
- Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2), LBP-80-30, 12 NRC 683, 688 (1980)
need for evidence supporting basis of contention at pleading stage; LBP-85-20, 21 NRC 1740 (1985)
- Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2), LBP-84-2, 19 NRC 36, 42-44, 213-18 (1984)
consideration of applicant's management practices at another facility; LBP-85-11, 21 NRC 634 (1985)
- Commonwealth Edison Co. (Dresden Nuclear Power Station; Zion Nuclear Plant), DD-83-8, 17 NRC 1183, 1185 (1983)
issues affecting safe construction of a facility; DD-85-7, 21 NRC 1559 (1985)
- Commonwealth Edison Co. (LaSalle County Station, Units 1 and 2), DD-84-6, 19 NRC 891, 895-96 (1984)
general discovery of documentation in possession of licensees; DD-85-2, 21 NRC 272 n.1 (1985)
- Commonwealth Edison Co. (Zion Station, Units 1 and 2), ALAB-116, 6 AEC 258, 259 (1973)
burden for erroneous interlocutory rulings; ALAB-805, 21 NRC 600 n.15 (1985)
- Commonwealth Edison Co. (Zion Station, Units 1 and 2), ALAB-196, 7 AEC 457, 469 (1974)
means for settling proprietary information disputes; ALAB-807, 21 NRC 1214 n.105 (1985)
- Commonwealth Edison Co. (Zion Station, Units 1 and 2), ALAB-226, 8 AEC 381, 389 (1974)
right of intervenor to make its case solely through cross-examination; LBP-85-20, 21 NRC 1745 (1985)
- Connecticut Mutual Life Insurance Co. v. Shields, 18 F.R.D. 448 (S.D.N.Y. 1955)
factors considered in determining applicability of privilege to inadvertently disclosed documents; LBP-85-1, 21 NRC 18 (1985)
- Consolidated Edison Co. of New York (Indian Point Station, Unit 2), ALAB-399, 5 NRC 1156, 1167 (1977)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC 404 n.7 (1985)

LEGAL CITATIONS INDEX CASES

- Consolidated Edison Co. of New York (Indian Point, Unit 2), ALAB-399, 5 NRC 1156, 1170 (1977)
federal preemption of State and County laws prohibiting utility from performing emergency response activities; LBP-85-12, 21 NRC 897 (1985)
- Consolidated Edison Co. of New York (Indian Point, Unit 2), LBP-83-68, 18 NRC 811, 958 (1983)
willingness of volunteers to perform their duties in an emergency; LBP-85-14, 21 NRC 1306, 1325 (1985)
- Consolidated Edison Co. of New York (Indian Point, Unit 2), LBP-83-68, 18 NRC 811, 1016 (1983)
need for identification of mobility-impaired persons requiring evacuation assistance during radiological emergency; LBP-85-12, 21 NRC 848 (1985)
- Consolidated Edison Co. of New York (Indian Point, Units 1, 2 and 3), ALAB-319, 3 NRC 188, 189-90 (1976)
resolution of safety or environmental issues that are not the subject of contentions; ALAB-799, 21 NRC 383 n.100 (1985)
- Consolidated Edison Co. of New York (Indian Point, Units 1, 2 and 3), CLI-75-8, 2 NRC 173, 177 (1975)
use of 10 C.F.R. 2.206 procedures as vehicle for reconsideration; CLI-85-4, 21 NRC 563 (1985)
- Consolidated Edison Co. of New York (Indian Point, Units 1, 2, and 3), CLI-75-8, 2 NRC 173, 177 (1975)
litigability of issues under 2.206 petitions that may be raised in a pending operating license proceeding; DD-85-1, 21 NRC 265-66 (1985); DD-85-9, 21 NRC 1762 n.1 (1985)
- Consolidated Edison Co. of New York (Indian Point, Units 2 and 3), LBP-83-68, 18 NRC 811 (1983)
need for backup for siren alerting system to function in 15 minutes; LBP-85-12, 21 NRC 759 (1985)
- Consolidated Edison Co. v. Donovan, 673 F.2d 61 (2d Cir. 1982)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1764 n.3 (1985)
- Consumers Power Co. (Big Rock Point Plant), ALAB-795, 21 NRC 1 (1985)
Appeal Board policy on review of unappealed licensing actions; ALAB-796, 21 NRC 5 (1985)
- Consumers Power Co. (Big Rock Point Plant), LBP-82-60, 16 NRC 540, 544 (1982)
dissemination of guidance on radiation effects from nuclear power plant accident; LBP-85-12, 21 NRC 769 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-106, 6 AEC 182, 184 (1973)
effect of licensee's lack of candor; CLI-85-9, 21 NRC 1160 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-270, 1 NRC 473, 475 (1975)
treatment of inadequately supported briefs; ALAB-799, 21 NRC 381 n.88 (1985); ALAB-802, 21 NRC 496 n.30 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-283, 2 NRC 11, 17-18 (1975), clarified, ALAB-315, 3 NRC 101 (1976)
applicability of backfit criteria to consolidated operating license/enforcement proceeding; LBP-85-2, 21 NRC 45 n.10 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-283, 2 NRC 11, 20 (1975)
relevance of an applicant's remedial measures to character and competence determinations; ALAB-799, 21 NRC 374 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-674, 15 NRC 1101, 1102-03 (1982)
scope of Licensing Board authority to impose sanctions; DD-85-9, 21 NRC 1769 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-691, 16 NRC 897, 916 & n.26 (1982)
standard for judging an attorney's conduct in NRC proceedings; LBP-85-19, 21 NRC 1717 n.7 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), CLI-73-38, 6 AEC 1082, 1083 (1973)
right of licensee to hearing on enforcement action; CLI-85-9, 21 NRC 1123 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), CLI-74-5, 7 AEC 19, 32 (1974)
interpretation of the term "prima facie" showing; LBP-85-5, 21 NRC 443 n.16 (1985)
- Consumers Power Co. (Midland Plant, Units 1 and 2), LBP-75-39, 2 NRC 29, 113 (1975)
Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1235 (1985)

LEGAL CITATIONS INDEX CASES

- Consumers Power Co. (Palisades Nuclear Power Facility), ALAB-670, 15 NRC 493, 506 (1982)
(concurring opinion of Mr. Rosenthal), vacated as moot, CLI-82-18, 16 NRC 50 (1982)
protection of an individual's economic interests under the Atomic Energy Act; CLI-85-2, 21
NRC 316 (1985)
- Control Data Corp. v. IBM Corp., 16 Fed. R. Serv. 2d 1233 (D. Minn. 1972)
factors considered in determining applicability of privilege to inadvertently disclosed documents;
LBP-85-1, 21 NRC 18 (1985)
- Dairyland Power Cooperative (La Crosse Boiling Water Reactor), LBP-83-23, 17 NRC 655, aff'd (sua
sponte), ALAB-733, 18 NRC 9 (1983)
new methodology for determining response spectra; LBP-85-2, 21 NRC 50 n.11 (1985)
- Detroit Edison Co. (Enrico Fermi Atomic Power Plant, Unit 2), ALAB-707, 16 NRC 1760, 1767
(1982)
weight given to factors (ii) and (iv) of 10 C.F.R. 2.714(a)(1); LBP-85-11, 21 NRC 629 (1985)
- Detroit Edison Co. (Enrico Fermi Atomic Power Plant, Unit 2), ALAB-730, 17 NRC 1057, 1066
(1983)
degree of completion required of emergency plans prior to close of hearings; LBP-85-14, 21 NRC
1230 n.26 (1985)
need for local school districts or municipalities to adopt emergency plans before county adopts its
plans; LBP-85-14, 21 NRC 1376 (1985)
predictive nature of emergency planning findings; LBP-85-12, 21 NRC 653 (1985)
- Detroit Edison Co. (Enrico Fermi Atomic Power Plant, Unit 2), ALAB-730, 17 NRC 1057, 1067
(1983)
showing necessary for grant of stay motion; ALAB-808, 21 NRC 1601 (1985)
- Detroit Edison Co. (Enrico Fermi Atomic Power Plant, Unit 2), LBP-79-1, 9 NRC 73, 81 (1979)
effectiveness of evacuation routes which initially travel toward a plant; LBP-85-8, 21 NRC 522
(1985)
- Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3), ALAB-476, 7 NRC 759, 764 (1978)
value of identification of intervenor's witnesses to Board determination of intervenor's
contribution to a sound record; LBP-85-20, 21 NRC 1745 n.8 (1985)
- Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3), ALAB-476, 7 NRC 759, 760-62
(1978)
reason for considering delay factor in determining admissibility of late-filed contentions;
LBP-85-11, 21 NRC 630 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-150, 6 AEC 811, 812 (1973)
supporting evidence necessary when contention is initially filed; LBP-85-11, 21 NRC 617 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 NRC 397, 406 n.26 (1976)
obligation of applicants to inform Boards of significant new information; LBP-85-6, 21 NRC 461
(1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 NRC 397, 411-12 (1976)
admissibility of hearsay evidence; ALAB-802, 21 NRC 501 n.67 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-359, 4 NRC 619, 620 (1976)
burden on proponent of motion to reopen a record; LBP-85-19, 21 NRC 1720 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 464 (1982),
rev'd in part on other grounds, CLI-83-19, 17 NRC 1041 (1983)
importance of delay caused by further Staff reviews of safety issues; LBP-85-3, 21 NRC 257 n.19
(1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 466 (1982)
conditional admission of contentions; ALAB-806, 21 NRC 1188 n.17 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 466-67 (1982)
characterization of admission of amended contention; LBP-85-20, 21 NRC 1737-38 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 467-68 (1982)
conditional admission of broad contentions; LBP-85-11, 21 NRC 635 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-768, 19 NRC 988, 992 (1984)
burden for erroneous interlocutory rulings; ALAB-805, 21 NRC 600 n.15 (1985)

LEGAL CITATIONS INDEX

CASES

- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-794, 20 NRC 1630, 1632-33 (1984) showing necessary by movant for stay of agency action; ALAB-810, 21 NRC 1619 n.7 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), CLI-83-19, 17 NRC 1041 (1983) factors balanced for admission of late-filed contentions; LBP-85-9, 21 NRC 526 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), CLI-83-19, 17 NRC 1041, 1045-47 (1983) factors governing admission of late-filed contentions based on previously unavailable documents; ALAB-806, 21 NRC 1188 n.17 (1985); LBP-85-5, 21 NRC 413 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), CLI-83-19, 17 NRC 1041, 1048 (1983) obligations of persons seeking to participate in NRC proceedings; ALAB-807, 21 NRC 1212 n.93 (1985)
- Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), LBP-84-24, 19 NRC 1418, 1428 (1984) Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1236 n.35 (1985)
- Duke Power Co. (Cherokee Nuclear Station, Units 1, 2, and 3), ALAB-440, 6 NRC 642, 645 (1977) effect of an intervenor's withdrawal on litigation of his contentions; ALAB-799, 21 NRC 383 n.103 (1985)
- Duke Power Co. (Cherokee Nuclear Station, Units 1, 2, and 3), ALAB-478, 7 NRC 772, 773 (1978) effect of utility's discrimination against employee on plant's licensability; DD-85-9, 21 NRC 1769 n.8 (1985)
- Duke Power Co. (Cherokee Nuclear Station, Units 1, 2, and 3), ALAB-482, 7 NRC 979, 981 n.4 (1978) stare decisis effect of Licensing Board decisions that are not appealed; ALAB-795, 21 NRC 2 n.5 (1985)
- Duke Power Co. (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-143, 6 AEC 623, 625-26 (1973) effect on character determination of licensee's failure to notify Board of significant contractor report; LBP-85-19, 21 NRC 1715 (1985) obligation of applicants to inform Boards of significant new information; LBP-85-6, 21 NRC 460-61 (1985) reportability of engineering design deficiencies; LBP-85-6, 21 NRC 452 (1985)
- Duke Power Co. (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-669, 15 NRC 453, 477 (1982) admissibility of hearsay evidence; ALAB-802, 21 NRC 501 n.67 (1985) exclusion of evidence for lack of expert sponsor; ALAB-808, 21 NRC 1602 (1985)
- Duke Power Co. v. Carolina Environmental Study Group, 438 U.S. 59 (1978) liability of nuclear power plants for damages from accidents; LBP-85-4, 21 NRC 402 (1985)
- Dunn Chemical Co. v. Sybron Corp., 1975-2 Trade Cas. (CCH) ¶ 60,561 at 67,463 (S.D.N.Y. 1975) factors considered in determining applicability of privilege to inadvertently disclosed documents; LBP-85-1, 21 NRC 18 (1985)
- Duplan Corp. v. Deering Milliken, Inc., 397 F. Supp. 1146 (D.C.S.C. 1974) waiver of attorney-client or work product privilege through inadvertent disclosure of documents; LBP-85-1, 21 NRC 16 n.7 (1985)
- Environmental Defense Fund, Inc. v. Andrus, 619 F.2d 1368, 1377 (9th Cir. 1982) need for supplemental environmental impact statement for low-power operation where eventual full-power operation is in doubt; CLI-85-12, 21 NRC 1593 (1985)
- Ewing v. Mytinger & Casselberry, Inc., 339 U.S. 594, 599 (1950) right of licensee to hearing on enforcement action; CLI-85-9, 21 NRC 1123 (1985)
- Fahay v. Mallonee, 332 U.S. 245, 253 (1947) right of licensee to hearing on enforcement action; CLI-85-9, 21 NRC 1123 (1985)
- Fidelity Federal Savings and Loan Association v. de la Cuesta, 458 U.S. 141, 73 L. Ed. 2d 664 (1982) circumstances appropriate for federal preemption of State law; LBP-85-12, 21 NRC 901 (1985)
- Florida Lime and Avocado Growers, Inc. v. Paul, 373 U.S. 132, 142-43, 10 L. Ed. 2d 248 (1963) circumstances appropriate for federal preemption of State law; LBP-85-12, 21 NRC 901 (1985)

LEGAL CITATIONS INDEX CASES

- Florida Power and Light Co. (St. Lucie Nuclear Power Plant, Unit 2), ALAB-404, 5 NRC 1185, 1188 (1977)
consideration of economic harm to an applicant if stay of its license is granted; ALAB-808, 21 NRC 1603 (1985)
- Florida Power and Light Co. (St. Lucie Nuclear Power Plant, Unit 2), ALAB-579, 11 NRC 223, 226 (1980)
nexus between motions to reopen as basis for Appeal Board's jurisdiction; ALAB-797, 21 NRC 8 (1985)
- Florida Power and Light Co. (St. Lucie Nuclear Power Plant, Unit 2), CLI-80-41, 12 NRC 650 (1980)
Commission authority to lift stay and decide need for hearing; CLI-85-7, 21 NRC 1106 n.2 (1985)
- Florida Power and Light Co. (St. Lucie Nuclear Power Plant, Unit 2), LBP-81-58, 14 NRC 1167, 1188-89 (1981)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC 404 n.7 (1985)
- Florida Power and Light Co. (Turkey Point Nuclear Generating Station, Units 3 and 4), ALAB-660, 14 NRC 987, 1014 (1981)
cure for deficiencies in Final Environmental Statements; LBP-85-3, 21 NRC 252, 256 (1985)
- Garcia v. San Antonio Metropolitan Transit Authority, 53 U.S.L.W. 4135 (U.S. February 19, 1985)
transfer of authority from a government to a private entity; LBP-85-12, 21 NRC 909 n.14 (1985)
- General Public Utilities Nuclear Corp. (Three Mile Island Nuclear Station, Units 1 and 2; Oyster Creek Nuclear Generating Station), DD-85-1, 21 NRC 263, 265 (1985), aff'd, CLI-85-4, 21 NRC 561 (1985)
litigability of issues under 2.206 petitions that may be raised in a pending operating license proceeding; DD-85-9, 21 NRC 1762 n.1 (1985)
- Georgia Power Co. (Alvin W. Vogtle Nuclear Plant, Units 1 and 2), ALAB-291, 2 NRC 404, 408-12 (1975)
obligation of applicants to inform Boards of significant new information; LBP-85-6, 21 NRC 461 (1985)
reportability of engineering design deficiencies; LBP-85-6, 21 NRC 452 (1985)
- Guardian Federal Savings and Loan Association v. FSLIC, 589 F.2d 658, 664 (D.C. Cir. 1978)
obligation of adjudicative boards to apply policy statements to their determinations; LBP-85-15, 21 NRC 1506 (1985)
- Gulf States Utilities Co. (River Bend Station, Units 1 and 2, ALAB-444, 6 NRC 760, 796 (1977)
good cause for allowing an intervenor to adopt a departing intervenor's contentions; ALAB-799, 21 NRC 384 n.108 (1985)
- Hines v. Davidowitz, 312 U.S. 52, 67, 85 L. Ed. 581 (1941)
existence of conflict between State and federal laws as ground for preemption; LBP-85-12, 21 NRC 901 (1985)
- Houston Lighting and Power Co. (Allens Creek Nuclear Generating Station, Unit 1), ALAB-590, 11 NRC 542, 547-49 (1980)
consideration of merits of a contention in determining its admissibility; ALAB-806, 21 NRC 1193 n.39 (1985)
- Houston Lighting and Power Co. (Allens Creek Nuclear Generating Station, Unit 1), ALAB-590, 11 NRC 542, 548-49 (1980)
means for providing sufficient basis for contention at pleading stage; LBP-85-20, 21 NRC 1740 (1985)
supporting evidence necessary when contention is initially filed; LBP-85-11, 21 NRC 617 (1985)
- Houston Lighting and Power Co. (Allens Creek Nuclear Generating Station, Unit 1), ALAB-671, 15 NRC 508, 513 n.13 (1982)
means of protecting an intervenor's interests other than through litigation of contentions; LBP-85-9, 21 NRC 528 (1985)
- Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), ALAB-799, 21 NRC 360, 384 n.108 (1985)
adequacy of NRC Staff's participation in licensing proceeding as means to protect private party's interests; ALAB-806, 21 NRC 1191 n.27 (1985)

LEGAL CITATIONS INDEX CASES

- Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), CLI-77-13, 5 NRC 1303, 1321 (1977)
litigability of antitrust issues at the operating license stage; LBP-85-4, 21 NRC 404 (1985)
- Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), CLI-82-9, 15 NRC 1363, 1367 (1982)
loss of judge's experience as ground for dismissal of disqualification motion; CLI-85-5, 21 NRC 568, 571 (1985)
- Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), LBP-79-27, 10 NRC 563, 566 (1979), aff'd, ALAB-575, 11 NRC 14 (1980)
criteria for determining collateral estoppel effect of licensing decision on enforcement action; DD-85-9, 21 NRC 1768 (1985)
requirements for applying collateral estoppel; LBP-85-11, 21 NRC 620 (1985)
- Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), LBP-79-27, 10 NRC 563, 572 (1979), aff'd, ALAB-575, 11 NRC 14 (1980)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC 404 n.7 (1985)
- Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), LBP-81-54, 14 NRC 918, 922-23 & n.4 (1981)
invocation of Licensing Board's sua sponte powers; ALAB-799, 21 NRC 385 n.111 (1985)
- Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), LBP-84-13, 19 NRC 659 (1984)
definition of licensee "character" or "integrity"; CLI-85-9, 21 NRC 1136 (1985)
- ICC v. Oregon Pacific Industries, 420 U.S. 121, 127 (1975) (Powell, J., concurring)
Commission obligation to lift effectiveness of shutdown order following resolution of concerns; CLI-85-9, 21 NRC 1151 (1985)
- Johnson v. University of Pittsburgh, 435 F. Supp. 1328 (W.D. Pa. 1977)
employment actions not affecting an individual's liberty interest; CLI-85-2, 21 NRC 316 (1985)
- Jones v. Rath Packing Co., 430 U.S. 519, 525, 51 L. Ed. 2d 604 (1977)
circumstances appropriate for federal preemption of State law; LBP-85-12, 21 NRC 901, 902 (1985)
- Jones v. Rath Packing Co., 430 U.S. 519, 525-26, 51 L. Ed. 2d 604 (1977)
existence of conflict between State and federal laws as ground for preemption; LBP-85-12, 21 NRC 901 (1985)
- Kansas Gas and Electric Co. (Wolf Creek Generating Station, Unit 1), ALAB-462, 7 NRC 320, 338 (1978)
burden on proponent of motion to reopen a record; LBP-85-19, 21 NRC 1720 (1985)
- Kansas Gas and Electric Co. (Wolf Creek Generating Station, Unit 1), ALAB-477, 7 NRC 766, 768 (1978)
matters legitimately raised in petition for reconsideration; CLI-85-7, 21 NRC 1109 (1985)
- Kansas Gas and Electric Co. (Wolf Creek Generating Station, Unit 1), LBP-84-26, 20 NRC 53 (1984)
need for documentation of backup procedures in case of siren failure; LBP-85-12, 21 NRC 759 (1985)
- Kansas Gas and Electric Co. (Wolf Creek Generating Station, Unit 1), LBP-84-26, 20 NRC 53, 71 (1984)
need for letters of agreement with reception centers for special facilities; LBP-85-12, 21 NRC 838 (1985)
- Kleppe v. Sierra Club, 427 U.S. 390, 409-10 (1976)
need to consider broader implications of individual deficiencies; LBP-85-6, 21 NRC 460 (1985)
- Landers v. Commonwealth Lord Joint Venture, 83-ERA-4 (Sept. 9, 1983)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1764 n.3 (1985)
- Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), ALAB-743, 18 NRC 387, 399-401 (1983)
value of identification of intervenor's witnesses to Board determination of intervenor's contribution to a sound record; LBP-85-20, 21 NRC 1745 n.8, 1746 (1985)

LEGAL CITATIONS INDEX

CASES

- Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), ALAB-788, 20 NRC 1102, 1151 (1984)
standard for establishing due process violation by Licensing Board; ALAB-799, 21 NRC 377 n.54 (1985)
- Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), ALAB-788, 20 NRC 1102, 1176-79 (1984)
penalty for party's failure to proceed in accordance with Board ruling; ALAB-807, 21 NRC 1215 n.108 (1985)
- Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), ALAB-788, 20 NRC 1102, 1178 (1984), aff'g, LBP-82-107, 16 NRC 1667 (1982)
Board authority to impose constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1236 n.35 (1985)
- Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), CLI-84-8, 19 NRC 1154, 1156 n.3 (1984)
circumstances appropriate for grant of exemption from regulations; ALAB-809, 21 NRC 1612 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1087 n.12 (1983)
basis for a Board's decisionmaking; ALAB-809, 21 NRC 1613 n.13 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1096 (1983)
propriety of limitations on cross-examination; ALAB-799, 21 NRC 377 n.67 (1985); ALAB-808, 21 NRC 1601 (1985)
standard for establishing due process violation by Licensing Board; ALAB-799, 21 NRC 377 n.54 (1985)
standard for grant of motion to reopen; ALAB-807, 21 NRC 1216 n.114 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1096 n.30 (1983)
value of cross-examination in development of a full record; LBP-85-20, 21 NRC 1745 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1103-04 (1983)
finality required of emergency plans prior to license authorization; ALAB-808, 21 NRC 1601 (1985); LBP-85-14, 21 NRC 1230 n.21 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1103-07 (1983)
post-hearing verification of emergency planning measures by NRC Staff; ALAB-808, 21 NRC 1600 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1109-10 (1983)
distinction between character and competence; ALAB-799, 21 NRC 375 n.41 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1110-12 (1983)
cause for invocation of Licensing Board's sua sponte powers; ALAB-799, 21 NRC 385 n.111 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1111-14 (1983)
factors considered by Licensing Board in deciding whether to invoke its sua sponte review authority; LBP-85-8, 21 NRC 519 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-753, 18 NRC 1321, 1324 (1983)
criteria for reopening a record; CLI-85-7, 21 NRC 1106 (1985); LBP-85-19, 21 NRC 1720 (1985)
showing necessary by movant seeking to reopen record; ALAB-807, 21 NRC 1199 n.5 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-797, 21 NRC 6, 9 (1985)
importance of Board consideration of all areas of quality assurance performance; LBP-85-6, 21 NRC 462 (1985)

LEGAL CITATIONS INDEX

CASES

- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), CLI-85-3, 21 NRC 471, 477 (1985)
 consideration of economic harm to an applicant if stay of its license is granted; ALAB-808, 21 NRC 1603 (1985)
- Louisiana Power and Light Co. (Waterford Steam Electric Station, Unit 3), LBP-82-100, 16 NRC 1550, 1566, 1584 (1982)
 exemption from emergency planning requirements for maximum security prison; ALAB-809, 21 NRC 1613 n.11 (1985)
- Mackowiak v. University Nuclear Systems, Inc., 735 F.2d 1159, 1162-63 (9th Cir. 1984)
 interpretation of protected activities for quality control inspectors; DD-85-9, 21 NRC 1765 (1985)
- Mackowiak v. University Nuclear Systems, Inc., 82-ERA-8 (April 29, 1983), remanded on other grounds, 735 F.2d 1159 (9th Cir. 1984)
 scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1764 n.3 (1985)
- MCI Communications Corp. v. AT&T, 85 F.R.D. 28 (N.D. Ill. 1979), aff'd, 708 F.2d 1081, 1170-73 (7th Cir. 1983)
 Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1235 (1985)
- Mendenhall v. Barber Greene Co., 531 F. Supp. 951, 953 n.9, 954 (N.D. Ill. 1982)
 consideration of intent of disclosing party in deciding applicability of waiver of privilege to inadvertent disclosure; LBP-85-1, 21 NRC 18 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-685, 16 NRC 449, 452 n.5 (1982)
 invocation of Licensing Board's sua sponte powers; ALAB-799, 21 NRC 385 n.111 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-698, 16 NRC 1290, 1298-99 (1982)
 means for demonstrating compliance with emergency planning requirements; LBP-85-14, 21 NRC 1228 n.14 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-699, 16 NRC 1324 (1982)
 jurisdiction to consider motion to reopen when appeal from partial initial decision has been taken; LBP-85-19, 21 NRC 1713 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-715, 17 NRC 102 (1983)
 cause for subpoena of Staff witnesses not otherwise scheduled to testify; ALAB-802, 21 NRC 501 n.66 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-738, 18 NRC 177, 180 (1983)
 showing necessary by movant seeking to reopen record; ALAB-807, 21 NRC 1199 n.5 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-738, 18 NRC 177, 190 (1983)
 Appeal Board policy on reviewing Licensing Board determinations not constituting final resolution; ALAB-799, 21 NRC 369 n.15 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-772, 19 NRC 1193, 1206, 1232 (1984)
 standards for determining an applicant's character and competence; ALAB-799, 21 NRC 370 n.18, 374 n.38 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-772, 19 NRC 1193, 1206-08 (1984)
 definition of licensee "character" or "integrity"; CLI-85-9, 21 NRC 1136 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-772, 19 NRC 1193, 1246-47 (1984), rev'd in part on other grounds, CLI-85-2, 21 NRC 282 (1985)
 responsibility for providing counsel for intervenors; ALAB-802, 21 NRC 498 n.45 (1985)

LEGAL CITATIONS INDEX CASES

- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-772, 19 NRC 1193, 1246-48, 1273 (1984), *rev'd in part, on other grounds*, CLI-85-2, 21 NRC 282 (1985)
preclusion of Commission financial assistance to intervenors to pay for expert witnesses;
ALAB-807, 21 NRC 1212 nn.92, 93 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-772, 19 NRC 1193, 1247-48 (1984), *rev'd in part on other grounds*, CLI-85-2, 21 NRC 282 (1985)
Board participation in intervenor cross-examination; ALAB-802, 21 NRC 499 n.54 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-774, 19 NRC 1350, 1355 (1984)
criteria for reopening a record; LBP-85-19, 21 NRC 1720 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-774, 19 NRC 1350, 1357-60 (1984)
obligation of applicants to inform Boards of significant new information; LBP-85-6, 21 NRC 461 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-791, 20 NRC 1579, 1583 (1984)
forum for resolution of intervenor's concerns, other than directed certification; ALAB-805, 21 NRC 600 n.15 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), CLI-82-31, 16 NRC 1236, 1238 (1982)
scope of Licensing Board authority to impose sanctions; DD-85-9, 21 NRC 1769 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), CLI-84-3, 19 NRC 555, 562-63 (1984)
standard for sua sponte review of admitted contentions; LBP-85-8, 21 NRC 519 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), CLI-85-2, 21 NRC 282, 285 n.3 (1985)
standards for grant of motion to reopen; CLI-85-8, 21 NRC 1112 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), LBP-81-59, 14 NRC 1211, 1639, 1640 (1981)
necessity of letters of agreement with schools to implement protective measures during radiological emergency; LBP-85-12, 21 NRC 857 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 2), ALAB-384, 5 NRC 612, 615 (1977)
showing necessary on other admission factors where good cause is not shown for late filing;
LBP-85-11, 21 NRC 629 (1985)
- Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 2), ALAB-486, 8 NRC 9, 22 (1978)
application of reopening criteria separately to each issue; LBP-85-19, 21 NRC 1720 (1985)
- Minnesota v. NRC, 602 F.2d 412 (D.C. Cir. 1979)
obligation of NRC adjudicative boards to apply policy statements to their determinations;
LBP-85-15, 21 NRC 1505-06 (1985)
- Mississippi Power and Light Co. (Grand Gulf Nuclear Station, Unit 1), CLI-84-19, 20 NRC 1055, 1059 n.7 (1984)
criteria to be satisfied for grant of exemptions from Part 50 regulations; ALAB-809, 21 NRC 1610 (1985)
- Mississippi Power and Light Co. (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-130, 6 AEC 423, 426 (1973)
need for evidence supporting basis of contention at pleading stage; LBP-85-20, 21 NRC 1740, 1741 (1985)
- Mississippi Power and Light Co. (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-704, 16 NRC 1725, 1730 (1982)
standard for determining a party's ability to contribute to the record; ALAB-806, 21 NRC 1191 n.29 (1985)
value of identification of intervenor's witnesses to Board determination of intervenor's contribution to a sound record; LBP-85-20, 21 NRC 1745 n.8 (1985)

LEGAL CITATIONS INDEX

CASES

- Mississippi Power and Light Co. (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-704, 16 NRC 1725, 1730-31 (1982)
weight given to factors (ii) and (iv) of 10 C.F.R. 2.714(a)(1); LBP-85-11, 21 NRC 629 (1985)
- Niagara Mohawk Power Corp. (Nine Mile Point Nuclear Station, Unit 2), 1 NRC 347, 352-72 (1975)
scope of cost/benefit analysis at construction permit stage; LBP-85-5, 21 NRC 441 (1985)
- Northern Indiana Public Service Co. (Bailly Generating Station, Nuclear-1), CLI-78-7, 7 NRC 429 (1979), aff'd, Porter County Chapter of the Izaak Walton League, Inc. v. NRC, 606 F.2d 1363 (D.C. Cir. 1979)
use of 10 C.F.R. 2.206 procedures as means to reopen issues previously adjudicated; CLI-85-4, 21 NRC 564 (1985)
- Northern States Power Co. (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-244, 8 AEC 857, 863, 867-68 (1974), aff'd in pertinent part, CLI-75-1, 1 NRC 1 (1975)
intervenor participation on contentions sponsored by others; ALAB-799, 21 NRC 383 n.101 (1985)
- Northwest Airlines v. CAB, 539 F.2d 738 (D.C. Cir. 1976)
Commission obligation to lift effectiveness of shutdown order following resolution of concerns; CLI-85-9, 21 NRC 1124, 1151 (1985)
- O'Bannon v. Town Court Nursing Center, 447 U.S. 773 (1980)
hearing rights of individuals indirectly affected by government actions; CLI-85-2, 21 NRC 316 n.39 (1985)
- Orr v. Trinter, 444 F.2d 128 (6th Cir.), cert. denied, 408 U.S. 943 (1971)
description of an individual's property interest for purpose of determining entitlement to a hearing; CLI-85-2, 21 NRC 317 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-598, 11 NRC 876, 879 (1980)
criteria for reopening a record; ALAB-801, 21 NRC 481 n.2 (1985); ALAB-803, 21 NRC 578 n.2 (1985); CLI-85-2, 21 NRC 285 n.3 (1985); LBP-85-19, 21 NRC 1720 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-644, 13 NRC 903, 923 (1981)
Board findings contrary to those urged by a party as evidence of bias; ALAB-799, 21 NRC 376 n.51 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-644, 13 NRC 903, 924 n.40 (1981)
definition of a response spectrum; LBP-85-2, 21 NRC 137 n.59 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-644, 13 NRC 903, 937 (1981)
use of measures other than NUREG-0654 criteria to bring emergency plans into conformity; LBP-85-12, 21 NRC 653 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-775, 19 NRC 1361, 1365-67 & n.18, aff'd, San Luis Obispo Mothers for Peace v. NRC, 751 F.2d 1287 (D.C. Cir. 1984)
criteria for reopening a record; ALAB-801, 21 NRC 481 n.2 (1985); ALAB-803, 21 NRC 578 n.2 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-775, 19 NRC 1361, 1368 n.22 (1984)
consequences of inadequate Staff response to motion to reopen; ALAB-801, 21 NRC 484 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-775, 19 NRC 1361, 1369 (1984)
significant factor in determining timeliness of motion to reopen a record; LBP-85-19, 21 NRC 1723 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-776, 19 NRC 1373, 1376-78 (1984)
materiality of FEMA reviews to Board disposition of emergency planning contentions; LBP-85-14, 21 NRC 1376 (1985)

LEGAL CITATIONS INDEX CASES

- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-782, 20 NRC 838, 841-42 (1984)
nexus requirement for reopening a record; LBP-85-19, 21 NRC 1714 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-5, 13 NRC 361, 364 (1981)
failure of intervenor to demonstrate good cause for late filing of soils contention; LBP-85-9, 21 NRC 527 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-6, 13 NRC 443 (1981)
denial of petition for enforcement proceeding on issue already pending before the Commission; DD-85-1, 21 NRC 265 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-6, 13 NRC 443, 444 (1981)
litigability of issues under 2.206 petitions that may be raised in a pending operating license proceeding; DD-85-9, 21 NRC 1762 n.1, 1769, 1774 (1985)
use of 10 C.F.R. 2.206 procedures as vehicle for reconsideration; CLI-85-4, 21 NRC 563-64 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-82-39, 16 NRC 1712, 1714-15 (1982)
requirements for reopening record on new issues; ALAB-801, 21 NRC 481 n.2 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-84-5, 19 NRC 953 (1984), aff'd, San Luis Obispo Mothers for Peace v. NRC,
right to hearing on lifting of license suspension; CLI-85-10, 21 NRC 1575 n.7 (1985)
- Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-84-5, 19 NRC 953, 959-60 (1984)
showing necessary to stay full-power authorization; ALAB-808, 21 NRC 1601 n.6 (1985)
- Pacific Gas and Electric Co. (Stanislaus Nuclear Project, Unit 1), ALAB-550, 9 NRC 683 (1979)
means of obtaining documents from nonparties; LBP-85-1, 21 NRC 22 (1985)
- Pacific Gas and Electric Co. v. FPC, 506 F.2d 33, 38 (D.C. Cir. 1974)
effect of policy statements of agency determinations; LBP-85-15, 21 NRC 1505 (1985)
- Pacific Gas and Electric Co. v. State Energy Resources Conservation and Development Commission, 461 U.S. 190, 205 (1983)
responsibility for protecting public health and safety in nuclear power-related matters; CLI-85-12, 21 NRC 1589 (1985)
- Pacific Gas and Electric Co. v. State Energy Resources Conservation and Development Commission, 461 U.S. 190, 75 L. Ed. 2d 752, 765 (1983)
existence of conflict between State and federal laws as ground for preemption; LBP-85-12, 21 NRC 908 (1985)
- Pacific Gas and Electric Co. v. State Energy Resources Conservation and Development Commission, 461 U.S. 190, 75 L. Ed. 2d 752, 765, 766, 770 (1983)
circumstances appropriate for federal preemption of State law; LBP-85-12, 21 NRC 901, 902 (1985)
- Pacific Gas and Electric Co. v. State Energy Resources Conservation and Development Commission, 461 U.S. 190, 75 L. Ed. 2d 752, 765, 766, 772, 773 (1983)
power of States to regulate nuclear power plants; LBP-85-12, 21 NRC 902-04 (1985)
- Pan American Airways v. CAB, 684 F.2d 31 (D.C. Cir. 1982)
Commission obligation to lift effectiveness of shutdown order following resolution of concerns; CLI-85-9, 21 NRC 1124, 1151 (1985)
- Parklane Hosiery Co. v. Shore, 439 U.S. 322, 326 n.5, 99 S. Ct. 645, 58 L. Ed. 2d 552 (1979)
requirements for applying collateral estoppel; LBP-85-11, 21 NRC 620 (1985)
- Pennsyl v. Catalytic, Inc., 83-ERA-2 (Jan. 13, 1984)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1764 n.3 (1985)

LEGAL CITATIONS INDEX CASES

- Pennsylvania Power and Light Co. (Susquehanna Steam Electric Station, Units 1 and 2), LBP-82-30, 15 NRC 771, 782, 798 (1982), sua sponte review, ALAB-702, 16 NRC 1530 (1982)
necessity of letters of agreement with schools to implement protective measures during radiological emergency; LBP-85-12, 21 NRC 857 (1985)
- Permian Corp. and Occidental Petroleum Corp. v. United States, 665 F.2d 1214, 1219 (D.C. Cir. 1981)
waiver of attorney-client or work product privilege through inadvertent disclosure of documents; LBP-85-1, 21 NRC 16 n.8 (1985)
- Petition for Emergency and Remedial Action, CLI-78-6, 7 NRC 400 (1978)
Commission discretion in selecting sanctions for violations; DD-85-9, 21 NRC 1771 (1985)
- Petition for Emergency and Remedial Action, CLI-78-6, 7 NRC 400, 404 (1978)
circumstances requiring immediate shutdown of nuclear power plant; CLI-85-10, 21 NRC 1576 (1985)
- Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-726, 17 NRC 755 (1983)
factors considered in determining jurisdictional disputes in NRC proceedings; ALAB-797, 21 NRC 9 (1985)
- Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-726, 17 NRC 755, 757 n.4 (1983)
jurisdiction to consider motion to reopen record on which an initial decision or partial initial decision has been issued; LBP-85-19, 21 NRC 1713 & n.5 (1985)
- Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-789, 20 NRC 1443, 1446 (1984)
most important factor in deciding whether a stay of agency action is warranted; ALAB-808, 21 NRC 1599 (1985)
- Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1423, 1458-61 (1982)
considerations in applying collateral estoppel to health and safety issues vs. environmental issues; LBP-85-11, 21 NRC 623 n.8 (1985)
- Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1423, 1459-60 (1982)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC 404 n.7 (1985)
- Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), LBP-83-39, 18 NRC 67, 88-89 (1983)
basis and specificity requirements for amended quality assurance contention; LBP-85-11, 21 NRC 636 (1985); LBP-85-20, 21 NRC 1741 (1985)
- Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), LBP-84-31, 20 NRC 446, 509-511 (1984)
deposition of NRC Staff officials by intervenors, on quality assurance matters; LBP-85-11, 21 NRC 635 (1985)
- Philadelphia Electric Co. (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974)
responsibility for determining degree of specificity with which a contention is to be pled; LBP-85-11, 21 NRC 617 (1985)
- Philadelphia Electric Co. (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20-21 (1974)
effect of lack of specificity of contention; ALAB-804, 21 NRC 591 (1985)
purpose of specificity requirement for contentions; LBP-85-20, 21 NRC 1742 (1985)
- Phillips v. Interior Board of Mine Operations Appeals, 500 F.2d 722 (D.C. Cir. 1974), cert. denied, 420 U.S. 938 (1975)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1766 n.5 (1985)
- Pollard v. FBI, 705 F.2d 1151, 1153-54 (9th Cir. 1983)
means for settling proprietary information disputes; ALAB-807, 21 NRC 1215 n.107 (1985)

LEGAL CITATIONS INDEX CASES

- Portland General Electric Co. (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610 (1976)
showing necessary to establish standing in licensing proceedings; CLI-85-2, 21 NRC 316 (1985)
- Portland General Electric Co. (Trojan Nuclear Plant), ALAB-181, 7 AEC 207, 208 n.4 (1974)
scope of approval conferred by appellate sua sponte review; ALAB-795, 21 NRC 3 n.7 (1985)
- Portland General Electric Co. (Trojan Nuclear Plant), ALAB-496; 8 NRC 308, 310 (1978)
consolidation of contentions LBP-85-14, 21 NRC 1234 n.31 (1985)
- Power Reactor Development Co. v. International Union of Electrical Radio and Machine Workers, 367 U.S. 396, 406 (1961)
scope of Commission regulatory responsibilities; DD-85-7, 21 NRC 1555 (1985)
- Power Reactor Development Co. v. International Union of Electrical, Radio & Machine Workers, 367 U.S. 396, 415 (1961)
effect of the progress of construction on a Board's evaluation of the adequacy of a structure's design; LBP-85-2, 21 NRC 37 (1985)
- Project Management Corp. (Clinch River Breeder Reactor Plant), ALAB-354, 4 NRC 383, 389 (1976)
showing necessary on other admission factors where good cause is not shown for late filing; LBP-85-11, 21 NRC 629 (1985)
- Project Management Corp. (Clinch River Breeder Reactor Plant), ALAB-354, 4 NRC 383, 391-92 (1976)
effect of an intervenor's withdrawal on litigation of his contentions; ALAB-799, 21 NRC 382 n.99, 383 n.103 (1985)
- Project Management Corp. (Clinch River Breeder Reactor Plant), ALAB-354, 4 NRC 383, 394-95 (1976)
reason for considering delay factor in determining admissibility of late-filed contentions; LBP-85-11, 21 NRC 630 (1985)
- Public Service Co. of Indiana (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-405, 5 NRC 1190, 1192 (1977)
showing necessary by party invoking directed certification; ALAB-805, 21 NRC 599 (1985)
- Public Service Co. of Indiana (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-459, 7 NRC 179, 188 (1978)
Appeal Board standard for overturning a Licensing Board's scheduling decision; ALAB-799, 21 NRC 379 n.75 (1985)
- Public Service Co. of Indiana (Marble Hill Nuclear Generating Station, Units 1 and 2), CLI-80-10, 11 NRC 438 (1980), aff'd, *Save the Valley v. NRC*, 714 F.2d 142 (6th Cir. 1983) (Table)
right to a hearing on restart of a facility; CLI-85-9, 21 NRC 1148 n.61 (1985)
- Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33, 42-53 (1977)
use of aggregate recreational facilities populations to determine population center and low population zone; LBP-85-11, 21 NRC 625, 626 (1985)
- Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), ALAB-667, 15 NRC 421, 426-42 (1982)
extent to which use of probabilistic methodology is permissible under 10 C.F.R. Part 100, Appendix A; LBP-85-2, 21 NRC 47, 131 (1985)
- Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 522, 530-36 (1977)
scope of cost/benefit analysis at construction permit stage; LBP-85-5, 21 NRC 441-42 (1985)
- Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 524-25 (1977)
legality of Staff reliance on information generated by Applicants; LBP-85-3, 21 NRC 256 n.17 (1985)
- Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), CLI-78-1, 7 NRC 1, 27 (1978)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC 404 n.7 (1985)

LEGAL CITATIONS INDEX CASES

- Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), CLI-80-33, 12 NRC 295, 298 (1980)
 extent to which use of probabilistic methodology is permissible under 10 C.F.R. Part 100, Appendix A; LBP-85-2, 21 NRC 47 (1985)
- Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), LBP-83-32A, 17 NRC 1170, 1177 n.5 (1983)
 weight given to NUREG-0654 by Licensing Boards when evaluating emergency plans; LBP-85-12, 21 NRC 653 (1985)
- Public Service Co. of Oklahoma (Black Fox Station, Units 1 and 2), ALAB-505, 8 NRC 527, 532 (1978)
 obligation of counsel to advise Boards of significant new information; LBP-85-6, 21 NRC 461 (1985)
- Public Service Co. of Oklahoma (Black Fox Station, Units 1 and 2), ALAB-573, 10 NRC 775, 785-87 (1979)
 cure for deficiencies in Final Environmental Statements; LBP-85-3, 21 NRC 252, 256 (1985)
- Public Service Co. of Oklahoma (Black Fox Station, Units 1 and 2), ALAB-573, 10 NRC 775, 786-87 (1979)
 treatment of inadequately supported brief; ALAB-799, 21 NRC 381 n.88 (1985)
- Public Service Electric and Gas Co. (Salem Nuclear Generating Station, Unit 1), ALAB-588, 11 NRC 533, 536 (1980)
 showing necessary by party invoking directed certification; ALAB-805, 21 NRC 599 (1985)
- Puget Sound Power and Light Co. (Skagit Nuclear Power Project, Units 1 and 2), ALAB-552, 10 NRC 1, 5 (1979)
 failure of intervenor to demonstrate good cause for late filing of soils contention; LBP-85-9, 21 NRC 527 (1985)
- Rice v. Santa Fe Elevator Corp., 331 U.S. 218, 230, 91 L. Ed. 1447 (1947)
 premise for finding that a State's traditional police powers are preempted; LBP-85-12, 21 NRC 901 (1985)
- Rochester Gas and Electric Corp. (R.E. Ginna Nuclear Power Plant), DD-82-3, 15 NRC 1348, 1357-58 (1982)
 need for further NRC action where licensee voluntarily takes remedial action to correct a deficiency; DD-85-2, 21 NRC 272 (1985)
- Rockford League of Women Voters v. NRC, 679 F.2d 1218 (7th Cir. 1982)
 use of 10 C.F.R. 2.206 procedures as vehicle for reconsideration; CLI-85-4, 21 NRC 563-64 (1985)
- Rockford League of Women Voters v. NRC, 679 F.2d 1218, 1222 (7th Cir. 1982)
 proper forum for intervenor to air disagreements over Licensing Board's decision; DD-85-9, 21 NRC 1774 (1985)
- Sacramento Municipal Utility District (Rancho Seco Nuclear Generating Station), CLI-79-7, 9 NRC 680 (1979)
 Commission obligation to lift effectiveness of shutdown order following resolution of concerns; CLI-85-9, 21 NRC 1151 (1985)
- Sacramento Municipal Utility District (Rancho Seco Nuclear Generating Station), CLI-79-7, 9 NRC 680, aff'd, Friends of the Earth v. United States, 600 F.2d 753 (9th Cir. 1979)
 right to a hearing on restart of a facility; CLI-85-9, 21 NRC 1148 n.61 (1985)
- San Luis Obispo Mothers for Peace v. NRC, 751 F.2d 1287, 1313, 1314 (D.C. Cir. 1984)
 applicability of hearing requirements to lifting of license suspension; CLI-85-10, 21 NRC 1575, 1577-79 (1985)
- San Luis Obispo Mothers for Peace v. NRC, 751 F.2d 1287, 1314 (D.C. Cir. 1984)
 right to a hearing on restart of a facility; CLI-85-9, 21 NRC 1148 n.61 (1985)
- San Luis Obispo Mothers for Peace v. NRC, 751 F.2d 1287, 1322 (D.C. Cir. 1984)
 right of dissenting NRC Staff to present views; ALAB-803, 21 NRC 582 (1985)
- Sealed Case, 676 F.2d 793, 807 (D.C. Cir. 1982)
 waiver of attorney-client or work product privilege through inadvertent disclosure of documents; LBP-85-1, 21 NRC 16 n.7 (1985)

LEGAL CITATIONS INDEX CASES

- SEC v. Chenery Corp., 318 U.S. 80, 94; 87 L. Ed. 626, 636 (1943)
cause for Staff deferral of determination on application for permanent onsite storage of mill tailings; LBP-85-3, 21 NRC 250 (1985)
- Sholly v. NRC, 651 F.2d 780 (D.C. Cir. 1980), vacated on other grounds, 103 S. Ct. 1170 (1983)
characterization of license amendment; CLI-85-10, 21 NRC 1578 (1985)
- Sholly v. NRC, 651 F.2d 780, 791 (D.C. Cir. 1980), vacated on other grounds, 103 S. Ct. 1170 (1983)
Commission actions triggering hearing rights; CLI-85-10, 21 NRC 1579 (1985)
- Silkwood v. Kerr-McGee Chemical Corp., 78 L. Ed. 2d 443, 454 (1984)
power of States to regulate nuclear power plants; LBP-85-12, 21 NRC 902, 906-07 (1985)
- Silkwood v. Kerr-McGee Chemical Corp., 78 L. Ed. 2d 443, 458 (1984)
nuclear power development objectives considered in deciding issue of federal preemption of State laws; LBP-85-12, 21 NRC 909 (1985)
- South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 884, 889 (1981)
effect on other parties of delay caused by late-filed contentions; LBP-85-11, 21 NRC 631 (1985)
- South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 884-85 (1981)
weight given to factors (ii) and (iv) of 10 C.F.R. 2.714(a)(1); LBP-85-11, 21 NRC 629 (1985)
- South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 894 (1981)
value of identification of intervenor's witnesses to Board determination of intervenor's contribution to a sound record; LBP-85-20, 21 NRC 1745 n.8 (1985)
- South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), ALAB-642, 13 NRC 881, 895 (1981)
weight given to factors (ii) and (iv) in five-factor test for admission of late-filed contentions; LBP-85-9, 21 NRC 528 (1985)
- South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), ALAB-663, 14 NRC 1140, 1151 (1981)
basis for Board exercise of discretionary authority to call its own witnesses; ALAB-805, 21 NRC 599 n.8 (1985)
- South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), ALAB-663, 14 NRC 1140, 1156 (1981)
composition of NRC Licensing Boards; ALAB-807, 21 NRC 1212 n.94 (1985)
- South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), LBP-82-57, 16 NRC 477, 486-87 (1982), aff'd, ALAB-710, 17 NRC 25 (1983)
inclusion of schools within close proximity of each other in EPZ; LBP-85-12, 21 NRC 704, 705 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-248, 8 AEC 957, 963 (1974)
effectiveness of evacuation routes which initially travel toward a plant; LBP-85-8, 21 NRC 522 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 694-96 (1982)
prerequisites to applying collateral estoppel in NRC proceedings; LBP-85-11, 21 NRC 620, 623 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 695-97 (1982)
standard for applying collateral estoppel to prevent litigation of a contention; LBP-85-4, 21 NRC 404 n.7 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-673, 15 NRC 688, 697 & n.14, aff'd, CLI-82-11, 15 NRC 1383 (1982)
Board authority to curtail cross-examination; ALAB-799, 21 NRC 377 n.60 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-680, 16 NRC 127 (1982)
factors considered in grant of exemption for emergency plan deficiencies; ALAB-809, 21 NRC 1612 (1985)

LEGAL CITATIONS INDEX CASES

- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 353-54 (1983)
applicability of collateral estoppel where construction permit proceeding was uncontested; LBP-85-11, 21 NRC 624 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 354 (1983)
considerations in applying collateral estoppel to health and safety issues vs. environmental issues; LBP-85-11, 21 NRC 623 n.8 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 365-68 (1983)
extent of Board dependence on material lacking formal sponsorship in making its findings; LBP-85-2, 21 NRC 229 n.106 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 380 n.57 (1983)
nature of emergency planning findings; ALAB-811, 21 NRC 1627 n.19 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), CLI-83-10, 17 NRC 528, 533 (1983)
extent of coverage to be provided by emergency plans; LBP-85-12, 21 NRC 653 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-3, 15 NRC 61, 78-82 (1982)
application of collateral estoppel to prevent intervenor who was not a party to construction permit proceeding from relitigating issue at operating license stage; LBP-85-11, 21 NRC 62223 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-39, 15 NRC 1163, 1269 (1982); ALAB-717, 17 NRC 346, 376 (1983)
notifying boaters of a radiological emergency; LBP-85-12, 21 NRC 763 (1985)
- Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-39, 15 NRC 1163, 1270 (1982), aff'd, ALAB-717, 17 NRC 346 (1983)
means for demonstrating compliance with emergency planning requirements; LBP-85-14, 21 NRC 1228 n.14 (1985)
- Statement of Policy on Conduct of Licensing Proceedings, CLI-81-8, 13 NRC 452 (1981)
Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1235 (1985)
completion of operating license proceedings prior to completion to facility construction; ALAB-811, 21 NRC 1627 n.16 (1985)
- Statement of Policy on Conduct of Licensing Proceedings, CLI-81-8, 13 NRC 452, 454 (1981)
penalty for nonresponsive filings and ignoring Commission directives; CLI-85-2, 21 NRC 287 (1985)
time allowed for intervenors' case preparation; ALAB-802, 21 NRC 498 n.44 (1985)
- Statement of Policy on Conduct of Licensing Proceedings, CLI-81-8, 13 NRC 452, 455 (1981)
circumstances appropriate for consolidation of intervenors; ALAB-808, 21 NRC 1601 (1985)
Commission policy towards resolution of issues outside the hearing process; ALAB-806, 21 NRC 1193 (1985)
consolidation of contentions; LBP-85-14, 21 NRC 1234 n.31 (1985)
resolution of health and safety issues without litigation; ALAB-799, 21 NRC 383 n.104 (1985)
- Statement of Policy on Conduct of Licensing Proceedings, CLI-81-8, 13 NRC 452, 457 (1981)
means for Licensing Boards to expedite proceedings; ALAB-799, 21 NRC 377 n.57 (1985)
- Statement of Policy: Further Commission Guidance for Power Reactor Operating Licenses, CLI-80-42, 12 NRC 654, 660 (1980)
obligation of adjudicative boards to apply policy statements to their determinations; LBP-85-15, 21 NRC 1507 n.38 (1985)
- Subpoenas Duces Tecum Fulbright and Jaworski, Vinson and Elkins, Tesoro Petroleum Corp., 738 F.2d 1367 (D.C. Cir. 1984)
waiver of attorney-client or work product privilege through inadvertent disclosure of documents; LBP-85-1, 21 NRC 16 n.8 (1985)

LEGAL CITATIONS INDEX

CASES

- Suburban Sew'n Sweep Inc. v. Swiss Bernina, Inc., 91 F.R.D. 254, 257 (N.D. Ill. 1981)
waiver of attorney-client or work product privilege through inadvertent disclosure of documents; LBP-85-1, 21 NRC 16 (1985)
- Temmer v. FCC, 743 F.2d 918, 927-28 (D.C. Cir. 1984)
types of agency licensing actions triggering hearing rights; CLI-85-10, 21 NRC 1579 (1985)
- Tennessee Valley Authority (Browns Ferry Nuclear Plant, Units 1 and 2), LBP-76-10, 3 NRC 209, 216 (1976)
use of massive documents in support of a contention; LBP-85-20, 21 NRC 1741 (1985)
- Tennessee Valley Authority (Browns Ferry Nuclear Plant, Units 1, 2 and 3), ALAB-677, 15 NRC 1387, 1394 (1982)
obligation of applicants to inform Boards of significant new information; LBP-85-6, 21 NRC 461 (1985)
- Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B, and 2B), ALAB-463, 7 NRC 341, 356 (1978)
right of intervenor to make its case solely through cross-examination; LBP-85-20, 21 NRC 1745 (1985)
- Tennessee Valley Authority (Watts Bar Nuclear Plant, Units 1 and 2), ALAB-413, 5 NRC 1418, 1422 n.5 (1977)
considerations in applying collateral estoppel to health and safety issues vs. environmental issues; LBP-85-11, 21 NRC 623 n.8 (1985)
- Tennessee Valley Authority (Yellow Creek Nuclear Plant, Units 1 and 2), ALAB-515, 8 NRC 702, 714 (1978)
obligation of NRC adjudicative boards to apply policy statements to their determinations; LBP-85-15, 21 NRC 1505 (1985)
- Texas Utilities Electric Co. (Comanche Peak Steam Electric Station, Units 1 and 2), LBP-84-56, 20 NRC 1696)
basis for broad discovery request involving licensee's attorney; LBP-85-19, 21 NRC 1729 (1985)
- Texas Utilities Generating Co. (Comanche Peak Steam Electric Station, Units 1 and 2), CLI-81-24, 14 NRC 614 (1981)
scope of Licensing Board justification to the Commission of exercise of the Board's sua sponte review authority; LBP-85-8, 21 NRC 519 (1985)
- Texas Utilities Generating Co. (Comanche Peak Steam Electric Station, Units 1 and 2), CLI-81-36, 14 NRC 1111, 1113-14 (1981)
resolution of safety or environmental issues that are not the subject of contentions; ALAB-799, 21 NRC 383 n.100 (1985)
standard for sua sponte review of admitted contentions; LBP-85-8, 21 NRC 519 (1985)
- Texas Utilities Generating Co. (Comanche Peak Steam Electric Station, Units 1 and 2), DD-83-11, 18 NRC 293, 295 (1983)
general discovery of documentation in possession of licensees; DD-85-2, 21 NRC 273 (1985)
use of 2,206 petitions by members of the public as information-gathering devices; DD-85-7, 21 NRC 1559-60 (1985)
- Toledo Edison Co. (Davis-Besse Nuclear Power Station, Units 1, 2, and 3), ALAB-378, 5 NRC 557 (1977)
applicability of collateral estoppel to NRC proceedings; LBP-85-11, 21 NRC 620 (1985)
- Trane Co. v. Klutznick, 87 F.R.D. 473 (W.D. Wisc. 1980)
treatment of requests for documents filed on nonparties; LBP-85-1, 21 NRC 22 (1985)
- Transamerica Computer Co. v. IBM, 573 F.2d 646, 653 (9th Cir. 1978)
factors considered in determining applicability of privilege to inadvertently disclosed documents; LBP-85-1, 21 NRC 18-19 (1985)
- Underwater Storage, Inc. v. U.S. Rubber Co., 314 F. Supp. 546, 549 (D.D.C. 1970)
inadvertent disclosure of documents as cause for waiver of privilege; LBP-85-1, 21 NRC 17 (1985)
- Union Electric Co. (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 345 (1983)
litigability of construction quality assurance issues in operating license proceedings; ALAB-799, 21 NRC 374 n.35 (1985)

LEGAL CITATIONS INDEX CASES

- Union Electric Co. (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983)
interpretation of the term "promptly" as applied to the reporting of quality assurance deficiencies; ALAB-802, 21 NRC 503 n.75 (1985)
reason for requiring specificity of quality assurance contentions; LBP-85-11, 21 NRC 636 (1985)
support required for contentions alleging construction deficiencies; LBP-85-20, 21 NRC 1741 (1985)
- Union Electric Co. (Callaway Plant, Unit 1), ALAB-750, 18 NRC 1205, 1209 (1983)
standard for grant of motion to reopen; ALAB-807, 21 NRC 1216 n.114 (1985)
- Union Electric Co. (Callaway Plant, Units 1 and 2), ALAB-527, 9 NRC 126, 132-39 (1979)
Commission authority to investigate and initiate action for discrimination; DD-85-9, 21 NRC 1767 (1985)
- United Broadcasting Co. v. FCC, 565 F.2d 699 (D.C. Cir. 1977), cert. denied, 434 U.S. 1046 (1978), aff'g Applications of United Television Co., 55 F.C.C.2d 416 (1975)
penalty for violation of rules; ALAB-799, 21 NRC 374 n.39 (1985)
- United States v. Brutzman, 731 F.2d 1449, 1452 (9th Cir. 1984)
Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1236 (1985)
- United States v. Cole, 456 F.2d 142, 144 (8th Cir. 1972)
waiver of attorney-client or work product privilege through inadvertent disclosure of documents; LBP-85-1, 21 NRC 16 n.7 (1985)
- United States v. Kelsey-Hayes Wheel Co., 15 F.R.D. 461, 464, 465 (E.D. Mich. 1954)
waiver of attorney-client or work product privilege through inadvertent disclosure of documents; LBP-85-1, 21 NRC 16 n.7, 17-18 (1985)
- United States v. Utah Construction & Mining Co., 384 U.S. 394, 421-22 (1966)
applicability of collateral estoppel to NRC proceedings; LBP-85-11, 21 NRC 620 (1985)
- United States v. White, 454 F.2d 435, 439 (7th Cir. 1979)
treatment of inadequately supported brief; ALAB-799, 21 NRC 381 n.88 (1985)
- Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), ALAB-138, 6 AEC 520, 523 (1973)
importance of timeliness of motion to reopen a record; LBP-85-19, 21 NRC 1721 (1985)
- Virginia Electric and Power Co. (North Anna Power Station, Units 1 and 2), ALAB-289, 2 NRC 395, 398 (1975)
showing necessary on other admission factors where good cause is not shown for late filing; LBP-85-11, 21 NRC 629 (1985)
- Virginia Electric and Power Co. (North Anna Power Station, Units 1 and 2), ALAB-342, 4 NRC 98, 107 (1976)
Licensing Board discretion in balancing admissibility factors for late-filed contentions; LBP-85-11, 21 NRC 631 (1985)
- Virginia Electric and Power Co. (North Anna Power Station, Units 1 and 2), ALAB-551, 9 NRC 704, 707 (1979)
nexus between motions to reopen as basis for Appeal Board's jurisdiction; ALAB-797, 21 NRC 8 (1985); LBP-85-19, 21 NRC 1714 (1985)
- Virginia Electric and Power Co. (North Anna Power Station, Units 1 and 2), LBP-78-10, 7 NRC 295, 299 (1978)
means for determining deficiencies reportable under 10 C.F.R. 50.55(e); LBP-85-6, 21 NRC 459 (1985)
- W.R. Grace v. Pullman Inc., 446 F. Supp. 771 (W.D. Okla. 1976)
waiver of disclosure where opposing party is allowed to review documents in response to discovery request; LBP-85-1, 21 NRC 18 (1985)
- Washington Public Power Supply System (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167 (1983)
means of protecting an intervenor's interests other than through litigation of contentions; ALAB-799, 21 NRC 384 n.108 (1985); LBP-85-9, 21 NRC 528 (1985)

LEGAL CITATIONS INDEX

CASES

- Washington Public Power Supply System (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167, 1171 (1983)
Licensing Board discretion in balancing factors to determine admissibility of late-filed contentions; ALAB-806, 21 NRC 1190 n.24 (1985)
- Washington Public Power Supply System (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167, 1177-78, 1181, and 1182-83 (concurring opinion of Mr. Edles) (1983)
need for intervenors to provide witness and subject lists with amended quality assurance contentions; LBP-85-11, 21 NRC 637 (1985)
- Washington Public Power Supply System (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167, 1177-78, 1182-83 (1983) (concurring opinion of Judge Edles)
value of identification of intervenor's witnesses to Board determination of intervenor's contribution to a sound record; LBP-85-20, 21 NRC 1745 n.7, 1746 (1985)
- Weil v. Investment/Indicators Research & Management, 647 F.2d 18, 24 (9th Cir. 1981)
consideration of intent of disclosing party in deciding applicability of privilege to inadvertently disclosed documents; LBP-85-1, 21 NRC 18 (1985)
- Wells v. Kansas Gas and Electric Co., 83-ERA-12 (June 14, 1984), appeal pending sub nom. Kansas Gas and Electric Co. v. Donovan, No. 84-2114 (10th Cir.)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1764 n.3 (1985)
- Wisconsin Electric Power Co. (Point Beach Nuclear Plant, Unit 1), ALAB-696, 16 NRC 1245, 1255 (1982)
treatment of inadequately supported brief; ALAB-799, 21 NRC 381 n.88 (1985)
- Wisconsin Electric Power Co. (Point Beach Nuclear Plant, Unit 1), ALAB-696, 16 NRC 1245, 1261 (1982)
means for settling proprietary information disputes; ALAB-807, 21 NRC 1215 n.106 (1985)
outcome of party's refusal to sign protective order; ALAB-807, 21 NRC 1215 n.108 (1985)
- Wisconsin Electric Power Co. (Point Beach Nuclear Plant, Unit 1), ALAB-719, 17 NRC 387, 391 (1983)
Appeal Board standard for overturning a Licensing Board's scheduling decision; ALAB-799, 21 NRC 379 n.75 (1985)
- Wisconsin Electric Power Co. (Point Beach Nuclear Plant, Unit 2), ALAB-137, 6 AEC 491, 504-05 (1973)
right of intervenor to make its case solely through cross-examination; LBP-85-20, 21 NRC 1745 (1985)
- Wisconsin v. Weinberger, 745 F.2d 412 (7th Cir. 1984)
need for license suspension pending environmental review of restart of nuclear power plant; CLI-85-10, 21 NRC 1576 n.9 (1985)
- X-ray Engineering Co., 1 AEC 466 (1966)
noncompliance with NRC regulations as lack of licensee integrity; CLI-85-9, 21 NRC 1160 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 0.735-27
responsibility for interpreting Commission conflict of interest regulations; ALAB-803, 21 NRC 583 (1985)
- 10 C.F.R. 2
characterization of Commission order as license amendment or enforcement order for purpose of determining existence of hearing rights; CLI-85-10, 21 NRC 1573 n.4 (1985)
- 10 C.F.R. 2.103(b)
prerequisite to denial of application for permanent onsite storage of mill tailings; LBP-85-3, 21 NRC 250 (1985)
- 10 C.F.R. 2.104(c)
limit on issues litigable in operating license proceedings; ALAB-799, 21 NRC 382 n.97 (1985)
- 10 C.F.R. 2.107(a)
exercise of Board authority to prescribe terms for withdrawal of application; LBP-85-7, 21 NRC 509 (1985)
- 10 C.F.R. 2.202(f)
Commission authority to require hearing prior to restart of facility; CLI-85-9, 21 NRC 1124 n.2 (1985)
- 10 C.F.R. 2.204
effect of Commission failure to include prior notice and offer of hearing in its order; CLI-85-10, 21 NRC 1573 n.4 (1985)
standards for making an effectiveness decision; CLI-85-9, 21 NRC 1148 (1985)
- 10 C.F.R. 2.205
right of licensee to contest civil penalty; DD-85-9, 21 NRC 1773 n.9 (1985)
- 10 C.F.R. 2.206
as a means to reopen issues previously adjudicated; CLI-85-4, 21 NRC 564 (1985)
as vehicle for reconsideration; CLI-85-4, 21 NRC 563 (1985)
denial of petition alleging inadequacies in construction at Callaway; DD-85-7, 21 NRC 1553 (1985)
denial of petition alleging significant emergency preparedness deficiencies; DD-85-6, 21 NRC 1548 (1985)
denial of petition for action to remedy alleged violations and deficiencies in construction at Seabrook; DD-85-3, 21 NRC 533 (1985)
denial of petition for revocation of license, alleging lack of character of licensee; DD-85-1, 21 NRC 264 (1985)
denial of request for disclosure of licensee's intended sources of interim supplemental cooling water; DD-85-8, 21 NRC 1562 (1985)
denial of request for show cause order alleging deficiencies with equipment qualification; DD-85-5, 21 NRC 1034 (1985)
forum for making voluntary licensee commitments into a license amendment; CLI-85-10, 21 NRC 1574 n.5 (1985)
forum for request for stay of order lifting license suspension; CLI-85-10, 21 NRC 1576 (1985)
remedy for site redress problems following withdrawal of limited work authorization; LBP-85-7, 21 NRC 514 (1985)
request for enforcement action on basis of violations of NRC regulations and alleged harassment and intimidation of quality control inspectors; DD-85-9, 21 NRC 1761 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 2.713(b)
representation of parties in NRC proceedings; ALAB-802, 21 NRC 498 n.43 (1985)
- 10 C.F.R. 2.714
admissibility of amended quality assurance contention; LBP-85-20, 21 NRC 1737, 1748 (1985)
admission requirements applicable to late-filed contentions; LBP-85-11, 21 NRC 627 (1985)
- 10 C.F.R. 2.714(a)
factors weighed for admission of contentions greatly expanded during particularization; LBP-85-8, 21 NRC 518 (1985)
rejection of late-filed soils contention; LBP-85-9, 21 NRC 529 (1985)
- 10 C.F.R. 2.714(a)(1)
factors balanced for admission of late-filed contentions; LBP-85-9, 21 NRC 526 (1985)
factors governing admission of late-filed contentions based on previously unavailable documents; ALAB-806, 21 NRC 1188 n.17, 1190 n.23 (1985)
test applied in determining whether to allow intervenor to adopt contentions of another intervenor who has withdrawn; ALAB-799, 21 NRC 381 n.93 (1985)
- 10 C.F.R. 2.714(a)(1)(i-v)
factors balanced to determine admissibility of late-filed quality assurance contentions; LBP-85-11, 21 NRC 627-32 (1985)
need for intervenors to plead admissibility of late-filed amended contention; LBP-85-20, 21 NRC 1738, 1740, 1744 (1985)
- 10 C.F.R. 2.714(a)(1)(iii)
demonstration by intervenor filing late amended contention of its contribution to a sound record; LBP-85-20, 21 NRC 1744 (1985)
- 10 C.F.R. 2.714(a)(1)(v)
counterbalancing of delay caused by admission of late-filed broad quality assurance contention; LBP-85-20, 21 NRC 1747, 1748 n.9 (1985)
- 10 C.F.R. 2.714(a)(2)
requirements for intervention; LBP-85-2, 21 NRC 118 (1985)
- 10 C.F.R. 2.714(a)(3)
Board discretion to permit amendment of intervention petition; LBP-85-20, 21 NRC 1738 (1985)
- 10 C.F.R. 2.714(b)
admission requirements applicable to late-filed contentions; ALAB-804, 21 NRC 590, 591 n.5 (1985); LBP-85-11, 21 NRC 627 n.12 (1985); LBP-85-20, 21 NRC 1739, 1740 (1985)
consideration of merits of a contention in determining its admissibility; ALAB-806, 21 NRC 1193 n.39 (1985)
factors governing admission of late-filed contentions based on previously unavailable documents; ALAB-806, 21 NRC 1190 n.23 (1985)
intervenor participation on contentions sponsored by others; ALAB-799, 21 NRC 383 n.102 (1985)
need for specificity of reasons for grant of exemption from regulations; ALAB-809, 21 NRC 1614 (1985)
reason for basis with specificity requirement for contentions; LBP-85-11, 21 NRC 616 (1985)
test applied in determining whether to allow intervenor to adopt contentions of another intervenor who has withdrawn; ALAB-799, 21 NRC 381 n.94 (1985)
- 10 C.F.R. 2.715a
circumstances appropriate for consolidation of intervenors; ALAB-808, 21 NRC 1601 (1985)
- 10 C.F.R. 2.716
application of collateral estoppel to consolidated proceedings; LBP-85-4, 21 NRC 405 n.8 (1985)
- 10 C.F.R. 2.718
Board discretion to permit amendment of defective initial pleadings; LBP-85-20, 21 NRC 1739 (1985)
- 10 C.F.R. 2.718(e)
Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1235 (1985)
Licensing Board authority to demand cross-examination plans; ALAB-799, 21 NRC 377 n.55 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 2.718(i)
reason for denial of directed certification request; ALAB-799, 21 NRC 379 (1985)
- 10 C.F.R. 2.720
use of subpoenas to obtain documents from nonparties; LBP-85-1, 21 NRC 22 (1985)
- 10 C.F.R. 2.720(h)(2)(i)
admissibility of hearsay evidence; ALAB-802, 21 NRC 501 n.67 (1985)
Board authority to order appearance of Staff member as a witness; ALAB-802, 21 NRC 500-01 (1985)
- 10 C.F.R. 2.721(d)
Board before which a stay motion is filed; ALAB-808, 21 NRC 1599 n.3 (1985)
- 10 C.F.R. 2.722
duties of judges serving on Licensing Board Panels; LBP-85-5, 21 NRC 413 n.2 (1985)
prohibition against appointment of special master to conduct discovery on behalf of a party; LBP-85-19, 21 NRC 1729 n.16 (1985)
- 10 C.F.R. 2.730
Commission authority to delegate responsibility for disposing of motions to Appeal Boards; ALAB-797, 21 NRC 9 n.5 (1985)
- 10 C.F.R. 2.730(f)
dismissal of Licensing Board referral of interlocutory ruling; ALAB-805, 21 NRC 600 (1985)
- 10 C.F.R. 2.740(b)(1)
need for discovery request to relate to matters in controversy; LBP-85-19, 21 NRC 1729 (1985)
- 10 C.F.R. 2.740(b)(2)
identification of records for which attorney-client privilege is claimed; LBP-85-19, 21 NRC 1731 (1985)
- 10 C.F.R. 2.741
requests for documents filed on nonparties; LBP-85-1, 21 NRC 21 (1985)
- 10 C.F.R. 2.743(b)
use of prefiled written testimony in NRC proceedings; ALAB-799, 21 NRC 379 n.71 (1985)
- 10 C.F.R. 2.743(c)
admissibility of evidence proffered by witness who violated Commission conflict of interest regulations; ALAB-803, 21 NRC 584 n.11 (1985)
bases for Licensing Board determination on emergency planning contentions; LBP-85-14, 21 NRC 1229 (1985)
- 10 C.F.R. 2.743(d)
effect of lengthy objections on a proceeding; ALAB-799, 21 NRC 378 n.65 (1985)
- 10 C.F.R. 2.743(i)(1)
effect of Institute of Nuclear Power Operations accreditation on finding of adequacy of reactor operator training program; LBP-85-15, 21 NRC 1503 n.28 (1985)
- 10 C.F.R. 2.744(c)
interpretation of the term "in camera"; ALAB-807, 21 NRC 1215 n.107 (1985)
- 10 C.F.R. 2.749
content of summary disposition motions; LBP-85-4, 21 NRC 408 (1985)
- 10 C.F.R. 2.757(c)
Board authority to impose time constraints on examination and cross-examination of witnesses; LBP-85-14, 21 NRC 1235 (1985)
means for Licensing Boards to expedite proceedings; ALAB-799, 21 NRC 377 n.56 (1985)
- 10 C.F.R. 2.758
background of need for power rule; LBP-85-5, 21 NRC 441 (1985)
interpretation of the term "prima facie" showing; LBP-85-5, 21 NRC 443 n.16 (1985)
means for challenging regulations; LBP-85-4, 21 NRC 404 (1985)
means for obtaining waiver from need for power rule; LBP-85-5, 21 NRC 440 (1985)
showing necessary for waiver of need for power rule; LBP-85-5, 21 NRC 444 (1985)
- 10 C.F.R. 2.758(a)
litigability of Commission rules in licensing proceedings; LBP-85-5, 21 NRC 440 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 2.758(b)
standard for obtaining waiver from need for power rule; LBP-85-5, 21 NRC 441 (1985)
- 10 C.F.R. 2.758(c)
Board action where no showing is made for waiver of need for power rule; LBP-85-5, 21 NRC 441 (1985)
- 10 C.F.R. 2.758(d)
Board action where showing is made for waiver of need for power rule; LBP-85-5, 21 NRC 441 (1985)
- 10 C.F.R. 2.759
Commission policy towards resolution of issues outside the hearing process; ALAB-806, 21 NRC 1193 (1985)
resolution of health and safety issues without litigation; ALAB-799, 21 NRC 383 n.104 (1985)
- 10 C.F.R. 2.760(a)
finality of initial decisions; LBP-85-11, 21 NRC 621 (1985)
- 10 C.F.R. 2.760a
Board authority to raise issues sua sponte; LBP-85-6, 21 NRC 450 (1985)
cause for invocation of Licensing Board's sua sponte powers; ALAB-799, 21 NRC 385 (1985);
LBP-85-8, 21 NRC 517, 519 (1985)
issues to be decided in an operating license amendment proceeding; ALAB-796, 21 NRC 5 (1985);
ALAB-799, 21 NRC 382 n.97 (1985)
limit on environmental matters litigable in operating license proceeding; LBP-85-5, 21 NRC 445 (1985)
scope of emergency planning issues to be considered by Licensing Boards; LBP-85-14, 21 NRC 1229 (1985)
- 10 C.F.R. 2.761
dismissal of proceedings when issues are no longer disputed; ALAB-796, 21 NRC 5 (1985)
- 10 C.F.R. 2.762
proper forum for intervenor to air disagreements over Licensing Board's decision; DD-85-9, 21 NRC 1774 (1985)
- 10 C.F.R. 2.762(d)
treatment of inadequately briefed allegations; ALAB-799, 21 NRC 378 n.64 (1985)
- 10 C.F.R. 2.762(d)(1)
content of appellant's briefs; ALAB-802, 21 NRC 496 n.30 (1985)
- 10 C.F.R. 2.762(e)
page limit on briefs; ALAB-799, 21 NRC 369 n.14 (1985)
- 10 C.F.R. 2.762(g)
treatment of briefs lacking record citations; ALAB-802, 21 NRC 496 n.30 (1985)
- 10 C.F.R. 2.764
depth of examination of the record for immediate effectiveness reviews; ALAB-800, 21 NRC 390 n.9 (1985)
standards for making an effectiveness decision; CLI-85-9, 21 NRC 1148 (1985)
status of immediate effectiveness review where questions involving party's hearing rights are unresolved; ALAB-809, 21 NRC 1608 (1985)
- 10 C.F.R. 2.764(f)(1)
immediate effectiveness reviews of operating license authorizations for 5% power or less; ALAB-800, 21 NRC 390 n.7 (1985)
- 10 C.F.R. 2.764(f)(2)
decisions applicable to; CLI-85-9, 21 NRC 1148 n.62 (1985)
- 10 C.F.R. 2.764(f)(2)(i)
effectiveness of Licensing Board decision authorizing full-power operation; CLI-85-9, 21 NRC 1148 n.62 (1985)
- 10 C.F.R. 2.764(f)(2)(ii)
right of parties to submit comments pertaining to immediate effectiveness issues; ALAB-800, 21 NRC 390 n.9 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 2.764(g)
 - effect on Appeal Board of Commission's immediate effectiveness review; ALAB-800, 21 NRC 390 (1985)
- 10 C.F.R. 2.772(h)
 - authority of Commission Secretary; ALAB-806, 21 NRC 1186 n.1 (1985)
- 10 C.F.R. 2.785(b)(1)
 - Commission authority to delegate responsibility for disposing of motions to Appeal Boards; ALAB-797, 21 NRC 9 n.5 (1985)
- 10 C.F.R. 2.786
 - cause for Commission reversal of Appeal Board decision; CLI-85-2, 21 NRC 347 (1985)
- 10 C.F.R. 2.787(b)(1)
 - authority of Board Chairman in absence of a quorum; ALAB-810, 21 NRC 1618 n.4 (1985)
- 10 C.F.R. 2.788(a)
 - right of a party to seek stay of decision or agency action; ALAB-808, 21 NRC 1598 n.2 (1985)
- 10 C.F.R. 2.788(b)(4)
 - consideration of unlitigated matters in deciding stay motions; ALAB-808, 21 NRC 1603 (1985)
- 10 C.F.R. 2.788(e)
 - criteria for determining stay motions; ALAB-808, 21 NRC 1599, 1603 (1985); ALAB-810, 21 NRC 1618-20 (1985)
- 10 C.F.R. 2.788(f)
 - Board before which a stay motion is filed; ALAB-808, 21 NRC 1599 n.3 (1985)
- 10 C.F.R. 2.790
 - interpretation of the term "in camera"; ALAB-807, 21 NRC 1215 n.107 (1985)
- 10 C.F.R. 2.790(b)(6)
 - means for settling proprietary information disputes; ALAB-807, 21 NRC 1214 n.105 (1985)
- 10 C.F.R. 2.790(b)(6)(iii)
 - means for settling proprietary information disputes; ALAB-807, 21 NRC 1215 n.106 (1985)
- 10 C.F.R. 2.802
 - means for challenging regulations; LBP-85-4, 21 NRC 404 (1985)
- 10 C.F.R. 2, Appendix A, V(d)(4)
 - use of witness panels in NRC proceedings; ALAB-799, 21 NRC 379 n.72 (1985)
- 10 C.F.R. 2, Appendix A, VIII
 - scope of emergency planning issues to be considered by Licensing Boards; LBP-85-14, 21 NRC 1229 (1985)
- 10 C.F.R. 2, Appendix C, I and VII (1985)
 - Commission discretion in selecting sanctions for violations; DD-85-9, 21 NRC 1771-72 (1985)
- 10 C.F.R. 2, Appendix C, III and IV
 - definition of a noncompliance; ALAB-799, 21 NRC 367 n.3 (1985)
- 10 C.F.R. 2, Appendix C, IV.A (1984), as revised, V.A, 49 Fed. Reg. 8583, 8589 (Mar. 8, 1984)
 - NRC enforcement policy for severity level IV and V violations; DD-85-9, 21 NRC 1770 (1985)
- 10 C.F.R. 2, Appendix C, IV(E)(3)
 - definition of a deviation; ALAB-799, 21 NRC 367 n.3 (1985)
- 10 C.F.R. 2, Subpart B and Appendix C
 - Staff responsibility to determine need for enforcement action; DD-85-9, 21 NRC 1762 n.1 (1985)
- 10 C.F.R. 20
 - dose criteria for recovery and reentry of contaminated areas; LBP-85-12, 21 NRC 882 (1985)
- 10 C.F.R. 20.105
 - calculation of radiation doses to the thyroid; LBP-85-5, 21 NRC 428 (1985)
- 10 C.F.R. 20.105(a)
 - dose criteria for recovery and reentry of contaminated areas; LBP-85-12, 21 NRC 881 (1985)
- 10 C.F.R. 20.106
 - hazard from abnormal leakages in reactor coolant pressure boundary at GE training reactor; LBP-85-4, 21 NRC 403 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 21
 - basis for Commission investigation on violation of deficiency reporting obligations; LBP-85-18, 21 NRC 1644 (1985)
 - engineering design deficiencies reportable under; LBP-85-6, 21 NRC 451-52 (1985)
- 10 C.F.R. 35
 - requirements for a physician to receive an NRC license; DPRM-85-1, 21 NRC 1778 (1985)
- 10 C.F.R. 40, Appendix A
 - Staff evaluation of alternatives to onsite disposal of mill tailings; LBP-85-3, 21 NRC 246 (1985)
- 10 C.F.R. 50
 - need for physical security plan for substitute AC electric power system; ALAB-800, 21 NRC 395 (1985)
 - principal authority for granting exemptions from any requirements of; ALAB-809, 21 NRC 1610 (1985)
- 10 C.F.R. 50.7
 - admissibility of contentions alleging incidents of harassment, intimidation, and retaliatory action; LBP-85-20, 21 NRC 1742 (1985)
 - protection of employees from discrimination for raising health and safety issues; CLI-85-2, 21 NRC 327 (1985)
 - violation of, by utility giving employee a low performance rating for expressing safety concerns; DD-85-9, 21 NRC 1762-75 (1985)
- 10 C.F.R. 50.7(a)
 - scope of Commission prohibitions against employee discrimination; DD-85-9, 21 NRC 1764, 1766 (1985)
- 10 C.F.R. 50.10(c)
 - exemptions from; LBP-85-7, 21 NRC 509 (1985)
- 10 C.F.R. 50.10(e)(1) and (2)
 - scope of site suitability findings for purpose of obtaining limited work authorization; LBP-85-11, 21 NRC 621 (1985)
- 10 C.F.R. 50.12
 - exemption from 50.47; ALAB-809, 21 NRC 1608 (1985)
- 10 C.F.R. 50.12(a)
 - basis for dismissal of appeal of decision granting exemption from emergency planning requirements; ALAB-809, 21 NRC 1611 (1985)
 - criteria to be satisfied for grant of exemptions from regulations; ALAB-809, 21 NRC 1610, 1612-13 (1985)
 - effect of grant of exemption under, on need for physical security plan; ALAB-800, 21 NRC 396 (1985)
 - interpretation of the phrase "otherwise in the public interest"; ALAB-800, 21 NRC 389, 391 (1985)
 - scope of "public interest" finding for grant of exemption from regulations; CLI-85-1, 21 NRC 278 n.2 (1985)
- 10 C.F.R. 50.12(b)(2)
 - factors considered in deciding on grant of exemption from 10 C.F.R. 50.10(c); LBP-85-7, 21 NRC 509 (1985)
- 10 C.F.R. 50.34(a)(4) and (b)(4)
 - basis for evaluating adequacy of diesel generators for backup emergency electrical power at Shoreham; LBP-85-18, 21 NRC 1655 (1985)
- 10 C.F.R. 50.34(a), (c)(1)
 - litigability of tritium releases from GE training reactor; LBP-85-4, 21 NRC 402 (1985)
- 10 C.F.R. 50.34(b)(1)
 - site evaluation factors which must be included in Final Safety Analysis Report; LBP-85-2, 21 NRC 41, 45 (1985)
- 10 C.F.R. 50.34(c)
 - necessity for physical security plan with operating license application; ALAB-800, 21 NRC 392 n.15 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 50.36a(1)
 - litigability of tritium releases from GE training reactor; LBP-85-4, 21 NRC 403 (1985)
- 10 C.F.R. 50.47
 - appeal of order granting applicant exemption from; ALAB-809, 21 NRC 1607 (1985)
 - emergency planning findings necessary for issuance of operating license; ALAB-809, 21 NRC 1609 n.3 (1985); LBP-85-14, 21 NRC 1228 (1985)
 - exemption from; ALAB-809, 21 NRC 1608-09 (1985)
 - individualized evaluation of buildings to determine their adequacy for sheltering; LBP-85-14, 21 NRC 1303, 1344 (1985)
 - need for all emergency workers to be in place before protective actions are implemented; LBP-85-14, 21 NRC 1352 (1985)
 - need for post-training survey of teachers and school staff to determine their willingness to volunteer during a radiological emergency; LBP-85-14, 21 NRC 1315 (1985)
 - need for special institution-specific emergency plans for day care facilities; LBP-85-14, 21 NRC 1326 (1985)
 - need for special institution-specific emergency plans for facilities for mentally retarded; LBP-85-14, 21 NRC 1338 (1985)
 - need to consider effects of evacuation on areas outside emergency planning zones; LBP-85-14, 21 NRC 1405 (1985)
- 10 C.F.R. 50.47(a)(1)
 - Commission finding necessary for full-power operating license issuance; CLI-85-12, 21 NRC 1592 (1985)
 - degree of completion required of emergency plans prior to close of hearings; LBP-85-14, 21 NRC 1230 (1985)
 - effect of evacuation shadow phenomenon on Shoreham emergency planning; LBP-85-12, 21 NRC 655 (1985)
 - emergency planning findings necessary for operating license issuance; LBP-85-12, 21 NRC 649, 651 (1985)
 - NRC findings necessary for operating license issuance; LBP-85-14, 21 NRC 1228-29 (1985)
 - scope of protective actions to be taken in a radiological emergency; LBP-85-12, 21 NRC 914, 916, 917 (1985)
 - sheltering as a protective action during radiological emergency at Shoreham; LBP-85-12, 21 NRC 774 (1985)
- 10 C.F.R. 50.47(a)(2)
 - basis for NRC findings on adequacy of offsite emergency plans; LBP-85-12, 21 NRC 652 (1985); LBP-85-14, 21 NRC 1228 n.11 (1985)
 - weight given to FEMA interim findings for purpose of issuance of full-power license; LBP-85-14, 21 NRC 1229 n.17 (1985)
- 10 C.F.R. 50.47(b)
 - adequacy of Indian Point emergency planning; CLI-85-6, 21 NRC 1080 (1985)
 - guidance and criteria for judging adequacy of emergency response plans; LBP-85-14, 21 NRC 1228 (1985)
 - guidance for satisfying emergency planning standards; LBP-85-12, 21 NRC 652, 653 (1985)
- 10 C.F.R. 50.47(b)(1)
 - effect of evacuation shadow phenomenon on Shoreham emergency planning; LBP-85-12, 21 NRC 655 (1985)
 - staffing of emergency operations centers; LBP-85-14, 21 NRC 1362, 1363, 1366 (1985)
- 10 C.F.R. 50.47(b)(3)
 - organization, needing letters of agreement to augment emergency response actions; LBP-85-14, 21 NRC 1366 (1985)
- 10 C.F.R. 50.47(b)(5)
 - interpretation of requirements for notification of emergency workers; LBP-85-12, 21 NRC 708 (1985)
 - provisions to notify emergency workers; LBP-85-14, 21 NRC 1351, 1354 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 50.47(b)(5), (6), (10), (13)
satisfaction of requirements of, through utility-implemented emergency plan; LBP-85-12, 21 NRC 919 (1985)
- 10 C.F.R. 50.47(b)(9)
reliability of nomogram for thyroid dose calculation; LBP-85-12, 21 NRC 780 (1985)
- 10 C.F.R. 50.47(b)(10)
effect of wind shifts on protective action recommendations; LBP-85-12, 21 NRC 779 (1985)
guidelines for determining which protective action to recommend in Shoreham radiological emergency; LBP-85-12, 21 NRC 772, 777 (1985)
scope of protective actions to be taken in a radiological emergency; LBP-85-12, 21 NRC 915, 916, 917 (1985)
sheltering as a protective action during radiological emergency at Shoreham; LBP-85-12, 21 NRC 774 (1985)
- 10 C.F.R. 50.47(b)(10), (c)(2)
size of emergency planning zones; LBP-85-8, 21 NRC 522 (1985)
- 10 C.F.R. 50.47(b)(12)
standard by which to consider exemptions in the emergency planning area; ALAB-809, 21 NRC 1611 n.7 (1985)
- 10 C.F.R. 50.47(b)(13)
adequacy of Shoreham plans for recovery and reentry; LBP-85-12, 21 NRC 880 (1985)
- 10 C.F.R. 50.47(b)(14)
unannounced emergency response exercises and drills; LBP-85-14, 21 NRC 1305 (1985)
- 10 C.F.R. 50.47(c)
types of deficiencies to which regulation is addressed; ALAB-809, 21 NRC 1612 (1985)
- 10 C.F.R. 50.47(c)(1)
adequacy of offsite emergency plan lacking State or local governmental participation; LBP-85-12, 21 NRC 884 (1985)
basis for Board's conclusion that exemption from 50.47 is warranted; ALAB-809, 21 NRC 1609, 1610-13 (1985)
configuration and size of emergency planning zone; LBP-85-12, 21 NRC 652 (1985)
results of applicant's failure to meet emergency planning standards; LBP-85-12, 21 NRC 654 (1985)
- 10 C.F.R. 50.47(c)(2)
adequacy of Shoreham EPZ configuration; LBP-85-12, 21 NRC 702 (1985)
distance of emergency mass care centers from nuclear power plant; LBP-85-14, 21 NRC 1404 (1985)
effect of evacuation shadow phenomenon on Shoreham emergency planning; LBP-85-12, 21 NRC 655 (1985)
inclusion of schools within close proximity of each other in EPZ; LBP-85-12, 21 NRC 704, 705 (1985)
satisfaction of requirements of, through utility-implemented emergency plan; LBP-85-12, 21 NRC 919 (1985)
treatment of FEMA emergency planning findings as rebuttable presumption; LBP-85-12, 21 NRC 655 (1985)
- 10 C.F.R. 50.47(d)
emergency planning matters required for low-power license; LBP-85-11, 21 NRC 632 (1985)
findings prerequisite to authorization for low-power license; CLI-85-1, 21 NRC 278 (1985)
scope of Commission immediate effectiveness reviews; ALAB-800, 21 NRC 391 n.11 (1985)
- 10 C.F.R. 50.47(d)
power levels not requiring approval of offsite emergency preparedness; LBP-85-12, 21 NRC 892 (1985)
- 10 C.F.R. 50.49
compliance of Pilgrim electrical equipment with; DD-85-5, 21 NRC 1040 (1985)
scope of environmental qualification rule; DD-85-5, 21 NRC 1036 (1985)
- 10 C.F.R. 50.54(a)
effect of changes in Joint Ownership Agreement between utilities on responsibility for design and construction of Seabrook; DD-85-3, 21 NRC 536 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 50.54(s)(2)(ii)
initiation of 120-day clock for correction of emergency planning deficiencies; CLI-85-6, 21 NRC 1102 (1985)
- 10 C.F.R. 50.55(e)
admissibility of late-filed contention based on report under; LBP-85-9, 21 NRC 526-27 (1985)
effect of applicant's failure to report findings of contractor review of engineering design activities; LBP-85-6, 21 NRC 450 (1985)
items reportable under; LBP-85-6, 21 NRC 451-52, 454, 458 (1985)
litigability of Staff's decisionmaking process with respect to reportability of applicant's contractor report; LBP-85-5, 21 NRC 466 (1985)
methodology used to evaluate deficiencies as representative of defect in applicant's competence; LBP-85-6, 21 NRC 460 (1985)
reportability of differential soil settlement beneath borated water storage tanks; LBP-85-2, 21 NRC 99, 182 (1985)
reportability of lack of records for as-built designs for electrical and instrumentation systems; DD-85-4, 21 NRC 551 (1985)
reportability of the lack of conformance of an item to manufacturer's criterion; LBP-85-9, 21 NRC 528 (1985)
requirement for treatment of construction errors in nuclear power plants; ALAB-799, 21 NRC 373 (1985)
- 10 C.F.R. 50.55(e)(1)
description of deficiency reporting requirements; LBP-85-6, 21 NRC 453 (1985)
- 10 C.F.R. 50.55(e)(1)(i)
standards for evaluating reportability of deficiencies; LBP-85-6, 21 NRC 454-56 (1985)
- 10 C.F.R. 50.55(e)(1)(i), (ii) or (iii)
reportability of findings in contractor review of engineering design activities; LBP-85-6, 21 NRC 450, 452 n.2, 453-54, 457, 460 (1985)
- 10 C.F.R. 50.55(e)(2) and (3)
deadline for reporting deficiencies to NRC; LBP-85-6, 21 NRC 453, 462 (1985)
- 10 C.F.R. 50.55a(d)(2)
criteria for assessing piping stresses resulting from soils settlement; LBP-85-2, 21 NRC 199 (1985)
- 10 C.F.R. 50.57
Commission findings necessary for operating license issuance; DD-85-7, 21 NRC 1555 (1985)
issuance of low-power license even though uncertainty exists about full-power license ever being issued; CLI-85-1, 21 NRC 279 (1985)
- 10 C.F.R. 50.57(a)(3)
effect of finding of employee discrimination on licensing of nuclear power plant; DD-85-9, 21 NRC 1769 (1985)
- 10 C.F.R. 50.57(a)(3)(i)
stability of soils beneath South Texas Project; LBP-85-9, 21 NRC 525 n.1 (1985)
- 10 C.F.R. 50.57(e)
authorization for low-power operation where eventual full-power operation is in doubt; CLI-85-12, 21 NRC 1591 (1985)
- 10 C.F.R. 50.91
need for a hearing prior to issuance of a license amendment; ALAB-796, 21 NRC 4 (1985)
- 10 C.F.R. 50.92
responsibility for issuance of license amendments; ALAB-796, 21 NRC 4 (1985)
- 10 C.F.R. 50.109
applicability of new seismic criteria at operating license review stage; LBP-85-2, 21 NRC 44, 45-46 (1985)
Staff imposition of safety assurance program for operating nuclear power plant; CLI-85-6, 21 NRC 1068 (1985)
- 10 C.F.R. 50, Appendix A
applicability of, to training reactor; LBP-85-4, 21 NRC 402, 404 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 50, Appendix A, GDC 2
evaluation of potential for soil liquefaction associated with SSE ground motions; LBP-85-2, 21 NRC 72 (1985)
seismic and geologic criteria for nuclear power plant design; LBP-85-2, 21 NRC 41 (1985)
- 10 C.F.R. 50, Appendix A, GDC 3
adequacy of Fermi fire protection system; DD-85-4, 21 NRC 556 (1985)
- 10 C.F.R. 50, Appendix A, GDC 14
hazard from abnormal leakages in reactor coolant pressure boundary at GE training reactor;
LBP-85-4, 21 NRC 402 (1985)
- 10 C.F.R. 50, Appendix A, GDC 17
adequacy of diesel generators for providing backup emergency electrical power at Shoreham;
LBP-85-18, 21 NRC 1640, 1655, 1656 (1985)
adequacy of maximum qualified load of Shoreham emergency diesel generators; LBP-85-18, 21
NRC 1689, 1698 (1985)
limit on exemption from; CLI-85-1, 21 NRC 276, 277, 280-81 (1985)
safety function and parameters of backup emergency electrical power source for nuclear power plant;
LBP-85-18, 21 NRC 1646 (1985)
scope of exemption from requirements of; ALAB-800, 21 NRC 388 (1985)
- 10 C.F.R. 50, Appendix B
adequacy of quality assurance for design verification program; ALAB-811, 21 NRC 1630 (1985)
delegation of quality assurance responsibilities by applicant; DD-85-3, 21 NRC 542 (1985)
denial of 2.206 petition alleging quality assurance violations at Seabrook; DD-85-3, 21 NRC 534,
539, 544 (1985)
reason for requirement for quality assurance program for nuclear power plants; ALAB-802, 21 NRC
492 n.5 (1985)
violation of, at Catawba; DD-85-9, 21 NRC 1761 (1985)
- 10 C.F.R. 50, Appendix B, Introduction
scope of the term "quality assurance"; ALAB-802, 21 NRC 492 n.1 (1985)
- 10 C.F.R. 50, Appendix B, I
admissibility of contentions alleging incidents of harassment, intimidation, and retaliatory action;
LBP-85-20, 21 NRC 1742 (1985)
employee harassment incidents constituting a violation of; DD-85-9, 21 NRC 1770 (1985)
- 10 C.F.R. 50, Appendix B, II, XVI
scope of quality assurance programs; ALAB-802, 21 NRC 493 nn.6-8 (1985)
- 10 C.F.R. 50, Appendix B, XVI
interpretation of the term "promptly" as applied to the reporting of quality assurance deficiencies;
ALAB-802, 21 NRC 502 n.70 (1985)
reportability of quality assurance breakdowns; ALAB-799, 21 NRC 374 n.34 (1985)
- 10 C.F.R. 50, Appendix C, II.C
calculation of radiation doses to the thyroid; LBP-85-5, 21 NRC 428 (1985)
- 10 C.F.R. 50, Appendix E
emergency planning findings necessary for issuance of operating license; LBP-85-14, 21 NRC 1228
(1985)
individualized evaluation of buildings to determine their adequacy for sheltering; LBP-85-14, 21
NRC 1303 (1985)
need for special institution-specific emergency plans for facilities for mentally retarded; LBP-85-14,
21 NRC 1338 (1985)
prohibition against utility activating a public emergency notification system; LBP-85-12, 21 NRC
908 (1985)
- 10 C.F.R. 50, Appendix E, I, n.1
size of emergency planning zones; LBP-85-8, 21 NRC 522 (1985)
- 10 C.F.R. 50, Appendix E, IV
guidance for satisfying emergency planning standards; LBP-85-12, 21 NRC 652 (1985)
- 10 C.F.R. 50, Appendix E, IV.D
start of 15-minute emergency notification period; LBP-85-12, 21 NRC 757 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 50, Appendix E, IV.D.2
purpose of emergency planning brochure; LBP-85-12, 21 NRC 768 (1985)
- 10 C.F.R. 50, Appendix E, IV.D.3
interpretation of requirements for notification of emergency workers; LBP-85-12, 21 NRC 708 (1985)
- 10 C.F.R. 50, Appendix E, IV.F
public participation in conducting emergency planning exercises; LBP-85-14, 21 NRC 1306 (1985)
- 10 C.F.R. 50, Appendix I
accuracy of calculations of radionuclide deposition rates for South Texas Project; LBP-85-8, 21 NRC 521 (1985)
calculation of doses associated with attachment of noble gases to fly ash particles; LBP-85-5, 21 NRC 416 (1985)
comparison of radiation doses calculated on an annualized basis and those calculated over the life of the plant; LBP-85-5, 21 NRC 421 (1985)
- 10 C.F.R. 50, Appendix I, II.B
calculation of doses associated with attachment of noble gases to fly ash particles; LBP-85-5, 21 NRC 425 (1985)
- 10 C.F.R. 50, Appendix I, II.C
calculation of radiation doses to lymph nodes; LBP-85-5, 21 NRC 427 (1985)
- 10 C.F.R. 50, Appendix J
remedy for discrepancies in containment leak rate testing; DD-85-2, 21 NRC 271-72 (1985)
- 10 C.F.R. 51, Table S-3, n.1
litigability of health effects attributable to S-3 values in individual licensing proceedings; LBP-85-5, 21 NRC 429 (1985)
- 10 C.F.R. 51.45(b) and (c) and 51.60
legality of Staff reliance on information generated by Applicants; LBP-85-3, 21 NRC 256 n.17 (1985)
- 10 C.F.R. 51.53(a), 51.95(a)
considerations in applying collateral estoppel to health and safety issues vs. environmental issues; LBP-85-11, 21 NRC 623 n.8 (1985)
- 10 C.F.R. 51.53(c)
litigability of need for power contentions in operating license proceedings; LBP-85-5, 21 NRC 440 (1985)
- 10 C.F.R. 51.92(a)
need for supplemental environmental impact statement for low-power operation where eventual full-power operation is in doubt; CLI-85-12, 21 NRC 1589 (1985)
- 10 C.F.R. 55
qualification requirements for senior reactor operator candidates; LBP-85-15, 21 NRC 1471 (1985)
- 10 C.F.R. 55.24
circumstances appropriate for reactor operator testing on a simulator; LBP-85-15, 21 NRC 1525 n.47 (1985)
- 10 C.F.R. 61
applicability of, to plan for permanent onsite disposal of mill tailings; LBP-85-3, 21 NRC 259-60 (1985)
denial of petition for rulemaking requesting adoption of interim regulations for shallow-land disposal of low-level radioactive waste; DPRM-85-2, 21 NRC 1781 (1985)
- 10 C.F.R. 73
applicability of physical security requirements to substitute AC electric power system; ALAB-800, 21 NRC 389, 392, 395, 396 (1985)
exemption from requirements of; ALAB-800, 21 NRC 396 (1985)
- 10 C.F.R. 73.1(b)(1)(i)
content of physical security plans; ALAB-800, 21 NRC 392 n.16 (1985)
- 10 C.F.R. 73.2(i)
definition of "vital equipment"; ALAB-800, 21 NRC 392 n.18, 394 n.30 (1985)
- 10 G.F.R. 73.55
protection of vital equipment; ALAB-800, 21 NRC 392 n.17 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 100
 - computation of population center distance; LBP-85-11, 21 NRC 614, 625 (1985)
 - population density requirements for siting reactors; CLI-85-6, 21 NRC 1049 (1985)
 - radiation levels resulting from accident at 25% power levels; CLI-85-9, 21 NRC 1152 (1985)
- 10 C.F.R. 100.3(e)
 - standard for choosing nearest densely populated center; LBP-85-11, 21 NRC 626 (1985)
 - use of aggregate recreational facilities populations to determine population center and low population zone; LBP-85-11, 21 NRC 625 (1985)
- 10 C.F.R. 100.10(c)(1)
 - compatibility of site-specific response spectra approach with 10 C.F.R. Part 100, Appendix A; LBP-85-2, 21 NRC 46, 122 (1985)
- 10 C.F.R. 100.11(a)(2) and (3)
 - use of aggregate recreational facilities populations to determine population center and low population zone; LBP-85-11, 21 NRC 625 (1985)
- 10 C.F.R. 100.11(a)(3)
 - computation of low population zone; LBP-85-11, 21 NRC 626 (1985)
- 10 C.F.R. 100, Appendix A
 - applicability of, to training reactor; LBP-85-4, 21 NRC 402, 404 (1985)
 - calculation of design basis earthquake prior to promulgation of; LBP-85-2, 21 NRC 51 (1981)
 - compatibility of site-specific response spectra approach with; LBP-85-2, 21 NRC 46, 50, 127 (1985)
 - definition of seismotectonic province; LBP-85-2, 21 NRC 54 n.16 (1985)
 - determination of tectonic province for Midland Plant site; LBP-85-2, 21 NRC 53, 58, 127, 130, 133 (1985)
 - extent to which use of probabilistic methodology is permissible under; LBP-85-2, 21 NRC 47 (1985)
 - interpretation of the terms "important to safety" and "safety-related" as applied to seismic design requirements; LBP-85-2, 21 NRC 52 n.12, 195 n.94 (1985)
 - legal issues raised by applicant's use of site-specific response spectra; LBP-85-2, 21 NRC 43 (1985)
 - qualification of Central Stable Region as a tectonic province; LBP-85-2, 21 NRC 59 (1985)
 - seismic and geologic criteria for nuclear power plant design; LBP-85-2, 21 NRC 41 (1985)
 - site evaluation factors to be included in Final Safety Evaluation Report; LBP-85-2, 21 NRC 45 (1985)
 - Staff concerns about design basis earthquake accepted before promulgation of; LBP-85-2, 21 NRC 123 (1985)
- 10 C.F.R. 100, Appendix A, II
 - compatibility of site-specific response spectra approach with 10 C.F.R. Part 100, Appendix A; LBP-85-2, 21 NRC 46 (1985)
- 10 C.F.R. 100, Appendix A, III(c)
 - use of construction permit stage design basis earthquake as safe shutdown earthquake; LBP-85-2, 21 NRC 42 n.7 (1985)
- 10 C.F.R. 100, Appendix A, III(d)
 - acceptability of proposed operating basis earthquake at Midland; LBP-85-2, 21 NRC 53 (1985)
- 10 C.F.R. 100, Appendix A, III(i)
 - explanation of response spectrum; LBP-85-2, 21 NRC 48, 137 n.59 (1985)
- 10 C.F.R. 100, Appendix A, IV(a)(1), (4)
 - evaluation of potential for soil liquefaction associated with SSE ground motions; LBP-85-2, 21 NRC 72, 147 (1985)
- 10 C.F.R. 100, Appendix A, V(a)
 - applicability of site-specific response spectra methodology; LBP-85-2, 21 NRC 50 (1985)
 - factors taken into account in determining response spectra; LBP-85-2, 21 NRC 48, 131 n.54 (1985)
- 10 C.F.R. 100, Appendix A, V(a)(1)
 - procedure for defining vibratory ground motion; LBP-85-2, 21 NRC 50 (1985)
- 10 C.F.R. 100, Appendix A, V(a)(1)(i)
 - conservatism applied to earthquakes associated with tectonic provinces LBP-85-2, 21 NRC 60 (1985)

LEGAL CITATIONS INDEX REGULATIONS

- 10 C.F.R. 100, Appendix A, V(a)(1)(ii)
inclusion of accelerograms in construction of site-specific response spectra; LBP-85-2, 21 NRC 137 (1985)
- 10 C.F.R. 100, Appendix A, V(a)(1)(iv)
reason for conservative application of procedures for determining safe shutdown earthquake;
LBP-85-2, 21 NRC 60 (1985)
scope of response spectra; LBP-85-2, 21 NRC 48, 50, 140 (1985)
- 10 C.F.R. 100, Appendix A, V(d)(1)
evaluation of potential for soil liquefaction associated with SSE ground motions; LBP-85-2, 21 NRC 72, 147 (1985)
- 10 C.F.R. 100, Appendix A, VI(a)
procedure for defining vibratory ground motion; LBP-85-2, 21 NRC 47, 50 (1985)
- 10 C.F.R. 100, Appendix A, VI(a)(1)
evaluation of potential for soil liquefaction associated with SSE ground motions; LBP-85-2, 21 NRC 72 (1985)
- 44 C.F.R. 350
FEMA responsibilities on emergency preparedness findings; LBP-85-14, 21 NRC 1228-29 (1985)
scope of FEMA approval process; DD-85-6, 21 NRC 1550 n.4 (1985)
- 47 C.F.R. 73.1250(f)
broadcast of emergency information at night by daytime AM radio stations; LBP-85-12, 21 NRC 764 (1985)

LEGAL CITATIONS INDEX STATUTES

- Administrative Procedure Act, 5 U.S.C. 554-558
violation of intervenor's due process rights through alleged procedural errors and bias; ALAB-799, 21 NRC 376 n.46 (1985)
- Administrative Procedure Act, 5 U.S.C. 555(b)
responsibility for ensuring that a party is represented by counsel; ALAB-802, 21 NRC 498 (1985)
- Administrative Procedure Act, 5 U.S.C. 555(e)
cause for Staff deferral of determination on application for permanent onsite storage of mill tailings; LBP-85-3, 21 NRC 250 (1985)
- Administrative Procedure Act, 5 U.S.C. 556(d)
use of prefiled written testimony in NRC proceedings; ALAB-799, 21 NRC 379 n.70 (1985)
- Administrative Procedure Act, 5 U.S.C. 557(c)
basis for a Board's decisionmaking; ALAB-809, 21 NRC 1613 n.13 (1985)
responsibility of tribunal to state reasons or basis for conclusions; ALAB-801, 21 NRC 483 (1985)
- Administrative Procedure Act, 5 U.S.C. 558(b)
circumstances requiring immediate shutdown of nuclear power plant; CLI-85-10, 21 NRC 1576 (1985)
- Atomic Energy Act, 105
litigability of antitrust issues at the operating license stage; LBP-85-4, 21 NRC 404 (1985)
- Atomic Energy Act, 161(b), 42 U.S.C. 2201(b)
legal authority for NRC to impose customized license requirements; CLI-85-6, 21 NRC 1078 (1985)
- Atomic Energy Act, 183
effect of changes in Joint Ownership Agreement between utilities on responsibility for design and construction of Seabrook; DD-85-3, 21 NRC 536 (1985)
- Atomic Energy Act, 186
effect of licensee's failure to file contractor reports in a timely fashion; CLI-85-2, 21 NRC 340 (1985)
- Atomic Energy Act, 189
right of applicants to a hearing on enforcement action; CLI-85-6, 21 NRC 1047 (1985)
- Atomic Energy Act, 189a, 42 U.S.C. 2239(a)
category of agency actions triggering hearing rights; CLI-85-10, 21 NRC 1573 n.3, 1575, 1577-79, 1581 (1985)
Commission authority to incorporate voluntary licensee commitments into a license; CLI-85-10, 21 NRC 1574 n.5 (1985)
FEMA public hearing on emergency planning as means of protecting private party's interests; ALAB-806, 21 NRC 1191 n.28 (1985)
right of an individual to a hearing when government action affects his employment; CLI-85-2, 21 NRC 315, 316 (1985)
right to hearing on licensee's character; CLI-85-4, 21 NRC 565 n.4 (1985)
- Atomic Energy Act, 42 U.S.C. 2239(a)(2)(A) (Supp. 1985)
effectiveness of "no significant hazards" determination; ALAB-807, 21 NRC 1200 n.12 (1985)
- Atomic Energy Act, 271, 274(k), 42 U.S.C. §§ 2018, 2021(k)
State regulatory authority over nuclear power; LBP-85-12, 21 NRC 903 (1985)
- Atomic Energy Act, 274(a)(1), 42 U.S.C. 2021(c)(1)
extent of NRC regulatory authority over nuclear power; LBP-85-12, 21 NRC 903 (1985)

LEGAL CITATIONS INDEX STATUTES

- Emergency Management Services Act of 1978, Pub. L. No. 1332, No. 323, 35 Pa. Cons. Stat. Ann. §§ 7103(1) and (2), 7501(a)
emergency planning requirements in the Commonwealth of Pennsylvania; LBP-85-14, 21 NRC 1369 (1985)
- Emergency Management Services Act of 1978, Pub. L. No. 1332, No. 323, 35 Pa. Cons. Stat. Ann. §§ 7301(c), 7502(d), 7503, 7501(a), 7504(a)
requirements for local emergency response organizations in Pennsylvania; LBP-85-14, 21 NRC 1370-71, 1389 (1985)
- Energy and Water Development Appropriation Act, Pub. L. No. 98-360, 502, 98 Stat. 403, 420 (1985)
compensation of parties intervening in NRC proceedings; ALAB-805, 21 NRC 598 n.6 (1985)
- Energy Reorganization Act of 1974, 206, 42 U.S.C. 5846
basis for Commission investigation on violation of deficiency reporting obligations; LBP-85-18, 21 NRC 1644 (1985)
- Energy Reorganization Act of 1974, 42 U.S.C. 5851
protection of employees from discrimination for raising health and safety issues; CLI-85-2, 21 NRC 327 (1985)
- Energy Reorganization Act of 1974, as amended, 210
application of, to NRC proceedings; DD-85-9, 21 NRC 1762-73 (1985)
responsibility for administration of employee discrimination remedies; DD-85-9, 21 NRC 1764 (1985)
- Federal Coal Mine Health and Safety Act, Pub. L. No. 91-173, 110, 83 Stat. 758 (1969)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1766 n.5 (1985)
- N.Y. Exec. Law, art. 2-B §§ 28 and 29a (McKinney 1982)
authority to authorize utility to take emergency response actions; LBP-85-12, 21 NRC 910 (1985)
- National Historic Preservation Act, 106, 16 U.S.C. 470f
admissibility of contention concerning aesthetic impacts of proposed structure on historic site; ALAB-804, 21 NRC 589 (1985)
- 1982-83 NRC Authorization Act, Pub. L. 97-415, 5, 96 Stat. 2067 (1983)
issuance of operating license in absence of State or local emergency plan; LBP-85-12, 21 NRC 906 (1985)
- 1984-85 NRC Authorization Act, Pub. L. 98-553, 108, 98 Stat. 2825 (1984)
alternative for applicants failing to meet emergency planning standards of 10 C.F.R. 50.47(b); LBP-85-12, 21 NRC 654, 906 (1985)
- Pennsylvania Act No. 147, 503
reimbursement for emergency planning and preparation exercises; LBP-85-14, 21 NRC 1389 (1985)
- Pub. L. 96-295, 109, 94 Stat. 784 (1980)
issuance of operating license in absence of State or local emergency plan; LBP-85-12, 21 NRC 906 (1985)
- Pub. L. No. 98-360, 502, 98 Stat. 403 (1984)
preclusion of Commission financial assistance to intervenors to pay for expert witnesses; ALAB-807, 21 NRC 1212 n.92 (1985)

LEGAL CITATIONS INDEX OTHERS

- ABA Model Rules of Professional Conduct, Rule 3.7(a)(3)
continued representation of a client by an attorney who testifies on the opposition's behalf;
LBP-85-19, 21 NRC 1718 (1985)
- Black's Law Dictionary 517, 684 (5th ed. 1979)
interpretation of the term "in camera"; ALAB-807, 21 NRC 1215 n.107 (1985)
- Code of Judicial Conduct, Canons 2A, 2B, 3A(6)
letter from NRC judge to District Court judge urging leniency as violation of; CLI-85-5, 21 NRC
570-71 (1985)
- Davis, Administrative Law § 7.08
right of licensee to hearing on enforcement action; CLI-85-9, 21 NRC 1123 (1985)
- Emergency Planning Around Nuclear Power Plants: Nuclear Regulatory Commission Oversight
Hearings Before a Subcomm. of the Comm. on Government Operations, 96th Cong., 1st Sess.
534 (1979)
requirement for State participation in emergency planning; LBP-85-12, 21 NRC 906 (1985)
- Model Code of Professional Responsibility, DR 5-101(B)(4)
continued representation of a client by an attorney who testifies on the opposition's behalf;
LBP-85-19, 21 NRC 1717 (1985)
- Model Code of Professional Responsibility, DR 5-102(A) and (B)
testimony by an attorney on behalf of his client's opponents; LBP-85-19, 21 NRC 1717, 1718 (1985)
- S. Rep. No. 181, 95th Cong., 1st Sess. 36, reprinted in 1977 U.S. Code Cong. & Ad. News 3436; S.
Rep. No. 848, 95th Cong. 2d Sess. 29 (1978)
scope of employee activities protected from discrimination and retaliation; DD-85-9, 21 NRC 1766
n.5 (1985)
- Senate Comm. on Environment and Public Works, S. Rep. No. 176 on S.562, Pub. L. 96-295, at 45
(May 15, 1979), 96th Cong. 2d Sess. (1980), reprinted in U.S. Code Cong. & Ad. News 2257-58
requirements for State participation in emergency planning; LBP-85-12, 21 NRC 905 (1985)
- U.S. Const. amend. V, Due Process Clause
right of an individual to a hearing when government action affects his employment; CLI-85-2, 21
NRC 315 (1985)
- United States Constitution, art. VI, cl. 2
foundation for federal preemption; LBP-85-12, 21 NRC 900 (1985)
- Webster's New Collegiate Dictionary 921 (1977 Ed.)
interpretation of the term "promptly" as applied to the reporting of quality assurance deficiencies;
ALAB-802, 21 NRC 503 n.74 (1985)
- 8 Wigmore, Evidence §§ 2325-2327 (McNaughton 1961)
waiver of attorney-client or work product privilege through inadvertent disclosure of documents;
LBP-85-1, 21 NRC 16 (1985)

SUBJECT INDEX

ACCIDENT

- at TMI-2, factors leading to loss of feedwater during; CLI-85-2, 21 NRC 282 (1985)
- at TMI-2, interpretation of pressure spike during; CLI-85-2, 21 NRC 282 (1985)
- fast-breaking radiological, effect of, on Shoreham evacuation; LBP-85-12, 21 NRC 644 (1985)

ADJUDICATORY BOARDS

- basis for finding of bias by; ALAB-799, 21 NRC 360 (1985)
- factors considered in determining jurisdiction of; ALAB-797, 21 NRC 6 (1985)
- jurisdiction of, to reconsider matters originally within scope of construction permit proceeding; ALAB-804, 21 NRC 587 (1985)

See also Appeal Boards

ADJUDICATORY PROCEEDINGS

- financial assistance to intervenors in; ALAB-807, 21 NRC 1195 (1985)

ADMINISTRATIVE PROCEDURE ACT

- circumstances appropriate for immediate agency action under; CLI-85-9, 21 NRC 1118 (1985)

ADMISSIBILITY

- of contentions, basis and specificity requirements for; ALAB-804, 21 NRC 587 (1985)
- of evidence proffered by witness violating Commission ethics regulations; ALAB-803, 21 NRC 575 (1985)
- of untimely contentions, five factors balanced to determine; LBP-85-11, 21 NRC 609 (1985)

AFFIDAVITS

- NRC Staff, treatment of deficiencies in; ALAB-801, 21 NRC 479 (1985)

AGREEMENT, LETTERS OF

- emergency planning requirements for; LBP-85-12, 21 NRC 644 (1985)
- format of; LBP-85-14, 21 NRC 1219 (1985)

AIR POLLUTION

- standard reference for evaluation of health effects of; LBP-85-5, 21 NRC 410 (1985)

ALCOHOL ABUSE

- description of program at Callaway to remedy; DD-85-7, 21 NRC 1552 (1985)

ALLEGATIONS

- NRC treatment of; DD-85-7, 21 NRC 1552 (1985)

AMENDMENT

- of intervention petition, Licensing Board discretion to permit; LBP-85-20, 21 NRC 1732 (1985)
- of regulations governing medical uses of byproduct materials, denial of petition for; DPRM-85-1, 21 NRC 1777 (1985)
- of rejected, late-filed contentions; LBP-85-11, 21 NRC 609 (1985)
- See also License Amendment, Operating License Amendment

APPEAL BOARD

- authority to sever unrelated material from motion to reopen; ALAB-797, 21 NRC 6 (1985)
- function in passing on stay motions; ALAB-810, 21 NRC 1616 (1985)
- jurisdiction over motion to reopen a record where a similar motion is pending; ALAB-797, 21 NRC 6 (1985)
- requirement for stating reasons or basis for conclusions by; ALAB-801, 21 NRC 479 (1985)
- review of Licensing Board determinations in partial initial decision, policy regarding; ALAB-799, 21 NRC 360 (1985)
- sua sponte review, scope of approval conferred by; ALAB-795, 21 NRC 1 (1985)

SUBJECT INDEX

APPEAL(S)

interlocutory, via directed certification, showing necessary by party invoking; ALAB-805, 21 NRC 596 (1985)

of orders disposing of some of a party's contentions; ALAB-807, 21 NRC 1195 (1985)

penalty for failure to adequately brief allegations made on; ALAB-799, 21 NRC 360 (1985)

scope of issues that can be raised on; ALAB-799, 21 NRC 360 (1985)

APPLICANT(S)

admissibility of contentions filed by; LBP-85-3, 21 NRC 244 (1985)

effect of remedial efforts by, on character and competence determinations; ALAB-799, 21 NRC 360 (1985)

operating license, failure to adhere to reporting requirements of 10 C.F.R. 50.55(e) as evidence of lack of managerial character and competence of; LBP-85-6, 21 NRC 447 (1985)

responsibility of, for intervenor's late filing of a contention; LBP-85-20, 21 NRC 1732 (1985)

See also Licensee

ATOMIC ENERGY ACT

basis for Commission licensing decisions; CLI-85-9, 21 NRC 1118 (1985)

Commission findings necessary for operating license issuance; DD-85-7, 21 NRC 1552 (1985)

Commission obligation to lift effectiveness of shutdown order; CLI-85-9, 21 NRC 1118 (1985)

effectiveness of initial licensing decisions; CLI-85-9, 21 NRC 1118 (1985)

effectiveness of license amendment involving "no significant hazards" determination; ALAB-807, 21 NRC 1195 (1985)

hearing rights on licensee character; CLI-85-4, 21 NRC 561 (1985)

hearing rights on nuclear power plant emergency plans; ALAB-806, 21 NRC 1183 (1985)

right of licensee to a hearing on enforcement actions; CLI-85-9, 21 NRC 1118 (1985)

standard for determining licensee character under; CLI-85-9, 21 NRC 1118 (1985)

standard for lifting immediate effectiveness of enforcement order; CLI-85-9, 21 NRC 1118 (1985)

zone of interests protected by; CLI-85-2, 21 NRC 282 (1985)

ATTORNEY CONDUCT

standards applied to; LBP-85-19, 21 NRC 1707 (1985)

AUXILIARY BUILDING

at Midland site, description of remedial measures for soils settlement beneath; LBP-85-2, 21 NRC 24 (1985)

BACKFITTING

of seismic design at operating license stage on basis of new criteria; LBP-85-2, 21 NRC 24 (1985)

BASEMAT

cracking at Waterford, description of, and remedy for; ALAB-803, 21 NRC 575 (1985); CLI-85-3, 21 NRC 471 (1985); ALAB-803, 21 NRC 575 (1985)

BAYES THEOREM

applicability of, to calculation of accident probability at high-population-density sites; CLI-85-6, 21 NRC 1043 (1985)

BIAS

by adjudicatory boards, basis for finding of, ALAB-799, 21 NRC 360 (1985)

in extrajudicial communications; CLI-85-5, 21 NRC 566 (1985)

See also Prejudice

BIOACCUMULATION

of radionuclides in aquatic organisms, adequacy of Staff treatment of, in construction FES; LBP-85-8, 21 NRC 516 (1985)

BOARDS

See Adjudicatory Boards, Appeal Board, Licensing Board

BOATERS

notification of, to evacuate; LBP-85-12, 21 NRC 644 (1985)

BONE MINERAL ANALYZER

denial of petition for amendment of regulations governing medical uses of; DPRM-85-1, 21 NRC 1777 (1985)

SUBJECT INDEX

BORATED WATER STORAGE TANKS

at Midland, adequacy of remedies for differential soils settlement beneath; LBP-85-2, 21 NRC 24 (1985)

BRIEFS

content of; ALAB-802, 21 NRC 490 (1985)
lacking record citations, treatment of; ALAB-799, 21 NRC 360 (1985)
NRC Staff, treatment of deficiencies in; ALAB-801, 21 NRC 479 (1985)

BURDEN

of persuasion on emergency planning issues for high-population-density site; CLI-85-6, 21 NRC 1043 (1985)
on movant for stay of agency action; ALAB-810, 21 NRC 1616 (1985)
on movant seeking to reopen a record; CLI-85-7, 21 NRC 1104 (1985)

BYPRODUCT MATERIALS

denial of petition for amendment of regulations governing medical uses; DPRM-85-1, 21 NRC 1777 (1985)

CANCER

levels in Three Mile Island area since 1979 Unit 2 accident; CLI-85-8, 21 NRC 1111 (1985)

CASE MANAGEMENT PLAN

requirement for applicant to file; LBP-85-16, 21 NRC 1539 (1985)

CERTIFICATION

See Directed Certification

CHARACTER

and competence of applicants, effect of remedial efforts by applicants on determinations of; ALAB-799, 21 NRC 360 (1985)
definition of; CLI-85-9, 21 NRC 1118 (1985)
licensee, defects of, as basis for revocation of license; DD-85-1, 21 NRC 263 (1985)
licensee, delay in replacing contractor as representative of a deficiency in; LBP-85-19, 21 NRC 1707 (1985)
licensee, hearing rights on, under Atomic Energy Act; CLI-85-4, 21 NRC 561 (1985)
licensee, standard for determining; CLI-85-9, 21 NRC 1118 (1985)
managerial, failure to adhere to reporting requirements of 10 C.F.R. 50.55(e) as evidence of lack of; LBP-85-6, 21 NRC 447 (1985)

CHEATING

on reactor operator tests at Three Mile Island, adequacy of management response to; LBP-85-10, 21 NRC 603 (1985)
on Three Mile Island reactor operator examinations, management response to; LBP-85-15, 21 NRC 1409 (1985)
post-accident, on reactor operator exams at TMI; CLI-85-2, 21 NRC 282 (1985)

CITATIONS

to the record, treatment of briefs lacking; ALAB-799, 21 NRC 360 (1985)

CIVIL PENALTIES

imposition of, for violations of NRC employee protection regulations; DD-85-9, 21 NRC 1759 (1985)

COAL

particulates associated with fuel cycle, estimation of health effects from; LBP-85-5, 21 NRC 410 (1985)

CODE OF JUDICIAL CONDUCT

violations of Canons 2A, 2B and 3A(6); CLI-85-5, 21 NRC 566 (1985)

COLLATERAL ESTOPPEL

applicability of, to contentions raised in both the construction permit and operating license stages; LBP-85-11, 21 NRC 609 (1985)
applicability of, to site suitability evaluation; LBP-85-11, 21 NRC 609 (1985)
effect of licensing decision on enforcement action; DD-85-9, 21 NRC 1759 (1985)
in administrative proceedings, applicability of; LBP-85-11, 21 NRC 609 (1985)
standards for applying; LBP-85-11, 21 NRC 609 (1985)

SUBJECT INDEX

- use of, to prevent litigation of contentions; LBP-85-4, 21 NRC 399 (1985)
- where earlier proceeding is uncontested, applicability of; LBP-85-11, 21 NRC 609 (1985)
- COLLECTIVE BARGAINING AGREEMENTS**
 - effect of, on teacher responsibilities during radiological emergency; LBP-85-14, 21 NRC 1219 (1985)
- COMMUNICATIONS**
 - among emergency response personnel, adequacy of Shoreham proposals for; LBP-85-12, 21 NRC 644 (1985)
 - extrajudicial, demonstrating bias in; CLI-85-5, 21 NRC 566 (1985)
- COMPENSATION**
 - for parties intervening in NRC proceedings; ALAB-805, 21 NRC 596 (1985)
- COMPETENCE**
 - managerial, failure to adhere to reporting requirements of 10 C.F.R. 50.55(e) as evidence of lack of; LBP-85-6, 21 NRC 447 (1985)
 - of applicants, effect of remedial efforts by applicants on determination of; ALAB-799, 21 NRC 360 (1985)
- COMPUTER SYSTEMS**
 - at Fermi, denial of request for investigation of inconsistencies in; DD-85-4, 21 NRC 546 (1985)
- CONDUCT**
 - See Attorney Conduct, Code of Judicial Conduct
- CONDUITS**
 - at Midland Plant, design adequacy of; LBP-85-2, 21 NRC 24 (1985)
- CONFLICT OF INTEREST**
 - by utility employees filling emergency response positions; LBP-85-12, 21 NRC 644 (1985)
 - scope of appellate review on; ALAB-803, 21 NRC 575 (1985)
- CONSOLIDATION**
 - of intervenors, Commission policy towards; ALAB-808, 21 NRC 1595 (1985)
- CONSTRUCTION**
 - deficiencies, regulations governing reporting of; LBP-85-6, 21 NRC 447 (1985)
 - inadequacies at Callaway plant, allegations of; DD-85-7, 21 NRC 1552 (1985)
 - quality assurance at Waterford, extent of breakdown in; CLI-85-3, 21 NRC 471 (1985)
 - quality assurance, litigability of, in operating license proceedings; ALAB-799, 21 NRC 360 (1985)
 - quality required for nuclear power plant licensing; ALAB-799, 21 NRC 360 (1985)
- CONSTRUCTION PERMIT**
 - criteria for grant of request for withdrawal of application for; LBP-85-7, 21 NRC 507 (1985)
 - effects of Seabrook organizational changes on activities authorized under; DD-85-3, 21 NRC 533 (1985)
- CONSTRUCTION PERMIT PROCEEDING**
 - uncontested, applicability of collateral estoppel in case of; LBP-85-11, 21 NRC 609 (1985)
- CONSTRUCTION SITE**
 - provision for modification of redress of; LBP-85-7, 21 NRC 507 (1985)
- CONTAINMENT**
 - basemat at Waterford, cracking of; CLI-85-3, 21 NRC 471 (1985)
 - filtered, vented system, or separate structure for Indian Point facility, need for; CLI-85-6, 21 NRC 1043 (1985)
 - GE Mark I, adequacy of design of; DD-85-4, 21 NRC 546 (1985)
 - leak rate testing at Zion Station, remedy for discrepancies in; DD-85-2, 21 NRC 270 (1985)
 - pressure, interpretation of sudden increase in; CLI-85-2, 21 NRC 282 (1985)
- CONTENTION(S)**
 - adoption of, by another intervenor, when sponsoring intervenor has withdrawn; ALAB-799, 21 NRC 360 (1985)
 - amended, late, factors balanced for admission of; LBP-85-20, 21 NRC 1732 (1985)
 - based on previously unavailable materials, factors for determining admissibility of; ALAB-806, 21 NRC 1183 (1985)
 - basis and specificity requirements for admission of; ALAB-804, 21 NRC 587 (1985)
 - challenging regulations, treatment of; LBP-85-4, 21 NRC 399 (1985)
 - conditional admission of; ALAB-806, 21 NRC 1183 (1985)

SUBJECT INDEX

consideration of merits of, in determining admissibility of; ALAB-806, 21 NRC 1183 (1985)
effect of acceptance of, on their litigability independent of their sponsoring intervenor; ALAB-799, 21 NRC 360 (1985)
expanded during particularization, standard for admission of; LBP-85-8, 21 NRC 516 (1985)
filed by applicant, admissibility of; LBP-85-3, 21 NRC 244 (1985)
filed late without good cause, reason for rejection of; LBP-85-11, 21 NRC 609 (1985)
harassment/intimidation, pleading requirements for; LBP-85-20, 21 NRC 1732 (1985)
late-filed, broad, pleading requirements for; LBP-85-20, 21 NRC 1732 (1985)
late-filed, counterbalance for delay caused by admission of; LBP-85-20, 21 NRC 1732 (1985)
late-filed, identification of witnesses prior to admission of; LBP-85-20, 21 NRC 1732 (1985)
late-filed, influence of withdrawal of other contentions on admissibility of; LBP-85-11, 21 NRC 609 (1985)
late-filed, Licensing Board discretion in balancing five factors for admission of; ALAB-806, 21 NRC 1183 (1985)
late-filed, means for protecting interests of petitioner seeking admission of; ALAB-806, 21 NRC 1183 (1985)
negotiation and voluntary respecification of; LBP-85-11, 21 NRC 609 (1985)
nontimely submission of contentions; LBP-85-9, 21 NRC 524 (1985)
quality assurance, basis and specificity requirements for; LBP-85-20, 21 NRC 1732 (1985)
quality assurance, importance of specificity in; LBP-85-11, 21 NRC 609 (1985)
raised in construction permit and operating license stages, applicability of collateral estoppel to; LBP-85-11, 21 NRC 609 (1985)
reason for specificity requirement for; LBP-85-20, 21 NRC 1732 (1985)
rejected, late-filed, amendment of; LBP-85-11, 21 NRC 609 (1985)
requirement for intervention; ALAB-799, 21 NRC 360 (1985)
responsibility of applicant for intervenor's late filing of; LBP-85-20, 21 NRC 1732 (1985)
sponsored by others, right of intervenor to cross-examination on; ALAB-799, 21 NRC 360 (1985)
untimely, five-factor test for admission of; LBP-85-11, 21 NRC 609 (1985)
use of collateral estoppel to prevent litigation of; LBP-85-4, 21 NRC 399 (1985)
which will require further Staff review, need to refer ruling on admissibility of; LBP-85-3, 21 NRC 244 (1985)

COOLANT

See Reactor Coolant

COOLING POND

dikes at Midland site, slope stability of; LBP-85-2, 21 NRC 24 (1985)
for South Texas Project, availability of make-up water for; LBP-85-8, 21 NRC 516 (1985)

COOLING WATER

license constraints on use of supplemental source of; DD-85-8, 21 NRC 1561 (1985)
supplementary system for Limerick, environmental impacts of; ALAB-804, 21 NRC 587 (1985)

CORROSION

of steam generator tubes at Three Mile Island Unit 1; ALAB-807, 21 NRC 1195 (1985)
of underground piping, susceptibility of; LBP-85-2, 21 NRC 24 (1985)

See also Intergranular Stress Corrosion Cracking

COUNSEL

representation by, in previous NRC proceeding, as basis for intervenor's contribution to record; LBP-85-11, 21 NRC 609 (1985)
responsibilities of counsel for form and quality of submissions; ALAB-801, 21 NRC 479 (1985)
responsibility for ensuring that a party is represented by; ALAB-802, 21 NRC 490 (1985)

CRACKING

in Waterford concrete basemat; ALAB-803, 21 NRC 575 (1985)

See also Intergranular Stress Corrosion Cracking

CRACKS

ligament, stud-to-stud, and circumferential, in emergency diesel generator cylinder blocks; LBP-85-18, 21 NRC 1637 (1985)

CRANKSHAFT

of emergency diesel generators, surveillance testing for failure of; LBP-85-18, 21 NRC 1637 (1985)

SUBJECT INDEX

CREDIBILITY

of utility's ability to implement emergency plans in absence of State and county participation in plan; LBP-85-12, 21 NRC 644 (1985)

CROSS-EXAMINATION

Board authority to demand plans for; ALAB-799, 21 NRC 360 (1985)
intervenor's, propriety of Licensing Board's active role in; ALAB-802, 21 NRC 490 (1985)
limitations on scope of; ALAB-799, 21 NRC 360 (1985)
of witnesses, time constraints on; LBP-85-14, 21 NRC 1219 (1985)
propriety of limitations on; ALAB-808, 21 NRC 1595 (1985)
right of intervenor to, on contentions sponsored by others; ALAB-799, 21 NRC 360 (1985)
right of party to make case solely through; LBP-85-20, 21 NRC 1732 (1985)

CYLINDER BLOCKS

emergency diesel generator, cracking of, at Shoreham; LBP-85-18, 21 NRC 1637 (1985)

DECISION(S)

by Commission on licensing, basis for; CLI-85-9, 21 NRC 1118 (1985)
initial licensing, effectiveness of; CLI-85-9, 21 NRC 1118 (1985)
Licensing Board scheduling, Appeal Board standard for overturning; ALAB-799, 21 NRC 360 (1985)
licensing, collateral estoppel effect of, on enforcement action; DD-85-9, 21 NRC 1759 (1985)
operating license, standard for; CLI-85-3, 21 NRC 471 (1985)
partial initial, appellate review policy regarding determinations in; ALAB-799, 21 NRC 360 (1985)
partial initial, scope of design issues considered in; LBP-85-2, 21 NRC 24 (1985)
precedential effect of; LBP-85-20, 21 NRC 1732 (1985)
right of party to seek stay of; ALAB-808, 21 NRC 1595 (1985)

DECONTAMINATION

activities following Shoreham accident, disposal of waste collected from; LBP-85-12, 21 NRC 644 (1985)

DEFICIENCIES

in NRC Staff submissions, Appeal Board treatment of; ALAB-801, 21 NRC 479 (1985)
quality assurance, regulations governing reports of; LBP-85-6, 21 NRC 447 (1985)
quality assurance, requirements for resolution of; ALAB-802, 21 NRC 490 (1985)
three-element test for reportability of; LBP-85-6, 21 NRC 447 (1985)

DEFINITIONS

of "drill," "exercise," "controller," "observer," "module," and "session" relevant to emergency response training; LBP-85-12, 21 NRC 644 (1985)
of "risk"; CLI-85-6, 21 NRC 1043 (1985)
of character and competence; ALAB-799, 21 NRC 360 (1985)
of licensee "character"; CLI-85-9, 21 NRC 1118 (1985)

DELAY

caused by admission of late-filed contention, counterbalance for; LBP-85-20, 21 NRC 1732 (1985)
caused by broadening of issues due to new contention, mitigation of; LBP-85-11, 21 NRC 609 (1985)

DEPOSITION

of NRC Staff officials by intervenors; LBP-85-11, 21 NRC 609 (1985)

DESIGN

as-built, of electrical and instrumentation systems at Fermi, denial of request for investigation of lack of records for; DD-85-4, 21 NRC 546 (1985)
deficiencies, regulations governing reporting of; LBP-85-6, 21 NRC 447 (1985)
features considered to reduce accident risks at high-population-density reactor sites; CLI-85-6, 21 NRC 1043 (1985)
issues considered in partial initial decisions, scope of; LBP-85-2, 21 NRC 24 (1985)
of GE Mark I boiling water reactor and containment, adequacy of; DD-85-4, 21 NRC 546 (1985)
structural, cantilever designs in; LBP-85-2, 21 NRC 24 (1985)
structural, evaluation of cracks in; LBP-85-2, 21 NRC 24 (1985)
verification program at Diablo Canyon, adequacy of quality assurance for; ALAB-811, 21 NRC 1622 (1985)

SUBJECT INDEX

DESIGN BASIS EARTHQUAKE

basis for, at Midland site; LBP-85-2, 21 NRC 24 (1985)

DEWATERING

at Midland site to prevent soil liquefaction; LBP-85-2, 21 NRC 24 (1985)

DIESEL FUEL TANKS

at Midland Plant, adequacy of design of, with respect to potential for liquefaction and stability of soils under; LBP-85-2, 21 NRC 24 (1985)

DIESEL GENERATOR(S)

building at Midland, structural adequacy of, in view of soils settlement problems; LBP-85-2, 21 NRC 24 (1985)

emergency, material properties of; LBP-85-18, 21 NRC 1637 (1985)

for backup emergency electrical power, adequacy of, at Shoreham; LBP-85-18, 21 NRC 1637 (1985)

Transamerica Delaval, reliability of; ALAB-805, 21 NRC 596 (1985)

DIKES

cooling pond, at Midland site, slope stability of; LBP-85-2, 21 NRC 24 (1985)

DIRECTED CERTIFICATION

of interlocutory ruling, showing necessary by party invoking; ALAB-805, 21 NRC 596 (1985)

DISCLOSURE

inadvertent, of privileged documents, as waiver of privilege; LBP-85-1, 21 NRC 11 (1985)

of intended source of supplemental cooling water, use of 2.206 petition to require; DD-85-8, 21 NRC 1561 (1985)

DISCOVERY

denial of, where motion to reopen is untimely; LBP-85-19, 21 NRC 1707 (1985)

of privileged matter; LBP-85-1, 21 NRC 11 (1985)

to support a motion to reopen, entitlement of movant to; CLI-85-7, 21 NRC 1104 (1985)

DISCRIMINATION

against employees for raising health and safety issues; CLI-85-2, 21 NRC 282 (1985)

against quality assurance employees; DD-85-9, 21 NRC 1759 (1985)

DISQUALIFICATION

of an attorney called as witness for opposing side, means for overcoming request for; LBP-85-19, 21 NRC 1707 (1985)

of NRC judges, standards for; CLI-85-5, 21 NRC 566 (1985)

DOCUMENT(S)

privileged, inadvertent disclosure of, as waiver of privilege; LBP-85-1, 21 NRC 11 (1985)

requests, responses to; LBP-85-1, 21 NRC 11 (1985)

DOSE(S)

calculation for hospital population, methods for; LBP-85-12, 21 NRC 644 (1985)

criteria for recovery and reentry of contaminated areas; LBP-85-12, 21 NRC 644 (1985)

inhalation, from tritiated water, calculation of; LBP-85-5, 21 NRC 410 (1985)

radiological, from radionuclide attachment to fly ash particles; LBP-85-5, 21 NRC 410 (1985)

radiological, to lymph nodes, calculation of; LBP-85-5, 21 NRC 410 (1985)

radiological, via crops-food chain pathway, calculation of; LBP-85-5, 21 NRC 410 (1985)

savings as a result of sheltering; LBP-85-12, 21 NRC 644 (1985)

DOSIMETRY

provision of, to emergency workers; LBP-85-14, 21 NRC 1219 (1985)

DRUG ABUSE

description of program at Callaway to remedy; DD-85-7, 21 NRC 1552 (1985)

DUAL PHOTON SPINE SCANNER

denial of petition for amendment of regulations governing medical uses of; DPRM-85-1, 21 NRC 1777 (1985)

DUE PROCESS

interests affected when an individual is deprived of employment; CLI-85-2, 21 NRC 282 (1985)

EARTHQUAKES

reevaluation of capability of older nuclear power plants to withstand; CLI-85-10, 21 NRC 1569 (1985)

See Design Basis Earthquake, Safe Shutdown Earthquake

SUBJECT INDEX

ECONOMIC ISSUES

litigability of, in operating license proceedings; ALAB-808, 21 NRC 1595 (1985)

EDDY CURRENT TESTING

to detect steam generator tube cracking at Three Mile Island Unit 1; ALAB-807, 21 NRC 1195 (1985)

EFFECTIVENESS

of enforcement order, standard for lifting; CLI-85-9, 21 NRC 1118 (1985)

of full-power license, denial of request for stay of; CLI-85-3, 21 NRC 471 (1985)

of initial licensing decisions; CLI-85-9, 21 NRC 1118 (1985)

of license amendment involving "no significant hazards" determination; ALAB-807, 21 NRC 1195 (1985)

of operating license amendment; CLI-85-9, 21 NRC 1118 (1985)

of shutdown order, Commission obligation to lift; CLI-85-9, 21 NRC 1118 (1985)

ELECTRICAL CABLES

unspliced, submersion in water and need for fireproofing of; DD-85-7, 21 NRC 1552 (1985)

ELECTRICAL DUCT BANKS

at Midland Plant, design adequacy of; LBP-85-2, 21 NRC 24 (1985)

ELECTRICAL EQUIPMENT

at Pilgrim Station, allegations of deficiencies in environmental qualification of; DD-85-5, 21 NRC 1033 (1985)

ELECTRICAL POWER

emergency, adequacy of Shoreham diesel generators for; LBP-85-18, 21 NRC 1637 (1985)

ELECTRICAL SYSTEMS

at Fermi, denial of request for investigation of lack of records for as-built designs for; DD-85-4, 21 NRC 546 (1985)

EMERGENCY

radiological, factors influencing human behavior during; LBP-85-12, 21 NRC 644 (1985)

EMERGENCY EXERCISES

for Wolf Creek, adequacy of; ALAB-798, 21 NRC 357 (1985)

unannounced, requirements for; LBP-85-14, 21 NRC 1219 (1985)

EMERGENCY OPERATIONS CENTERS

staffing of; LBP-85-14, 21 NRC 1219 (1985)

EMERGENCY PLANNING

basic principles of; LBP-85-14, 21 NRC 1219 (1985)

brochure, purpose of; LBP-85-12, 21 NRC 644 (1985)

findings necessary for operating license issuance; ALAB-809, 21 NRC 1605 (1985)

findings, predictive nature and magnitude and consequences of; LBP-85-12, 21 NRC 644 (1985)

for Indian point, adequacy of public information on; CLI-85-6, 21 NRC 1043 (1985)

guiding principles of; LBP-85-12, 21 NRC 644 (1985)

improvements for Indian Point facility; CLI-85-6, 21 NRC 1043 (1985)

measures, post-hearing verification of, by NRC Staff; ALAB-808, 21 NRC 1595 (1985)

nature of findings on; ALAB-808, 21 NRC 1595 (1985)

requirements in Pennsylvania; LBP-85-14, 21 NRC 1219 (1985)

standards, use of criteria other than NUREG-0654 for conformity with; LBP-85-12, 21 NRC 644 (1985)

EMERGENCY PLANNING ZONE(S)

boundaries, provision of information to the public on; LBP-85-12, 21 NRC 644 (1985)

boundary for Shoreham, adequacy of configuration of; LBP-85-12, 21 NRC 644 (1985)

inclusion of schools within close proximity to each other in; LBP-85-12, 21 NRC 644 (1985)

ingestion pathway, implementability of Shoreham plans for protective actions in; LBP-85-12, 21 NRC 644 (1985)

Shoreham, description of; LBP-85-12, 21 NRC 644 (1985)

size of; LBP-85-8, 21 NRC 516 (1985)

SUBJECT INDEX

EMERGENCY PLANS

- effect of wind shifts on; LBP-85-12, 21 NRC 644 (1985)
- for nuclear power plants, right to hearing on; ALAB-806, 21 NRC 1183 (1985)
- in which evacuation route initially heads toward a plant, validity of; LBP-85-8, 21 NRC 516 (1985)
- institution-specific, need for; LBP-85-14, 21 NRC 1219 (1985)
- litigability of implementing procedures for; LBP-85-12, 21 NRC 644 (1985)
- Maine Yankee offsite, allegations of deficiencies in; DD-85-6, 21 NRC 1547 (1985)
- State and local, for Wolf Creek, adequacy of; ALAB-798, 21 NRC 357 (1985)
- utility-sponsored, offsite, not relying on State or County participation, adequacy of; LBP-85-12, 21 NRC 644 (1985)
- weight given to NUREG-0654 by Licensing Boards when evaluating; LBP-85-12, 21 NRC 644 (1985)

EMERGENCY PREPAREDNESS

- controlling findings on adequacy of; CLI-85-12, 21 NRC 1587 (1985)

EMERGENCY RESPONSE

- models for high-population-density areas; CLI-85-6, 21 NRC 1043 (1985)
- offsite, by utility employees instead of State and County employees, prohibitions against; LBP-85-12, 21 NRC 644 (1985)

EMERGENCY WORKERS

- provisions for notification of; LBP-85-14, 21 NRC 1219 (1985)
- requirements for training of; LBP-85-14, 21 NRC 1219 (1985)
- role conflict in; LBP-85-12, 21 NRC 644 (1985)
- Shoreham, adequacy of communication system and precedents for notification of; LBP-85-12, 21 NRC 644 (1985)

ENFORCEMENT ACTION

- collateral estoppel effect of licensing decision on; DD-85-9, 21 NRC 1759 (1985)
- right of licensee to hearing on; CLI-85-9, 21 NRC 1118 (1985)

ENFORCEMENT ORDER

- right of licensee to hearing on; CLI-85-6, 21 NRC 1043 (1985)
- standard for lifting immediate effectiveness of; CLI-85-9, 21 NRC 1118 (1985)

ENFORCEMENT PROCEEDING

- effect of imposition of license conditions on; CLI-85-9, 21 NRC 1118 (1985)
- litigability of matters common to licensing proceedings in; DD-85-9, 21 NRC 1759 (1985)

ENVIRONMENTAL IMPACT

- of Limerick supplementary cooling water system; ALAB-804, 21 NRC 587 (1985)

ENVIRONMENTAL IMPACT STATEMENT

- cause for recirculation of; LBP-85-3, 21 NRC 244 (1985)
- supplemental, for low-power operation where eventual full-power operation is in doubt, need for; CLI-85-12, 21 NRC 1587 (1985)

See also Final Environmental Statement

ENVIRONMENTAL ISSUES

- extent of right to adjudicatory resolution of, in operating license proceedings; ALAB-799, 21 NRC 360 (1985)

ENVIRONMENTAL QUALIFICATION

- of electrical equipment at Pilgrim Station, allegations of deficiencies in; DD-85-5, 21 NRC 1033 (1985)

EVACUATION

- of high-population-density site, emergency response models for; CLI-85-6, 21 NRC 1043 (1985)
- of peak summer populations, adequacy of Maine Yankee facility planning for; DD-85-6, 21 NRC 1547 (1985)
- one-lift principle for; LBP-85-14, 21 NRC 1219 (1985)
- routes, provision of information to the public about; LBP-85-12, 21 NRC 644 (1985)
- time estimate study for Limerick facility; LBP-85-14, 21 NRC 1219 (1985)
- time estimates, factors affecting; LBP-85-12, 21 NRC 644 (1985)
- time estimates, traffic modeling for; LBP-85-12, 21 NRC 644 (1985)

SUBJECT INDEX

time, effect of mobilization travel on; LBP-85-12, 21 NRC 644 (1985)
which initially heads toward a plant, effectiveness of plan for; LBP-85-8, 21 NRC 516 (1985)

EVIDENCE

exclusion of, for lack of sponsoring testimony; ALAB-808, 21 NRC 1595 (1985)
hearsay, admissibility of; ALAB-802, 21 NRC 490 (1985)
proffered by witness violating Commission ethics regulations, admissibility of; ALAB-803, 21 NRC 575 (1985)

EXAMINATION(S)

reactor operator, TMI management response to cheating on; LBP-85-15, 21 NRC 1409 (1985)
security at Three Mile Island; LBP-85-15, 21 NRC 1409 (1985)
See also Cross Examination

EXEMPTION(S)

from 10 C.F.R. 50.10(c) on basis of applicant's ability to redress site; LBP-85-7, 21 NRC 507 (1985)
from regulations, considerations in conducting immediate effectiveness review of decision authorizing; CLI-85-1, 21 NRC 175 (1985)
from regulations, principal authority for granting ; ALAB-809, 21 NRC 1605 (1985)
from regulations, standard for grant of; LBP-85-4, 21 NRC 399 (1985)
from requirements of 10 C.F.R. 50.47, standards for grant of; ALAB-809, 21 NRC 1605 (1985)
under § 50.12(a), standard for grant of; LBP-85-4, 21 NRC 399 (1985)

EXPLOSIVE MATERIALS

transported from Joliet Arsenal by railroad, hazards to nuclear facility from; LBP-85-11, 21 NRC 609 (1985)

FARMERS

reentry into EPZ by, following radiological emergency; LBP-85-14, 21 NRC 1219 (1985)

FEDERAL PREEMPTION

controlling findings on adequacy of emergency preparedness; CLI-85-12, 21 NRC 1587 (1985)

FEEDWATER

loss of, during TMI-2 accident, factors that led up to; CLI-85-2, 21 NRC 282 (1985)

FEEDWATER ISOLATION VALVE PITS

at Midland site, description of remedial measures for soils settlement beneath; LBP-85-2, 21 NRC 24 (1985)

FINAL ENVIRONMENTAL STATEMENT

means for curing deficiencies in; LBP-85-3, 21 NRC 244 (1985)

FINANCIAL ASSISTANCE

to intervenors in adjudicatory proceedings; ALAB-807, 21 NRC 1195 (1985)

FINANCIAL CONSIDERATIONS

impact of, on TMI technical decisions; CLI-85-2, 21 NRC 282 (1985)

FIRE PROTECTION

guidelines, safe shutdown system required to ensure compliance with; DD-85-4, 21 NRC 546 (1985)

FLY ASH

particles, radiological doses from radionuclide attachment to; LBP-85-5, 21 NRC 410 (1985)

FOOD CHAIN

pathway, calculation of radiological doses via; LBP-85-5, 21 NRC 410 (1985)

FOREIGN LANGUAGE

materials and broadcasts for emergency situations, need for; LBP-85-12, 21 NRC 644 (1985)

FUEL

See Diesel Fuel Tanks

FUEL CYCLE

health effects of coal particulates associated with; LBP-85-5, 21 NRC 410 (1985)

FUNDING

intervenor, statutory proscription against; ALAB-805, 21 NRC 596 (1985)

GENERATOR

See Diesel Generators

GROUND MOTION

vibratory, use of site-specific response spectra to define; LBP-85-2, 21 NRC 24 (1985)

SUBJECT INDEX

GROUND WATER

applicability of State standards for, to mill tailings disposal plan; LBP-85-3, 21 NRC 244 (1985)

HANDICAPPED PERSONS

requiring evacuation assistance, registration of; LBP-85-12, 21 NRC 644 (1985)

HARASSMENT

of quality assurance workers at Catawba; DD-85-9, 21 NRC 1759 (1985)

HEALTH EFFECTS

from radiation exposure, appropriate time periods for calculating; LBP-85-5, 21 NRC 410 (1985)

of air pollution, standard reference for evaluation of; LBP-85-5, 21 NRC 410 (1985)

of coal particulates associated with fuel cycle, estimation of; LBP-85-5, 21 NRC 410 (1985)

of radiation releases from Three Mile Island accident; CLI-85-8, 21 NRC 1111 (1985)

HEARING(S)

consolidated operating license/show cause, procedural rules applicable to; LBP-85-2, 21 NRC 24 (1985)

need for, prior to issuance of operating license amendment; ALAB-796, 21 NRC 4 (1985)

need for, where individual is deprived of employment; CLI-85-2, 21 NRC 282 (1985)

on enforcement action, right of licensee to; CLI-85-9, 21 NRC 1118 (1985)

on enforcement order, right of licensee to; CLI-85-6, 21 NRC 1043 (1985)

right to, of licensed operator whose employment responsibilities have been restricted; CLI-85-2, 21 NRC 282 (1985)

rights on licensee character under Atomic Energy Act; CLI-85-4, 21 NRC 561 (1985)

rights on nuclear power plant emergency plans; ALAB-806, 21 NRC 1183 (1985)

rights on order confirming licensee's voluntary commitments; CLI-85-10, 21 NRC 1569 (1985)

rights resulting from restart of a nuclear power plant; CLI-85-9, 21 NRC 1118 (1985)

waiver of right to, through denial of license amendment application; LBP-85-3, 21 NRC 244 (1985)

HOSPITALS

evacuation of, during Shoreham radiological emergency; LBP-85-12, 21 NRC 644 (1985)

HUMAN BEHAVIOR

during radiological emergency, factors influencing; LBP-85-12, 21 NRC 644 (1985)

IMPARTIALITY

of adjudicator, interpretation of; CLI-85-5, 21 NRC 566 (1985)

IMPORTANT TO SAFETY

interpretation of, as applied to seismic design requirements; LBP-85-2, 21 NRC 24 (1985)

INSTRUMENTATION SYSTEMS

at Fermi, denial of request for investigation of lack of records for as-built designs for; DD-85-4, 21 NRC 546 (1985)

INSURANCE

coverage for nuclear power plant accidents, legality of limitations on; LBP-85-4, 21 NRC 399 (1985)

INTERGRANULAR STRESS CORROSION CRACKING

at Three Mile Island, mitigation of; ALAB-807, 21 NRC 1195 (1985)

INTERPRETATION

of "important to safety" and "safety-related" as applied to seismic design requirements; LBP-85-2, 21 NRC 24 (1985)

of regulations; LBP-85-4, 21 NRC 399 (1985)

of the phrase "otherwise in the public interest" contained in 10 C.F.R. 50.12(a); LBP-85-4, 21 NRC 399 (1985)

of the term "promptly" as it relates to identifying and correcting quality assurance deficiencies; ALAB-802, 21 NRC 490 (1985)

INTERVENOR(S)

Commission policy towards consolidation of; ALAB-808, 21 NRC 1595 (1985)

deposition of NRC Staff officials by; LBP-85-11, 21 NRC 609 (1985)

effect of withdrawal of, on proceedings; ALAB-799, 21 NRC 360 (1985)

financial assistance to; ALAB-807, 21 NRC 1195 (1985)

funding for; ALAB-805, 21 NRC 596 (1985)

right of, to cross-examination on contentions sponsored by others; ALAB-799, 21 NRC 360 (1985)

SUBJECT INDEX

INTERVENTION

contention requirement for; ALAB-799, 21 NRC 360 (1985)
petition, Licensing Board discretion to permit amendment of; LBP-85-20, 21 NRC 1732 (1985)

IRREPARABLE HARM

factor in deciding stay motions, weight given to; ALAB-808, 21 NRC 1595 (1985)
weight given to, in deciding stay motions; ALAB-810, 21 NRC 1616 (1985)

JURISDICTION

Appeal Board, nexus between pending motion to reopen and new motion as basis for; ALAB-797, 21 NRC 6 (1985)
NRC, to act on issues outside scope of laws established by Congress; CLI-85-9, 21 NRC 1118 (1985)
of Licensing Board to revoke limited work authorization; LBP-85-7, 21 NRC 507 (1985)
over economic issues; ALAB-808, 21 NRC 1595 (1985)
to consider motion to reopen record; LBP-85-19, 21 NRC 1707 (1985)
to reconsider matters originally within scope of construction permit proceeding; ALAB-804, 21 NRC 587 (1985)

LEAK RATE

falsifications at TMI-2, significance of; CLI-85-9, 21 NRC 1418 (1985)
testing at Zion Station, remedy for discrepancies in; DD-85-2, 21 NRC 270 (1985)
testing practices at TMI, falsification of; CLI-85-2, 21 NRC 282 (1985)

LIABILITY

of nuclear power plants for accidents, limits on; LBP-85-4, 21 NRC 399 (1985)

LIBERTY

deprivation of, through employment restrictions; CLI-85-2, 21 NRC 282 (1985)

LICENSE

requirements, customized, NRC authority to impose; CLI-85-6, 21 NRC 1043 (1985)

LICENSE AMENDMENT

involving "no significant hazards" determination, effectiveness of; ALAB-807, 21 NRC 1195 (1985)

LICENSE CONDITIONS

for limitations on load levels of emergency diesel generators; LBP-85-18, 21 NRC 1637 (1985)
for use of supplemental source of cooling water; DD-85-8, 21 NRC 1561 (1985)
right to a hearing on; CLI-85-9, 21 NRC 1118 (1985)

LICENSED OPERATOR(S)

requirement for assessment of performance of, in job setting; LBP-85-15, 21 NRC 1409 (1985)
training at Three Mile Island, adequacy of; CLI-85-9, 21 NRC 1118 (1985)
training for Three Mile Island, adequacy of; LBP-85-15, 21 NRC 1409 (1985)

LICENSEE

character, defects of, as basis for revocation of license; DD-85-1, 21 NRC 263 (1985)
character, hearing rights on, under Atomic Energy Act; CLI-85-4, 21 NRC 561 (1985)
character, standard for determining; CLI-85-9, 21 NRC 1118 (1985)
right of, to hearing on enforcement action; CLI-85-9, 21 NRC 1118 (1985)

LICENSING BOARD(S)

authority to demand plans for cross-examination; ALAB-799, 21 NRC 360 (1985)
authority to require intervenors to name witnesses by a certain date; LBP-85-20, 21 NRC 1732 (1985)
authority to summon witnesses on its own behalf; ALAB-805, 21 NRC 596 (1985)
composition of; ALAB-807, 21 NRC 1195 (1985)
decisionmaking responsibilities of; ALAB-809, 21 NRC 1605 (1985)
discretion in balancing five factors for admission of late-filed contentions; ALAB-806, 21 NRC 1183 (1985)
discretion in managing proceedings; ALAB-802, 21 NRC 490 (1985)
discretion to permit amendment of intervention petition; LBP-85-20, 21 NRC 1732 (1985)
jurisdiction of, to revoke limited work authorization; LBP-85-7, 21 NRC 507 (1985)
propriety of active role by, in intervenors' cross-examination; ALAB-802, 21 NRC 490 (1985)
review of issues sua sponte, constraints on; LBP-85-8, 21 NRC 516 (1985)

SUBJECT INDEX

LICENSING PROCEEDINGS

- Board discretion in management of; ALAB-802, 21 NRC 490 (1985)
- good cause for reopening; ALAB-799, 21 NRC 360 (1985)
- litigability in enforcement proceedings of matters common to; DD-85-9, 21 NRC 1759 (1985)
- NRC Staff participation in; ALAB-799, 21 NRC 360 (1985)
- responsibilities of parties to comply with Commission direction to address specific matters in;
CLI-85-2, 21 NRC 282 (1985)
- use of witness panels in; ALAB-799, 21 NRC 360 (1985)
- See also *Operating License Proceedings*

LIMITED WORK AUTHORIZATION

- scope of site suitability evaluation under; LBP-85-11, 21 NRC 609 (1985)

LIQUEFACTION

- at Midland site, potential for and means for dealing with; LBP-85-2, 21 NRC 24 (1985)

LOW POPULATION ZONE

- adequacy of planning for evacuation of peak summer populations from; DD-85-6, 21 NRC 1547 (1985)

LYMPH NODES

- calculation of radiological dose resulting from transfer of particles from lung to; LBP-85-5, 21 NRC 410 (1985)

MAINTENANCE

- at Oyster Creek, adequacy of procedures for; DD-85-1, 21 NRC 263 (1985)

MANAGEMENT

- applicant's, requirement for applicant to set forth its view of adequacy of; LBP-85-16, 21 NRC 1539 (1985)

See also *Case Management Plan*

MATERIAL FALSE STATEMENT

- in TMI licensee's response to notice of violation; CLI-85-2, 21 NRC 282 (1985)

MATERIALITY

- of information, period of time normally permissible to evaluate; LBP-85-6, 21 NRC 447 (1985)

MAXIMUM LIKELIHOOD PRINCIPLE

- applicability of, to calculation of accident probability at high-population-density sites; CLI-85-6, 21 NRC 1043 (1985)

MILL TAILINGS

- disposal, segmentation of plan for; LBP-85-3, 21 NRC 244 (1985)

MODELS

- for offsite emergency response in high-population-density area; CLI-85-6, 21 NRC 1043 (1985)
- See *Seismic Models*

MONITORING

- of Seismic Category I piping at Midland Plant, description of program for; LBP-85-2, 21 NRC 24 (1985)

MOTION TO REOPEN

- appellate jurisdiction over; ALAB-797, 21 NRC 6 (1985)
- entitlement of movant to discovery to support; CLI-85-7, 21 NRC 1104 (1985)
- factors considered in deciding; CLI-85-8, 21 NRC 1111 (1985)
- on basis of newly discovered information, standard for grant of; ALAB-807, 21 NRC 1195 (1985)
- timeliness in filing; LBP-85-19, 21 NRC 1707 (1985)
- See also *Reopening of Record*

NEED FOR POWER

- rule, denial of petition for waiver of; LBP-85-5, 21 NRC 410 (1985)

NEW YORK CITY

- risk to, from radiological accident at Indian Point; CLI-85-6, 21 NRC 1043 (1985)

NOMOGRAM

- reliability of, for calculating thyroid dose and making subsequent protective action recommendation; LBP-85-12, 21 NRC 644 (1985)

NOTICE

- official, of record of prior proceeding to prevent relitigation of issues; LBP-85-4, 21 NRC 399 (1985)

SUBJECT INDEX

NOTICE OF VIOLATION

material false statement in TMI licensee's response to; CLI-85-2, 21 NRC 282 (1985)

NOTIFICATION

of emergency workers, provisions for; LBP-85-14, 21 NRC 1219 (1985)
of public that radiological emergency exists, time limit on; LBP-85-12, 21 NRC 644 (1985)
of Shoreham emergency workers, adequacy of communication system and procedures for;
LBP-85-12, 21 NRC 644 (1985)

NRC INSPECTION

round-the-clock at TMI-1, Staff proposal for; CLI-85-9, 21 NRC 1118 (1985)

NRC PROCEEDINGS

applicability of collateral estoppel in; LBP-85-11, 21 NRC 609 (1985)
contested, settlement of; ALAB-806, 21 NRC 1183 (1985)
factors considered in determining jurisdictional disputes in; ALAB-797, 21 NRC 6 (1985)
See also Adjudicatory Proceedings, Licensing Proceedings, Operating License Proceeding, Show
Cause Proceeding

NRC STAFF

dissenting, right of, to express views; ALAB-803, 21 NRC 575 (1985)
matters left for post-hearing resolution by; ALAB-798, 21 NRC 357 (1985)
officials, deposition of, by intervenors; LBP-85-11, 21 NRC 609 (1985)
participation in licensing proceedings; ALAB-799, 21 NRC 360 (1985)
post-hearing verification of emergency planning measures by; ALAB-808, 21 NRC 1595 (1985)
responsibility to acknowledge and discuss disagreements among its personnel; ALAB-803, 21 NRC
575 (1985)
standards applicable to submissions by; ALAB-801, 21 NRC 479 (1985)
supervision of a party's compliance with a commitment; ALAB-811, 21 NRC 1622 (1985)
witness, cause for subpoena of; ALAB-802, 21 NRC 490 (1985)

NUCLEAR POWER PLANTS

hearing rights resulting from restart of; CLI-85-9, 21 NRC 1118 (1985)
limits on liability of, for accidents; LBP-85-4, 21 NRC 399 (1985)
older, reevaluation of seismic design basis of; CLI-85-10, 21 NRC 1569 (1985)

NUCLEAR REGULATORY COMMISSION

authority to consider issues of waste and cost overruns; DD-85-7, 21 NRC 1552 (1985)
authority to impose license requirements; CLI-85-6, 21 NRC 1043 (1985)
considerations in conducting immediate effectiveness review of decision authorizing exemption from
regulations; CLI-85-1, 21 NRC 175 (1985)
discretion in treatment of licensee's voluntary commitments; CLI-85-10, 21 NRC 1569 (1985)
enforcement policy for violation of employee protection regulations; DD-85-9, 21 NRC 1759 (1985)
judges, standards for disqualification of; CLI-85-5, 21 NRC 566 (1985)
jurisdiction to act on issues outside scope of laws established by Congress; CLI-85-9, 21 NRC 1118
(1985)

obligation to lift effectiveness of shutdown order; CLI-85-9, 21 NRC 1118 (1985)

OPERATING LICENSE AMENDMENT

effectiveness of; CLI-85-9, 21 NRC 1118 (1985)
issuance of, without prior hearing; ALAB-796, 21 NRC 4 (1985)
treatment of confirmatory order as; CLI-85-10, 21 NRC 1569 (1985)

OPERATING LICENSE PROCEEDING(S)

as forum for reconsideration of matters originally within scope of construction permit proceeding;
ALAB-804, 21 NRC 587 (1985)
automatic right to adjudicatory resolution of environmental or safety issues in; ALAB-799, 21 NRC
360 (1985)
issues for consideration in; LBP-85-6, 21 NRC 447 (1985)
litigability of economic issues in; ALAB-808, 21 NRC 1595 (1985)
litigation of construction quality assurance in; ALAB-799, 21 NRC 360 (1985)
nature of findings in; ALAB-811, 21 NRC 1622 (1985)
termination of, on basis of settlement agreement; LBP-85-6A, 21 NRC 468 (1985)
See also Licensing Proceedings

SUBJECT INDEX

OPERATING LICENSE SUSPENSION

distinction between license amendment and; CLI-85-10, 21 NRC 1569 (1985)

OPERATING LICENSE(S)

Commission discretion whether to amend; CLI-85-10, 21 NRC 1569 (1985)

criteria for physical security plans for; LBP-85-4, 21 NRC 399 (1985)

decision, standard for; CLI-85-3, 21 NRC 471 (1985)

finding required for denial of; ALAB-799, 21 NRC 360 (1985)

full power and low power, difference in considerations pertaining to authorization of; ALAB-808, 21 NRC 1595 (1985)

full power, Commission decision declining to make effective; CLI-85-11, 21 NRC 1585 (1985)

full-power for Waterford, denial of request for stay of effectiveness of; CLI-85-3, 21 NRC 471 (1985)

issuance, Commission findings necessary for; DD-85-7, 21 NRC 1552 (1985)

issuance, emergency planning findings necessary for; ALAB-809, 21 NRC 1605 (1985)

low-power, findings prerequisite to issuance of; CLI-85-1, 21 NRC 175 (1985)

review, application of new seismic criteria during; LBP-85-2, 21 NRC 24 (1985)

review, procedures for applying safe shutdown earthquake in; LBP-85-2, 21 NRC 24 (1985)

treatment of confirmatory orders that do not expand a licensee's authority under; CLI-85-10, 21 NRC 1569 (1985)

treatment of licensee's voluntary commitments under; CLI-85-10, 21 NRC 1569 (1985)

OPERATION

low power, need for supplemental environmental impact statement for; CLI-85-12, 21 NRC 1587 (1985)

ORDERS

confirmatory, that do not expand a licensee's authority under its operating license, treatment of; CLI-85-10, 21 NRC 1569 (1985)

See also Enforcement Orders, Shutdown Order

PENALTIES

See Civil penalties

PENNSYLVANIA

emergency planning requirements in; LBP-85-14, 21 NRC 1219 (1985)

PHYSICAL SECURITY PLANS

requirements for protection of vital equipment in; LBP-85-4, 21 NRC 399 (1985)

PIPING

underground, at Midland site, technical adequacy of, in view of excessive settlement of; LBP-85-2, 21 NRC 24 (1985)

POLLS

public opinion, on behavior during radiological emergency, efficacy of; LBP-85-12, 21 NRC 644 (1985)

POLLUTION

See Air Pollution

POPULATION CENTER

aggregate population of several recreational facilities as; LBP-85-11, 21 NRC 609 (1985)

POPULATION DENSITY

of Indian Point nuclear power plant site; CLI-85-6, 21 NRC 1043 (1985)

POTASSIUM IODIDE

provision of, to emergency workers; LBP-85-14, 21 NRC 1219 (1985)

POWER

emergency, during low-power operating, authorization of alternate system for; CLI-85-1, 21 NRC 175 (1985)

offsite, loss of, in conjunction with Shoreham accident, effect of, on emergency response; LBP-85-12, 21 NRC 644 (1985)

See also Need for Power

POWER LEVELS

Staff proposal of 25% limitation on, at TMI-1; CLI-85-9, 21 NRC 1118 (1985)

SUBJECT INDEX

PRECEDENTIAL EFFECT

of Board decisions; LBP-85-20, 21 NRC 1732 (1985)

PREJUDICE

demonstration of, through curtailment of cross-examination; ALAB-799, 21 NRC 360 (1985)
when an attorney is called to testify for the opposing side; LBP-85-19, 21 NRC 1707 (1985)

See also Bias

PRESSURE SPIKE

during TMI-2 accident, interpretation of; CLI-85-2, 21 NRC 282 (1985)

PRIVILEGE

attorney-client or work product, inadvertent disclosure of privileged documents as waiver of;
LBP-85-1, 21 NRC 11 (1985)

PROPRIETARY INFORMATION

means for handling disputes over; ALAB-807, 21 NRC 1195 (1985)

PROTECTED ACTIVITIES

covered by NRC employee protection regulations; DD-85-9, 21 NRC 1759 (1985)

PROTECTIVE ACTION RECOMMENDATIONS

adequacy of guidelines and implementing procedures for, in Shoreham emergency plan; LBP-85-12,
21 NRC 644 (1985)

role of mobilization time in making; LBP-85-12, 21 NRC 644 (1985)

PUBLIC INFORMATION

on emergency planning for Indian Point, adequacy of; CLI-85-6, 21 NRC 1043 (1985)

QUALIFICATION

See Environmental Qualification

QUALIFIED LOAD LEVEL

of Shoreham emergency diesel generators; LBP-85-18, 21 NRC 1637 (1985)

construction, allegations of breakdown in, at Waterford; CLI-85-3, 21 NRC 471 (1985)

contentions, basis and specificity requirements for; LBP-85-20, 21 NRC 1732 (1985)

contentions, importance of specificity in; LBP-85-11, 21 NRC 609 (1985)

deficiencies, regulations governing reports of; LBP-85-6, 21 NRC 447 (1985)

deficiencies, requirements for resolution of; ALAB-802, 21 NRC 490 (1985)

effect on, of Seabrook applicant's indebtedness to its contractors; DD-85-3, 21 NRC 533 (1985)

employees, discrimination against; DD-85-9, 21 NRC 1759 (1985)

finding required for denial of an operating license; ALAB-799, 21 NRC 360 (1985)

of construction, litigability of, in operating license proceedings; ALAB-799, 21 NRC 360 (1985)

of design verification program at Diablo Canyon, adequacy of; ALAB-811, 21 NRC 1622 (1985)

RADIATION

appropriate time periods for calculating health effects from exposure to; LBP-85-5, 21 NRC 410
(1985)

effects, treatment of, in emergency planning brochure; LBP-85-12, 21 NRC 644 (1985)

releases from Three Mile Island Unit 2 accident, health effects of; CLI-85-8, 21 NRC 1111 (1985)

RADIOACTIVE WASTE

low-level, denial of petition for adoption of interim regulations for shallow-land disposal of;
DPRM-85-2, 21 NRC 1781 (1985)

RADIOIODINE

technical specification limit for Indian Point, need for compliance with; CLI-85-6, 21 NRC 1043
(1985)

RADIONUCLIDE(S)

attachment to fly ash particles, radiological doses from; LBP-85-5, 21 NRC 410 (1985)

bioaccumulation of, in aquatic organisms, adequacy of Staff treatment of, in construction FES;
LBP-85-8, 21 NRC 516 (1985)

deposition rates, litigability of adequacy of calculations of; LBP-85-8, 21 NRC 516 (1985)

RADWASTE SYSTEMS

at Fermi, need for additional tests to verify adequacy of; DD-85-4, 21 NRC 546 (1985)

SUBJECT INDEX

REACTOR

boiling water, efficacy of testing at 5% of rated power; CLI-85-1, 21 NRC 175 (1985)
boiling water, GE Mark I, adequacy of design of; DD-85-4, 21 NRC 546 (1985)
training, applicability of Appendices A to 10 C.F.R. Parts 50 and 100 to; LBP-85-4, 21 NRC 399 (1985)

REACTOR COOLANT

pressure boundary at GETR Vallecitos, leakages in; LBP-85-4, 21 NRC 399 (1985)

REACTOR OPERATOR(S)

at TMI, adequacy of training program for; CLI-85-2, 21 NRC 282 (1985)
trainee evaluation case histories; LBP-85-15, 21 NRC 1409 (1985)
training program, approval of plan for evaluation of effectiveness of; LBP-85-21, 21 NRC 1751 (1985)

RECONSIDERATION

10 C.F.R. 2.206 procedures as vehicle for; CLI-85-4, 21 NRC 561 (1985)
in operating license proceeding, of matters originally within scope of construction permit proceeding; ALAB-804, 21 NRC 587 (1985)
of ruling admitting applicant's contention, denial of motion for; LBP-85-3, 21 NRC 244 (1985)
raising matters for first time in motion for; CLI-85-7, 21 NRC 1104 (1985)

RECORD(S)

closed, criteria for reopening; ALAB-803, 21 NRC 575 (1985)
contributions to, by intervenor filing contentions late; LBP-85-20, 21 NRC 1732 (1985)
for as-built designs for electrical and instrumentation systems, denial of request for investigation of lack of; DD-85-4, 21 NRC 546 (1985)
in restart proceeding, change in testimony during lawsuit as basis for reopening; ALAB-807, 21 NRC 1195 (1985); CLI-85-2, 21 NRC 282 (1985); CLI-85-8, 21 NRC 1111 (1985)
means for intervenor to contribute to; LBP-85-11, 21 NRC 609 (1985)
standards for reopening; CLI-85-2, 21 NRC 282 (1985); CLI-85-7, 21 NRC 1104 (1985)

RECOVERY AND REENTRY

following radiological emergency at Shoreham, adequacy of implementing procedures for; LBP-85-12, 21 NRC 644 (1985)

RECREATIONAL FACILITIES

aggregate population of, as population center; LBP-85-11, 21 NRC 609 (1985)

REENTRY

into EPZ by farmers following radiological emergency; LBP-85-14, 21 NRC 1219 (1985)
See also Recovery and Reentry

REGULATIONS

considerations in conducting immediate effectiveness review of decision authorizing exemption from; CLI-85-1, 21 NRC 175 (1985)
criteria for grant of exemptions from; LBP-85-4, 21 NRC 399 (1985); LBP-85-7, 21 NRC 507 (1985)
employee protection, protected activities covered by; DD-85-9, 21 NRC 1759 (1985)
governing medical uses of byproduct materials, denial of petition for amendment of; DPRM-85-1, 21 NRC 1777 (1985)
governing notification of emergency workers, interpretation of; LBP-85-12, 21 NRC 644 (1985)
governing reports of quality assurance deficiencies; LBP-85-6, 21 NRC 447 (1985)
interim, for shallow-land disposal of low-level radioactive wastes, denial of petition for adoption of; DPRM-85-2, 21 NRC 1781 (1985)
interpretation of; LBP-85-4, 21 NRC 399 (1985)
plant construction standards embodied in; ALAB-799, 21 NRC 360 (1985)
principal authority for granting exemptions from; ALAB-809, 21 NRC 1605 (1985)
specifying seismic and geologic criteria for nuclear power plant design; LBP-85-2, 21 NRC 24 (1985)
treatment of contentions challenging; LBP-85-4, 21 NRC 399 (1985)
See also Rules, Rules of Practice

REOPENING

issues, 10 C.F.R. 2.206 procedures as means for; CLI-85-4, 21 NRC 561 (1985)
of proceedings, legal standards for; LBP-85-19, 21 NRC 1707 (1985)

SUBJECT INDEX

REOPENING A RECORD

- allegation of falsified documents as support of motion for; ALAB-803, 21 NRC 575 (1985)
- burden on movant; CLI-85-7, 21 NRC 1104 (1985)
- criteria for; ALAB-807, 21 NRC 1195 (1985)
- factors considered in determining whether to grant motion for; CLI-85-8, 21 NRC 1111 (1985)
- jurisdiction to consider motion to; LBP-85-19, 21 NRC 1707 (1985)
- standards for; CLI-85-7, 21 NRC 1104 (1985)

REPORTABILITY

- of deficiencies, three-element test for; LBP-85-6, 21 NRC 447 (1985)

REPORTS

- of quality assurance deficiencies, regulations governing; LBP-85-6, 21 NRC 447 (1985)

RESPONSE SPECTRA

- site-specific, use of, to define vibratory ground motion; LBP-85-2, 21 NRC 24 (1985)

RESTART

- of nuclear power plant, hearing rights resulting from; CLI-85-9, 21 NRC 1118 (1985)
- of TMI-1, restriction of licensed operator's responsibilities as a condition of; CLI-85-2, 21 NRC 282 (1985)

REVIEW

- appellate sua sponte, circumstances inappropriate for; ALAB-796, 21 NRC 4 (1985)
- appellate sua sponte, scope of approval conferred by; ALAB-795, 21 NRC 1 (1985)
- appellate, of Licensing Board determinations in partial initial decisions; ALAB-799, 21 NRC 360 (1985)
- immediate effectiveness, effect of, on appeal board; LBP-85-4, 21 NRC 399 (1985)
- immediate effectiveness, of decision authorizing exemption from regulations, considerations in conducting; CLI-85-1, 21 NRC 175 (1985)
- immediate effectiveness, of operating license decisions; LBP-85-4, 21 NRC 399 (1985)
- of issues sua sponte by Licensing Boards, constraints on; LBP-85-8, 21 NRC 516 (1985)
- operating license, application of new seismic criteria during; LBP-85-2, 21 NRC 24 (1985)
- operating license, procedures for applying safe shutdown earthquake in; LBP-85-2, 21 NRC 24 (1985)

REVIEW, APPELLATE

- of conflict of interest issue scope of; ALAB-803, 21 NRC 575 (1985)

REVIEW, APPELLATE

- of correctness of Commission rulings, scope of; ALAB-810, 21 NRC 1616 (1985)

RISK(S)

- definition of; CLI-85-6, 21 NRC 1043 (1985)
- estimates for accidents at high-population-density sites, calculation of; CLI-85-6, 21 NRC 1043 (1985)
- of cold shutdown; LBP-85-12, 21 NRC 644 (1985)
- of serious accidents at Indian Point; CLI-85-6, 21 NRC 1043 (1985)
- reduction measures imposed as license requirement; CLI-85-6, 21 NRC 1043 (1985)
- to New York City from radiological accident at Indian Point; CLI-85-6, 21 NRC 1043 (1985)

ROUTE ALERTING

- procedures for implementing; LBP-85-14, 21 NRC 1219 (1985)

RULES

- penalty for violation of; ALAB-799, 21 NRC 360 (1985)
- procedural, applicable to consolidated operating license/show cause hearings; LBP-85-2, 21 NRC 24 (1985)
- standards and procedures governing waiver of; LBP-85-5, 21 NRC 410 (1985)

See also Regulations

RULES OF PRACTICE

- admissibility of evidence proffered by witness violating Commission ethics regulations; ALAB-803, 21 NRC 575 (1985)
- admissibility of hearsay evidence; ALAB-802, 21 NRC 490 (1985)
- allegation of falsified documents as support for motion to reopen closed record; ALAB-803, 21 NRC 575 (1985)

SUBJECT INDEX

amendment of rejected, late-filed contentions; LBP-85-11, 21 NRC 609 (1985)
appeals of orders disposing of some of a party's contentions; ALAB-807, 21 NRC 1195 (1985)
appellate review of cross-examination rulings; ALAB-799, 21 NRC 360 (1985)
applicability of collateral estoppel to contentions raised in both construction permit and operating license proceedings; LBP-85-11, 21 NRC 609 (1985)
application of new seismic criteria during operating license review; LBP-85-2, 21 NRC 24 (1985)
burden on movant for stay of agency action; ALAB-810, 21 NRC 1616 (1985)
cause for subpoena of NRC Staff witnesses; ALAB-802, 21 NRC 490 (1985)
comments from parties on immediate effectiveness review; LBP-85-4, 21 NRC 399 (1985)
Commission policy on immediate effectiveness reviews of operating license decisions; LBP-85-4, 21 NRC 399 (1985)
conditional admission of contentions; ALAB-806, 21 NRC 1183 (1985)
consideration of a contention's merits in determining its admissibility; ALAB-806, 21 NRC 1183 (1985)
consideration of matters not actually litigated in deciding stay motions; ALAB-808, 21 NRC 1595 (1985)
consolidation of intervenors; ALAB-808, 21 NRC 1595 (1985)
contention requirement for intervention; ALAB-799, 21 NRC 360 (1985)
contributions to the record by intervenor filing contentions late; LBP-85-20, 21 NRC 1732 (1985)
counterbalance for delay caused by admission of late-filed contention; LBP-85-20, 21 NRC 1732 (1985)
criteria for deciding request for stay of agency action; ALAB-810, 21 NRC 1616 (1985)
criteria for reopening a record; ALAB-803, 21 NRC 575 (1985); ALAB-807, 21 NRC 1195 (1985)
denial of discovery where motion to reopen is untimely filed; LBP-85-19, 21 NRC 1707 (1985)
deposition of NRC Staff officials by intervenors; LBP-85-11, 21 NRC 609 (1985)
economic injury as means of establishing standing to intervene; CLI-85-2, 21 NRC 282 (1985)
effect of acceptance of contentions on their litigability independent of their sponsoring intervenor; ALAB-799, 21 NRC 360 (1985)
effect of immediate effectiveness review on Appeal Board; LBP-85-4, 21 NRC 399 (1985)
effect on proceedings of withdrawal of intervenor; ALAB-799, 21 NRC 360 (1985)
factors considered in determining motions to reopen; CLI-85-8, 21 NRC 1111 (1985)
factors for determining admissibility of contentions based on previously unavailable material; ALAB-806, 21 NRC 1183 (1985)
factors weighed in deciding stay motions; ALAB-808, 21 NRC 1595 (1985)
failure to meet good cause factor for late-filed contentions; LBP-85-11, 21 NRC 609 (1985)
five factors balanced to determine admissibility of untimely contentions; LBP-85-11, 21 NRC 609 (1985)
identification of witnesses prior to admission of a late contention; LBP-85-20, 21 NRC 1732 (1985)
importance of specificity in broad quality assurance contentions; LBP-85-11, 21 NRC 609 (1985)
inadvertent disclosure of privileged documents as waiver of privilege; LBP-85-1, 21 NRC 11 (1985)
influence of withdrawal of other contentions on admissibility of new contention; LBP-85-11, 21 NRC 609 (1985)
initiation of show cause proceeding on basis of allegations before the Commission in another proceeding; DD-85-1, 21 NRC 263 (1985)
jurisdiction to consider motion to reopen record; LBP-85-19, 21 NRC 1707 (1985)
legal standards for reopening of proceedings; LBP-85-19, 21 NRC 1707 (1985)
Licensing Board authority to require intervenors to name witnesses by a certain date; LBP-85-20, 21 NRC 1732 (1985)
Licensing Board discretion in balancing five factors for admission of late-filed contentions; ALAB-806, 21 NRC 1183 (1985)
Licensing Board discretion to permit amendment of intervention petition; LBP-85-20, 21 NRC 1732 (1985)
limitations on scope of cross-examination; ALAB-799, 21 NRC 360 (1985)
litigability under 2.206 proceedings of matters common to a licensing proceeding; DD-85-9, 21 NRC 1759 (1985)

SUBJECT INDEX

- means for handling proprietary disputes; ALAB-807, 21 NRC 1195 (1985)
- means for intervenor to contribute to the record for purpose of admission of late-filed contention; LBP-85-20, 21 NRC 1732 (1985)
- means for offsetting enlargement of a proceeding; LBP-85-11, 21 NRC 609 (1985)
- means for overcoming request for disqualification of an attorney; LBP-85-19, 21 NRC 1707 (1985)
- means for protecting interests of petitioner seeking admission of late-filed contentions; ALAB-806, 21 NRC 1183 (1985)
- mitigation of delay caused by broadening of issues due to admission of new contention; LBP-85-11, 21 NRC 609 (1985)
- need for Appeal Board to state reasons or basis for its conclusions; ALAB-801, 21 NRC 479 (1985)
- need to state reasons for denial of license amendment application; LBP-85-3, 21 NRC 244 (1985)
- nontimely submission of contentions; LBP-85-9, 21 NRC 524 (1985)
- NRC Staff responsibility to acknowledge and discuss disagreements among its personnel; ALAB-803, 21 NRC 575 (1985)
- official notice of record of prior proceeding to prevent relitigation of issues; LBP-85-4, 21 NRC 399 (1985)
- penalty for failure to adequately brief allegations made on appeal; ALAB-799, 21 NRC 360 (1985)
- pleading requirements for harassment/intimidation contention; LBP-85-20, 21 NRC 1732 (1985)
- pleading requirements for late-filed, broad contention; LBP-85-20, 21 NRC 1732 (1985)
- precedential effect of Board decisions; LBP-85-20, 21 NRC 1732 (1985)
- prejudice when an attorney is called to testify for the opposing side; LBP-85-19, 21 NRC 1707 (1985)
- procedural rules applicable to consolidated operating license/show cause hearings; LBP-85-2, 21 NRC 24 (1985)
- propriety of limitations on cross-examination; ALAB-808, 21 NRC 1595 (1985)
- purpose of 2.206 petitions; DD-85-7, 21 NRC 1552 (1985)
- raising matters for first time in motion for reconsideration; CLI-85-7, 21 NRC 1104 (1985)
- reason for rejection of contentions filed late without good cause; LBP-85-11, 21 NRC 609 (1985)
- reason for specificity requirement for contentions; LBP-85-20, 21 NRC 1732 (1985)
- reconsideration through 10 C.F.R. 2.206 procedures; CLI-85-4, 21 NRC 561 (1985)
- referral of ruling on admissibility of contention which will require further Staff review; LBP-85-3, 21 NRC 244 (1985)
- replacement of withdrawing intervenor as good cause for reopening a proceeding; ALAB-799, 21 NRC 360 (1985)
- representation by counsel in previous NRC proceeding as basis for intervenor's contribution to record; LBP-85-11, 21 NRC 609 (1985)
- requirement for applicant to set forth its view of adequacy of its own management; LBP-85-16, 21 NRC 1539 (1985)
- responses to document requests; LBP-85-1, 21 NRC 11 (1985)
- responsibilities of counsel for form and quality of submissions; ALAB-801, 21 NRC 479 (1985)
- responsibilities of parties seeking to intervene in NRC proceedings; ALAB-807, 21 NRC 1195 (1985)
- responsibilities of parties to comply with Commission direction to address specific matters in a licensing proceeding; CLI-85-2, 21 NRC 282 (1985)
- responsibilities of parties to inform Boards of newly developing information; LBP-85-6, 21 NRC 447 (1985)
- responsibility for ensuring that a party is represented by counsel; ALAB-802, 21 NRC 490 (1985)
- responsibility of applicant for intervenor's late filing of contention; LBP-85-20, 21 NRC 1732 (1985)
- responsibility of parties to conduct their own research; ALAB-804, 21 NRC 587 (1985)
- responsibility of party to present its position in intelligible form to the decisionmaker; ALAB-801, 21 NRC 479 (1985)
- right of intervenor to cross-examination on contentions sponsored by others; ALAB-799, 21 NRC 360 (1985)
- right of party to make case solely through cross-examination; LBP-85-20, 21 NRC 1732 (1985)
- right of party to seek stay of decision or agency action; ALAB-808, 21 NRC 1595 (1985)

SUBJECT INDEX

- scope of design issues considered in partial initial decisions; LBP-85-2, 21 NRC 24 (1985)
- scope of issues that can be raised on appeal; ALAB-799, 21 NRC 360 (1985)
- settlement of contested NRC proceedings; ALAB-806, 21 NRC 1183 (1985)
- showing necessary by party invoking directed certification; ALAB-805, 21 NRC 596 (1985)
- showing necessary to establish standing to intervene; CLI-85-2, 21 NRC 282 (1985)
- specificity and basis requirements for admission of contention; ALAB-804, 21 NRC 587 (1985)
- standard for grant of motion to reopen record on basis of newly discovered information; ALAB-807, 21 NRC 1195 (1985)
- standard for overturning a Licensing Board's scheduling decision; ALAB-799, 21 NRC 360 (1985)
- standards applicable to submissions by NRC Staff; ALAB-801, 21 NRC 479 (1985)
- standards applied to attorney conduct; LBP-85-19, 21 NRC 1707 (1985)
- standards for reopening a record; CLI-85-2, 21 NRC 282 (1985)
- standards for reopening a record; CLI-85-7, 21 NRC 1104 (1985)
- test to determine whether one intervenor may adopt contentions sponsored by another intervenor who has withdrawn; ALAB-799, 21 NRC 360 (1985)
- timeliness in filing motion to reopen; LBP-85-19, 21 NRC 1707 (1985)
- use of collateral estoppel doctrine to prevent litigation of contentions; LBP-85-4, 21 NRC 399 (1985)
- use of prefiled written testimony in NRC proceedings; ALAB-799, 21 NRC 360 (1985)
- use of summary disposition to prevent relitigation of issues; LBP-85-4, 21 NRC 399 (1985)
- weight given to each of five factors of 10 C.F.R. 2.714(a)(1); LBP-85-11, 21 NRC 609 (1985)
- weight given to factors (ii) and (iv) in evaluating admissibility of untimely contentions; LBP-85-9, 21 NRC 524 (1985)
- weight given to irreparable harm factor in deciding stay motions; ALAB-808, 21 NRC 1595 (1985)
- weight given to irreparable harm in deciding stay motions; ALAB-810, 21 NRC 1616 (1985)
- RULING**
 - referral of, on admissibility of contention which will require further Staff review; LBP-85-3, 21 NRC 244 (1985)
- SAFE SHUTDOWN**
 - system required to ensure compliance with fire protection guidelines; DD-85-4, 21 NRC 546 (1985)
- SAFE SHUTDOWN EARTHQUAKE**
 - larger than maximum earthquake that has occurred historically within the tectonic province; LBP-85-2, 21 NRC 24 (1985)
 - procedures for applying, in operating license review; LBP-85-2, 21 NRC 24 (1985)
- SAFETY**
 - assurance program for Indian Point, need for; CLI-85-6, 21 NRC 1043 (1985)
 - See Important to Safety, Safety-Related
- SAFETY ISSUES**
 - extent of right to adjudicatory resolution of, in operating license proceedings; ALAB-799, 21 NRC 360 (1985)
- SAFETY-RELATED**
 - interpretation of, as applied to seismic design requirements; LBP-85-2, 21 NRC 24 (1985)
- SANCTIONS**
 - for violations, NRC policy for imposition of; DD-85-9, 21 NRC 1759 (1985)
- SCHEDULE**
 - set by a Licensing Board, standard for appellate review of; ALAB-799, 21 NRC 360 (1985)
- SCHOOLS**
 - evacuation of, during Limerick radiological emergency; LBP-85-14, 21 NRC 1219 (1985)
 - protective measures for, during Shoreham radiological emergency; LBP-85-12, 21 NRC 644 (1985)
- SECURITY**
 - for reactor operator examinations at Three Mile Island; LBP-85-15, 21 NRC 1409 (1985)
- SECURITY PLANS**
 - See Physical Security Plans
- SEISMIC AND GEOLOGIC CRITERIA**
 - applicable at operating license stage, scope of; LBP-85-2, 21 NRC 24 (1985)
 - for nuclear power plant design, regulations specifying; LBP-85-2, 21 NRC 24 (1985)

SUBJECT INDEX

SEISMIC DESIGN BASIS

of older nuclear power plants, reevaluation of; CLI-85-10, 21 NRC 1569 (1985)

SEISMIC ISSUES

reliability of, at operating license stage; LBP-85-4, 21 NRC 399 (1985)

SEISMIC MODELS

to perform seismic evaluation of Midland structures, description of; LBP-85-2, 21 NRC 24 (1985)

SERVICE WATER PUMP STRUCTURE

at Midland site, adequacy of soils compaction beneath; LBP-85-2, 21 NRC 24 (1985)

SETTLEMENT

of contested NRC proceedings; ALAB-806, 21 NRC 1183 (1985)

SETTLEMENT AGREEMENT

termination of operating license proceeding on basis of; LBP-85-6A, 21 NRC 468 (1985)

SHELTERING

during radiological emergency at Shoreham; LBP-85-12, 21 NRC 644 (1985)

evaluation of buildings to determine their adequacy for; LBP-85-14, 21 NRC 1219 (1985)

SHIELDING

factors on Long Island; LBP-85-12, 21 NRC 644 (1985)

SHOW CAUSE PROCEEDINGS

as vehicle for reconsideration or as means to reopen previously adjudicated issues; CLI-85-4, 21 NRC 561 (1985)

effect to be given to, in operating license proceeding; LBP-85-4, 21 NRC 399 (1985)

initiation of, on basis of allegations before the Commission in another proceeding; DD-85-1, 21 NRC 263 (1985)

SHUTDOWN

of Indian Point, consequences of; CLI-85-6, 21 NRC 1043 (1985)

of reactor during union strike, requirement for; LBP-85-12, 21 NRC 644 (1985)

See also Safe Shutdown

SHUTDOWN ORDER

Commission obligation to lift; CLI-85-9, 21 NRC 1118 (1985)

effect of adequacy of TMI licensed operator training on; CLI-85-9, 21 NRC 1118 (1985)

SIMULATOR

training for TMI reactor operators; LBP-85-15, 21 NRC 1409 (1985)

SIRENS

for public emergency notification system, backup for; LBP-85-12, 21 NRC 644 (1985)

SITE SUITABILITY

criteria, distance from reactor to population center which satisfies; LBP-85-11, 21 NRC 609 (1985)

SITE SUITABILITY EVALUATION

under limited work authorization, scope of; LBP-85-11, 21 NRC 609 (1985)

SITE(S)

Clinch River, imposition of conditions on redress of; LBP-85-7, 21 NRC 507 (1985)

high-population-density nuclear power plant, accident risk assessment and emergency response planning for; CLI-85-6, 21 NRC 1043 (1985)

See also Construction Site

SOIL

liquefaction at Midland site, potential for and means for dealing with; LBP-85-2, 21 NRC 24 (1985)

under South Texas Project, stability of; LBP-85-9, 21 NRC 524 (1985)

SOIL SPRING CONSTANTS

for Midland site, derivation of; LBP-85-2, 21 NRC 24 (1985)

SOURCE TERM

use of, in estimating accident risks for high-population-density reactor sites; CLI-85-6, 21 NRC 1043 (1985)

SPECIAL FACILITIES

notification of, to evacuate; LBP-85-12, 21 NRC 644 (1985)

SPECIAL POPULATION GROUPS

evacuation of, during Limerick radiological emergency; LBP-85-14, 21 NRC 1219 (1985)

SUBJECT INDEX

SPECIFICITY

in broad quality assurance contentions, importance of; LBP-85-11, 21 NRC 609 (1985)

STANDING

to intervene, economic injury as means of establishing; CLI-85-2, 21 NRC 282 (1985)

to intervene, showing necessary to establish; CLI-85-2, 21 NRC 282 (1985)

STARE DECISIS

effect of Licensing Board conclusions on legal issues not brought before Appeal Board by way of appeal; ALAB-795, 21 NRC 1 (1985)

STATUTES

State and county, prohibiting Applicant from performing activities to implement emergency plan, federal preemption of; LBP-85-12, 21 NRC 644 (1985)

STAY

motions, consideration of matters not actually litigated in deciding; ALAB-808, 21 NRC 1595 (1985)

motions, factors weighed in deciding; ALAB-808, 21 NRC 1595 (1985)

motions, function of Appeal Board in passing upon; ALAB-810, 21 NRC 1616 (1985)

of agency action, burden on movant for; ALAB-810, 21 NRC 1616 (1985)

of agency action, criteria for deciding request for; ALAB-810, 21 NRC 1616 (1985)

of decision, right of party to seek; ALAB-808, 21 NRC 1595 (1985)

of effectiveness of full-power license, denial of request for; CLI-85-3, 21 NRC 471 (1985)

STEAM GENERATOR TUBE

repair through kinetic expansion; ALAB-807, 21 NRC 1195 (1985)

STEAM GENERATOR(S)

at Three Mile Island, description of; ALAB-807, 21 NRC 1195 (1985)

fixes for Indian Point facility, license requirements for; CLI-85-6, 21 NRC 1043 (1985)

STRIKE

by utility union employees, effect of, on utility's ability to respond to emergency at Shoreham; LBP-85-12, 21 NRC 644 (1985)

SUBPOENA(S)

of NRC Staff witness, cause for; ALAB-802, 21 NRC 490 (1985)

to nonparty State agencies, issuance of; LBP-85-1, 21 NRC 11 (1985)

SULFUR

steam generator corrosion from, at Three Mile Island Unit 1; ALAB-807, 21 NRC 1195 (1985)

SUMMARY DISPOSITION

use of, to prevent relitigation of issues; LBP-85-4, 21 NRC 399 (1985)

SUSPENSION

of operating license, distinction between license amendment and; CLI-85-10, 21 NRC 1569 (1985)

TECHNICAL SPECIFICATIONS

for limitations on load levels of emergency diesel generators; LBP-85-18, 21 NRC 1637 (1985)

TECTONIC PROVINCE

determination of, for Midland Plant; LBP-85-2, 21 NRC 24 (1985)

TERMINATION

of operating license proceeding on basis of settlement agreement; LBP-85-6A, 21 NRC 468 (1985)

TEST

three-element, for reportability of deficiencies; LBP-85-6, 21 NRC 447 (1985)

TESTIMONY

change in, during lawsuit, as basis for reopening record in restart proceeding; CLI-85-2, 21 NRC 282 (1985)

prefiled, written, use of, in NRC proceedings; ALAB-799, 21 NRC 360 (1985)

sponsoring, exclusion of evidence for lack of; ALAB-808, 21 NRC 1595 (1985)

TESTING

containment leak rate, at Zion Station, remedy for discrepancies in; DD-85-2, 21 NRC 270 (1985)

leak rate, at TMI, falsification of; CLI-85-2, 21 NRC 282 (1985)

low power, need for supplemental environmental impact statement for; CLI-85-12, 21 NRC 1587 (1985)

surveillance, for failure of emergency diesel generator crankshafts; LBP-85-18, 21 NRC 1637 (1985)

See also Eddy Current Testing

SUBJECT INDEX

THORIUM

mill tailings disposal, segmentation of plan for; LBP-85-3, 21 NRC 244 (1985)

THYROID

calculation of radiological dose to; LBP-85-5, 21 NRC 410 (1985)

TORNADO

risk to Indian Point facility; CLI-85-6, 21 NRC 1043 (1985)

TRAFFIC

control during Shoreham evacuation, implementation of, with utility employees; LBP-85-12, 21 NRC 644 (1985)

TRAINING

irregularities at TMI prior to accident; CLI-85-2, 21 NRC 282 (1985)

licensed operator, at TMI, effect of adequacy of, on shutdown order; CLI-85-9, 21 NRC 1118 (1985)

licensed operator, for Three Mile Island, adequacy of; LBP-85-15, 21 NRC 1409 (1985)

of emergency response personnel, requirements for; LBP-85-14, 21 NRC 1219 (1985)

of nonutility personnel for emergency response, adequacy of Shoreham program for; LBP-85-12, 21 NRC 644 (1985)

of Oyster Creek operators, adequacy of; DD-85-1, 21 NRC 263 (1985)

of Shoreham emergency workers, adequacy of; LBP-85-12, 21 NRC 644 (1985)

simulator, for reactor operators at TMI; LBP-85-15, 21 NRC 1409 (1985)

TRAINING PROGRAM

at Three Mile Island, adequacy of; LBP-85-10, 21 NRC 603 (1985)

for licensed operators at TMI, adequacy of; CLI-85-2, 21 NRC 282 (1985)

for reactor operators, approval of plan for evaluation of effectiveness of; LBP-85-21, 21 NRC 1751 (1985)

licensed operator, method for demonstrating adequacy of; LBP-85-15, 21 NRC 1409 (1985)

TRANSIENTS

sheltering by, during Shoreham radiological emergency; LBP-85-12, 21 NRC 644 (1985)

TRANSMISSION LINES

litigability of impacts of electric field produced by; LBP-85-11, 21 NRC 609 (1985)

TRANSPORTATION

of explosive materials, hazards to Braidwood facility from; LBP-85-11, 21 NRC 609 (1985)

TRITIUM

releases to Vallecitos Creek from training reactor, admission of contention concerning; LBP-85-4, 21 NRC 399 (1985)

TUBE BUNDLE REGION

description of; ALAB-807, 21 NRC 1195 (1985)

VALVES

motor-operated, effect of emergency diesel generator operation on; LBP-85-18, 21 NRC 1637 (1985)

VIOLATION(S)

by diesel generator manufacturer of its legal obligations to report potential defects; LBP-85-18, 21 NRC 1637 (1985)

of 10 C.F.R. 50.55(e), consideration of, in operating license proceedings; LBP-85-6, 21 NRC 447 (1985)

of Code of Judicial Conduct Canons 2A, 2B and 3A(6); CLI-85-5, 21 NRC 566 (1985)

of NRC employee protection regulations; DD-85-9, 21 NRC 1759 (1985)

of rules, penalty for; ALAB-799, 21 NRC 360 (1985)

See also Deficiencies, Notice of Violation

VITAL EQUIPMENT

requirements for protection of, in physical security plans; LBP-85-4, 21 NRC 399 (1985)

WAIVER

of need for power rule, denial of petition for; LBP-85-5, 21 NRC 410 (1985)

of right to hearing through denial of license amendment application; LBP-85-3, 21 NRC 244 (1985)

of rules, standards and procedures governing; LBP-85-5, 21 NRC 410 (1985)

WASTE

See Radwaste Systems

SUBJECT INDEX

WASTE DISPOSAL

from decontamination activities following Shoreham accident, plans for; LBP-85-12, 21 NRC 644 (1985)

shallow-land, of low-level radioactive wastes, denial of petition for adoption of interim regulations for; DPRM-85-2, 21 NRC 1781 (1985)

WATER

make-up, for main cooling reservoir for South Texas Project, availability of; LBP-85-8, 21 NRC 516 (1985)

tritiated, calculation of inhalation doses from; LBP-85-5, 21 NRC 410 (1985)

See also Feedwater, Ground Water

WEATHER

conditions, consideration of, in evacuation time estimates; LBP-85-14, 21 NRC 1219 (1985)

consideration during radiological emergency at Shoreham; LBP-85-12, 21 NRC 644 (1985)

WELDING

deficiencies at Callaway, NRC Staff treatment of allegations of; DD-85-7, 21 NRC 1552 (1985)

WELDS

safety implications of reworking of; DD-85-7, 21 NRC 1552 (1985)

WIDMANSTAETTEN GRAPHITE

description of, relative to diesel generator cylinder block cracking; LBP-85-18, 21 NRC 1637 (1985)

WIND

shifts, effect of, on Shoreham emergency plan; LBP-85-12, 21 NRC 644 (1985)

WITHDRAWAL

of construction permit application, criteria for grant of request for; LBP-85-7, 21 NRC 507 (1985)

of intervenor, effect of, on proceedings; ALAB-799, 21 NRC 360 (1985)

WITNESS

panels, use of, in licensing proceedings; ALAB-799, 21 NRC 360 (1985)

WITNESSES

authority of Boards to summon; ALAB-805, 21 NRC 596 (1985)

identification of, prior to admission of late contention; LBP-85-20, 21 NRC 1732 (1985)

NRC Staff, cause for subpoena of; ALAB-802, 21 NRC 490 (1985)

requirement for intervenors to name, by a certain date; LBP-85-20, 21 NRC 1732 (1985)

time constraints on cross-examination of; LBP-85-14, 21 NRC 1219 (1985)

ZONES

See Emergency Planning Zones, Low Population Zone

FACILITY INDEX

- BIG ROCK POINT PLANT; Docket No. 50-155-OLA (Spent Fuel Pool Modification)
OPERATING LICENSE AMENDMENT; January 9, 1985; MEMORANDUM AND ORDER;
ALAB-795, 21 NRC 1 (1985)
- BRAIDWOOD NUCLEAR POWER STATION, Units 1 and 2; Docket Nos. 50-456, 50-457
OPERATING LICENSE; April 17, 1985; SPECIAL PREHEARING CONFERENCE ORDER;
LBP-85-11, 21 NRC 609 (1985)
OPERATING LICENSE; June 21, 1985; MEMORANDUM AND ORDER ADMITTING
ROREM ET AL. AMENDED QUALITY ASSURANCE CONTENTION; LBP-85-20, 21
NRC 1732 (1985)
- CALLAWAY PLANT, Unit 1; Docket No. 50-483
REQUEST FOR LICENSE SUSPENSION; May 17, 1985; DIRECTOR'S DECISION UNDER 10
C.F.R. § 2.206; DD-85-7, 21 NRC 1552 (1985)
- CATAWBA NUCLEAR STATION, Units 1 and 2; Docket Nos. 50-413, 50-414
REQUEST FOR ENFORCEMENT ACTION; June 4, 1985; DIRECTOR'S DECISION UNDER
10 C.F.R. § 2.206; DD-85-9, 21 NRC 1759 (1985)
- CLINCH RIVER BREEDER REACTOR PLANT; Docket No. 50-537-CP (ASLBP No. 75-291-12-CP)
CONSTRUCTION PERMIT; March 11, 1985; MEMORANDUM AND ORDER GRANTING
APPLICANTS' MOTION TO DISMISS PROCEEDING; LBP-85-7, 21 NRC 507 (1985)
- COMANCHE PEAK STEAM ELECTRIC STATION, Units 1 and 2; Docket Nos. 50-445-OL&OL-2,
50-446-OL&OL-2 (ASLBP No. 79-430-06-OL)
OPERATING LICENSE; May 24, 1985; MEMORANDUM AND ORDER; LBP-85-16, 21 NRC
1539 (1985)
OPERATING LICENSE; May 30, 1985; MEMORANDUM; LBP-85-17, 21 NRC 1544 (1985)
- DIABLO CANYON NUCLEAR POWER PLANT, Units 1 and 2; Docket Nos. 50-275-OL, 50-323-OL
OPERATING LICENSE; June 27, 1985; DECISION; ALAB-811, 21 NRC 1622 (1985)
- ENRICO FERMI ATOMIC POWER PLANT, Unit 2; Docket No. 50-341
REQUEST FOR ACTION; March 20, 1985; DIRECTOR'S DECISION UNDER 10 C.F.R.
§ 2.206; DD-85-4, 21 NRC 546 (1985)
- GETR VALLECITOS; Docket No. 50-70-OLR
OPERATING LICENSE RENEWAL; February 13, 1985; MEMORANDUM AND ORDER;
LBP-85-4, 21 NRC 399 (1985)
OPERATING LICENSE RENEWAL; April 23, 1985; MEMORANDUM AND ORDER;
LBP-85-13, 21 NRC 1031 (1985)
- HOPE CREEK GENERATING STATION; Docket No. 50-354-OL
OPERATING LICENSE; February 28, 1985; ORDER TERMINATING PROCEEDING;
LBP-85-6A, 21 NRC 468 (1985)
- INDIAN POINT, Units 2 and 3; Docket Nos. 50-247-SP, 50-286-SP
SPECIAL PROCEEDING; May 7, 1985; DECISION; CLI-85-6, 21 NRC 1043 (1985)
- LIMERICK GENERATING STATION, Units 1 and 2; Docket Nos. 50-352, 50-353
REQUEST FOR ACTION; May 17, 1985; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206;
DD-85-8, 21 NRC 1561 (1985)
- LIMERICK GENERATING STATION, Units 1 and 2; Docket Nos. 50-352-OL, 50-353-OL
OPERATING LICENSE; April 10, 1985; DECISION; ALAB-804, 21 NRC 587 (1985)
OPERATING LICENSE; May 1, 1985; DECISION; ALAB-806, 21 NRC 1183 (1985)
OPERATING LICENSE; May 2, 1985; THIRD PARTIAL INITIAL DECISION ON OFFSITE
EMERGENCY PLANNING; LBP-85-14, 21 NRC 1219 (1985)

FACILITY INDEX

- OPERATING LICENSE; June 11, 1985; MEMORANDUM AND ORDER; ALAB-808, 21 NRC 1595 (1985); CLI-85-11, 21 NRC 1585 (1985)
- OPERATING LICENSE; June 17, 1985; DECISION; ALAB-809, 21 NRC 1605 (1985)
- MAINE YANKEE ATOMIC POWER PLANT; Docket No. 50-309
- REQUEST FOR ACTION; May 13, 1985; FINAL DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; DD-85-6, 21 NRC 1547 (1985)
- MIDLAND PLANT, Units 1 and 2; Docket Nos. 50-329-OL&OM, 50-330-OL&OM (ASLBP Nos. 78-389-03-OL, 80-429-02-SP)
- OPERATING LICENSE/ENFORCEMENT; January 23, 1985; PARTIAL INITIAL DECISION; LBP-85-2, 21 NRC 24 (1985)
- OYSTER CREEK NUCLEAR GENERATING STATION; Docket No. 50-219
- PETITION FOR RELIEF; April 4, 1985; MEMORANDUM AND ORDER; CLI-85-4, 21 NRC 561 (1985)
- REQUEST FOR ACTION; January 15, 1985; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; DD-85-1, 21 NRC 263 (1985)
- PERRY NUCLEAR POWER PLANT, Units 1 and 2; Docket Nos. 50-440-OL, 50-441-OL
- OPERATING LICENSE; March 26, 1985; DECISION; ALAB-802, 21 NRC 490 (1985)
- OPERATING LICENSE; April 10, 1985; MEMORANDUM AND ORDER; ALAB-805, 21 NRC 596 (1985)
- PILGRIM NUCLEAR POWER STATION; Docket No. 50-293
- REQUEST FOR SHOW CAUSE ORDER; April 5, 1985; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; DD-85-5, 21 NRC 1033 (1985)
- SAN ONOFRE NUCLEAR GENERATING STATION, Unit 1; Docket No. 50-206
- OPERATING LICENSE SUSPENSION; February 19, 1985; DENIAL OF REQUEST FOR HEARING AND REQUEST FOR STAY; CLI-85-10, 21 NRC 1569 (1985)
- SEABROOK STATION, Units 1 and 2; Docket Nos. 50-443, 50-444
- REQUEST FOR ACTION; March 18, 1985; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; DD-85-3, 21 NRC 533 (1985)
- SHEARON HARRIS NUCLEAR POWER PLANT; Docket No. 50-400-OL (ASLBP No. 82-472-03-OL)
- OPERATING LICENSE; February 20, 1985; PARTIAL INITIAL DECISION ON ENVIRONMENTAL CONTENTIONS; LBP-85-5, 21 NRC 410 (1985)
- SHOREHAM NUCLEAR POWER STATION, Unit 1; Docket No. 50-322-OL
- OPERATING LICENSE; June 14, 1985; PARTIAL INITIAL DECISION ON EMERGENCY DIESEL GENERATORS; LBP-85-18, 21 NRC 1637 (1985)
- OPERATING LICENSE; June 19, 1985; MEMORANDUM AND ORDER; ALAB-810, 21 NRC 1616 (1985)
- SHOREHAM NUCLEAR POWER STATION, Unit 1; Docket No. 50-322-OL-3
- OPERATING LICENSE; April 17, 1985; PARTIAL INITIAL DECISION ON EMERGENCY PLANNING; LBP-85-12, 21 NRC 644 (1985)
- SHOREHAM NUCLEAR POWER STATION, Unit 1; Docket No. 50-322-OL-4
- OPERATING LICENSE; February 12, 1985; MEMORANDUM AND ORDER; CLI-85-1, 21 NRC 275 (1985)
- OPERATING LICENSE; February 21, 1985; DECISION; ALAB-800, 21 NRC 386 (1985)
- OPERATING LICENSE; June 20, 1985; ORDER; CLI-85-12, 21 NRC 1587 (1985)
- SOUTH TEXAS PROJECT, Units 1 and 2; Docket Nos. 50-498-OL, 50-499-OL
- OPERATING LICENSE; February 6, 1985; DECISION; ALAB-799, 21 NRC 360 (1985)
- SOUTH TEXAS PROJECT, Units 1 and 2; Docket Nos. STN 50-498-OL, STN 50-499-OL (ASLBP No. 79-421-07-OL)
- OPERATING LICENSE; February 26, 1985; MEMORANDUM AND ORDER; LBP-85-6, 21 NRC 447 (1985)
- OPERATING LICENSE; March 15, 1985; MEMORANDUM; LBP-85-8, 21 NRC 516 (1985)
- OPERATING LICENSE; March 29, 1985; MEMORANDUM AND ORDER; LBP-85-9, 21 NRC 524 (1985)
- OPERATING LICENSE; June 18, 1985; MEMORANDUM AND ORDER; LBP-85-19, 21 NRC 1707 (1985)

FACILITY INDEX

- THREE MILE ISLAND NUCLEAR STATION, Unit 1; Docket No. 50-289-OLA (Steam Generator Repair)
OPERATING LICENSE AMENDMENT; May 8, 1985; DECISION; ALAB-807, 21 NRC 1195 (1985)
- THREE MILE ISLAND NUCLEAR STATION, Unit 1; Docket No. 50-289-SP (Restart)
SPECIAL PROCEEDING; February 25, 1985; MEMORANDUM AND ORDER; CLI-85-2, 21 NRC 282 (1985)
SPECIAL PROCEEDING; April 5, 1985; MEMORANDUM AND ORDER; CLI-85-5, 21 NRC 566 (1985)
SPECIAL PROCEEDING; April 11, 1985; LICENSING BOARD RESPONSE TO CLI-85-2; LBP-85-10, 21 NRC 603 (1985)
SPECIAL PROCEEDING; May 9, 1985; ORDER; CLI-85-7, 21 NRC 1104 (1985)
SPECIAL PROCEEDING; May 16, 1985; MEMORANDUM AND ORDER; CLI-85-8, 21 NRC 1111 (1985)
SPECIAL PROCEEDING; May 29, 1985; MEMORANDUM AND ORDER; CLI-85-9, 21 NRC 1118 (1985)
- THREE MILE ISLAND NUCLEAR STATION, Unit 1; Docket No. 50-289-SP (ASLBP No. 79-429-09-SP) (Restart Remand on Management-Training)
SPECIAL PROCEEDING; May 3, 1985; PARTIAL INITIAL DECISION ON THE REMANDED ISSUE OF LICENSED-OPERATOR TRAINING AT TMI-1; LBP-85-15, 21 NRC 1409 (1985)
SPECIAL PROCEEDING; June 24, 1985; MEMORANDUM AND ORDER APPROVING PLAN FOR REVISING LICENSED-OPERATOR TRAINING PROGRAM; LBP-85-21, 21 NRC 1751 (1985)
- THREE MILE ISLAND NUCLEAR STATION, Units 1 and 2; Docket Nos. 50-289, 50-320
PETITION FOR RELIEF; April 4, 1985; MEMORANDUM AND ORDER; CLI-85-4, 21 NRC 561 (1985)
REQUEST FOR ACTION; January 15, 1985; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; DD-85-1, 21 NRC 263 (1985)
- TROJAN NUCLEAR PLANT; Docket No. 50-344-OLA
OPERATING LICENSE AMENDMENT; January 10, 1985; MEMORANDUM AND ORDER; ALAB-796, 21 NRC 4 (1985)
- WATERFORD STEAM ELECTRIC STATION, Unit 3; Docket No. 50-382-OL
OPERATING LICENSE; January 17, 1985; MEMORANDUM AND ORDER; ALAB-797, 21 NRC 6 (1985)
OPERATING LICENSE; March 15, 1985; MEMORANDUM AND ORDER; CLI-85-3, 21 NRC 471 (1985)
OPERATING LICENSE; March 22, 1985; MEMORANDUM AND ORDER; ALAB-801, 21 NRC 479 (1985)
OPERATING LICENSE; April 4, 1985; DECISION; ALAB-803, 21 NRC 575 (1985)
- WEST CHICAGO RARE EARTHS FACILITY; Docket No. 40-2061-ML (ASLBP No. 83-495-01-ML)
MATERIALS LICENSE; January 9, 1985; MEMORANDUM AND ORDER; LBP-85-1, 21 NRC 11 (1985)
MATERIALS LICENSE; January 23, 1985; MEMORANDUM AND ORDER; LBP-85-3, 21 NRC 244 (1985)
- WOLF CREEK GENERATING STATION, Unit 1; Docket No. 50-482-OL
OPERATING LICENSE; February 5, 1985; DECISION; ALAB-798, 21 NRC 357 (1985)
- ZION STATION, Unit 1; Docket No. 50-295
IMMEDIATE ACTION REQUEST; January 23, 1985; DIRECTOR'S DECISION UNDER 10 C.F.R. § 2.206; DD-85-2, 21 NRC 270 (1985)

