

NUCLEAR REGULATORY COMMISSION ISSUANCES

OPINIONS AND DECISIONS OF THE NUCLEAR REGULATORY COMMISSION WITH SELECTED ORDERS

July 1, 1977 — September 30, 1977

**Volume 6
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PREFACE

This is the fifth volume of issuances (pages 1 - 524) of the Nuclear Regulatory Commission and its Atomic Safety and Licensing Appeal Boards and Atomic Safety and Licensing Boards. It covers the period from July 1, 1977 to September 30, 1977.

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. The Commission may, however, on its own motion, review various decisions or actions of Appeal Boards.

This volume is made up of reprinted pages from the three monthly issues of the Nuclear Regulatory Commission publication *Nuclear Regulatory Commission Issuances (NRCI)* for this period, arranged in chronological order. 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, and Atomic Safety and Licensing Boards-LBP.

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

PACIFIC GAS AND ELECTRIC COMPANY

(Diablo Canyon Nuclear Power Plant, Units 1 and 2), Dockets 50-275 OL and 50-323 OL Order, CLI-77-23, September 15, 1977	455
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al.	
(Seabrook Station, Units 1 and 2), Dockets 50-443 and 50-444 Order, CLI-77-22, September 15, 1977	451

Issuances of the Atomic Safety and Licensing Appeal Boards

ATLANTIC CITY ELECTRIC COMPANY, et al.

(Hope Creek Generating Station, Units 1 and 2), Dockets 50-354 and 50-355 Memorandum and Order, ALAB-426, August 8, 1977	206
Decision, ALAB-429, August 24, 1977	229

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY, et al.

(Davis-Besse Nuclear Power Station, Units 1, 2, and 3), Dockets 50-346A, 50-500A, and 50-501A and (Perry Nuclear Power Plant, Units 1 and 2), Dockets 50-440A and 50-441A Memorandum and Order, ALAB-430, September 2, 1977	457
---	-----

DUKE POWER COMPANY

(Catawba Nuclear Station, Units 1 and 2), Dockets 50-413 and 50-414 Memorandum and Order, ALAB-426, August 8, 1977	206
(Perkins Nuclear Station, Units 1, 2, and 3), Dockets STN 50-488, STN 50-489, and STN 50-490 Decision, ALAB-431, September 8, 1977	460
Memorandum and Order, ALAB-433, September 16, 1977	469

DUQUESNE LIGHT COMPANY, et al.

(Beaver Valley Power Station, Units 1 and 2), Dockets 50-334 and 50-412 Memorandum and Order, ALAB-426, August 8, 1977	206
--	-----

EXXON NUCLEAR COMPANY, INC.

(Nuclear Fuel Recovery and Recycling Center), Docket 50-564 Memorandum and Order, ALAB-425, August 3, 1977	199
--	-----

FLORIDA POWER AND LIGHT COMPANY

(St. Lucie Nuclear Power Plant, Unit 2), Docket 50-389A Decision, ALAB-420, July 12, 1977	8
---	---

(St. Lucie Nuclear Power Plant, Unit 1), Docket 50-335A <i>and</i> (Turkey Point Plant, Units 3 and 4), Dockets 50-250A and 50-251A	
Decision, ALAB-428, August 23, 1977	221
GEORGIA POWER COMPANY	
(Alvin W. Vogtle Nuclear Plant, Units 1 and 2), Dockets 50-424 and 50-425	
Memorandum and Order, ALAB-426, August 8, 1977	206
KANSAS GAS AND ELECTRIC COMPANY	
KANSAS CITY POWER AND LIGHT COMPANY	
(Wolf Creek Generating Station, Unit 1), Docket STN 50-482	
Memorandum and Order, ALAB-424, July 29, 1977	122
METROPOLITAN EDISON COMPANY, et al.	
(Three Mile Island Nuclear Station, Units 1 and 2), Dockets 50-289 and 50-320	
Memorandum and Order, ALAB-426, August 8, 1977	206
NORTHERN STATES POWER COMPANY	
(Prairie Island Nuclear Generating Plant, Units 1 and 2), Dockets 50-282 and 50-306	
Memorandum and Order, ALAB-419, July 12, 1977	3
Memorandum, ALAB-427, August 15, 1977	212
PENNSYLVANIA POWER AND LIGHT COMPANY	
(Susquehanna Steam Electric Station, Units 1 and 2), Dockets 50-387 and 50-388	
Memorandum and Order, ALAB-426, August 8, 1977	206
PHILADELPHIA ELECTRIC COMPANY	
(Peach Bottom Atomic Power Station, Units 2 and 3), Dockets 50-277 and 50-278 <i>and</i>	
(Limerick Generating Station, Units 1 and 2), Dockets 50-352 and 50-353	
Memorandum and Order, ALAB-426, August 8, 1977	206
POWER AUTHORITY OF THE STATE OF NEW YORK	
(Greene County Nuclear Plant), Docket 50-549	
Memorandum and Order, ALAB-434, September 16, 1977	471
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al.	
(Seabrook Station, Units 1 and 2), Dockets 50-443 and 50-444	
Memorandum and Order, ALAB-421, July 18, 1977	25
Decision, ALAB-422, July 26, 1977	33
Memorandum and Order, ALAB-423, July 26, 1977	115
PUBLIC SERVICE ELECTRIC AND GAS COMPANY	
(Salem Nuclear Generating Station, Units 1 and 2), Dockets 50-272 and 50-311	
Memorandum and Order, ALAB-426, August 8, 1977	206
PUBLIC SERVICE ELECTRIC AND GAS COMPANY	
ATLANTIC CITY ELECTRIC COMPANY	
(Hope Creek Generating Station, Units 1 and 2),	

Dockets 50-354 and 50-355	
Memorandum and Order, ALAB-426, August 8, 1977	206
Decision, ALAB-429, August 24, 1977	229
SOUTHERN CALIFORNIA EDISON COMPANY	
SAN DIEGO GAS AND ELECTRIC COMPANY	
(San Onofre Nuclear Generating Station, Units 2 and 3), Dockets 50-361 and 50-362	
Decision, ALAB-432, September 14, 1977	465
TENNESSEE VALLEY AUTHORITY	
(Hartsville Nuclear Plant, Units 1A, 2A, 1B, and 2B), Dockets STN 50-518, STN 50-519, STN 50-520, and STN 50-521	
Memorandum and Order, ALAB-418, July 11, 1977	1
Memorandum and Order, ALAB-426, August 8, 1977	206
THE TOLEDO EDISON COMPANY	
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY	
(Davis-Besse Nuclear Power Station, Units 1, 2, and 3), Dockets 50-346A, 50-500A, and 50-501A	
Memorandum and Order, ALAB-430, September 2, 1977	457
UNION ELECTRIC COMPANY	
(Callaway Plant, Units 1 and 2), Dockets STN 50-483 and STN 50-486	
Memorandum and Order, ALAB-426, August 8, 1977	206
VERMONT YANKEE NUCLEAR POWER CORPORATION	
(Vermont Yankee Nuclear Power Station), Docket 50-271	
Memorandum and Order, ALAB-421, July 18, 1977	25
 Issuances of the Atomic Safety and Licensing Boards	
ASSOCIATED ELECTRIC COOPERATIVE, INC., et al.	
(Black Fox Station, Units 1 and 2), Dockets STN 50-556 and STN 50-557	
Order Ruling on Motions for Summary Disposition and Listing Board Questions, LBP-77-46, July 20, 1977	167
CONSUMERS POWER COMPANY	
(Midland Plant, Units 1 and 2), Dockets 50-329 and 50-330	
Order, LBP-77-57, September 23, 1977	482
DUKE POWER COMPANY	
(Cherokee Nuclear Station, Units 1, 2, and 3), Dockets STN 50-491, STN 50-492, and STN 50-493	
Supplemental Partial Initial Decision, LBP-77-47, July 26, 1977	191
EXXON NUCLEAR COMPANY, INC.	
(Nuclear Fuel Recovery and Recycling Center), Docket 50-564	

Order Ruling on Petitions for Leave to Intervene, LBP-77-59, September 30, 1977	518
JERSEY CENTRAL POWER AND LIGHT COMPANY	
(Oyster Creek Nuclear Generating Station), Docket 50-219	
Memorandum and Order, LBP-77-58, September 28, 1977	500
LONG ISLAND LIGHTING COMPANY	
(Shoreham Nuclear Power Station, Unit 1), Docket 50-322	
Memorandum and Order, LBP-77-50, August 1, 1977	261
NORTHERN STATES POWER COMPANY	
(Prairie Island Nuclear Generating Plant, Units 1 and 2), Dockets 50-282 and 50-306	
Order, LBP-77-42, July 5, 1977	131
Initial Decision, LBP-77-51, August 12, 1977	265
Order, LBP-77-55, September 8, 1977	473
OFFSHORE POWER SYSTEMS	
(Manufacturing License for Floating Nuclear Power Plants), Docket STN 50-437	
Memorandum and Order Re: Motions to Amend and Expand Contentions, LBP-77-48, August 1, 1977	249
PACIFIC GAS AND ELECTRIC COMPANY	
(Stanislaus Nuclear Project, Unit 1), Docket 50-564A	
Order Denying Motion of Pacific Gas and Electric Company (Applicant) for Summary Disposition, LBP-77-45, July 8, 1977	159
PACIFIC POWER AND LIGHT COMPANY, et al.	
(Skagit Nuclear Power Project, Units 1 and 2), Dockets STN 50-522 and STN 50-523	
Initial Decision Granting Pre-LWA Authority for Road Construction Except for a Zone 150 Feet West of Weisman Creek, and Except for the Areas Requiring Tree Removal and Denying Pre-LWA Authority for Projected Sewer Line, LBP-77-44, July 7, 1977	141
Order Denying Petition for Reconsideration of July 7, 1977, Initial Decision, LBP-77-56, September 15, 1977	478
PORTLAND GENERAL ELECTRIC COMPANY, et al.	
(Skagit Nuclear Power Project, Units 1 and 2), Dockets STN 50-522 and STN 50-523	
Initial Decision Granting Pre-LWA Authority for Road Construction Except for a Zone 150 Feet West of Weisman Creek, and Except for the Areas Requiring Tree Removal, and Denying Pre-LWA Authority for Projected Sewer Line, LBP-77-44, July 7, 1977	141
Order Denying Petition for Reconsideration of July 7, 1977, Initial Decision, LBP-77-56, September 15, 1977	478

PUBLIC SERVICE COMPANY OF INDIANA, INC.	
(Marble Hill Nuclear Generating Station, Units 1 and 2), Dockets STN 50-546 and STN 50-547	
Partial Initial Decision Limited Work Authorization, LBP-77-52, August 22, 1977	294
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al.	
(Seabrook Station, Units 1 and 2), Dockets 50-443 and 50-444	
Supplemental Initial Decision (Construction Permit), LBP-77-43, July 7, 1977	134
PUBLIC SERVICE COMPANY OF OKLAHOMA	
ASSOCIATED ELECTRIC COOPERATIVE, INC.	
WESTERN FARMERS ELECTRIC COOPERATIVE, INC.	
(Black Fox Station, Units 1 and 2), Dockets STN 50-556 and STN 50-557	
Order Ruling on Motions for Summary Disposition and Listing Board Questions, LBP-77-46, July 20, 1977	167
PUGET SOUND POWER AND LIGHT COMPANY	
PORTLAND GENERAL ELECTRIC COMPANY	
PACIFIC POWER AND LIGHT COMPANY	
THE WASHINGTON WATER POWER COMPANY	
(Skagit Nuclear Power Project, Units 1 and 2), Dockets STN 50-522 and STN 50-523	
Initial Decision Granting Pre-LWA Authority for Road Construction Except for a Zone 150 Feet West of Weisman Creek, and Except for the Areas Requiring Tree Removal, and Denying Pre-LWA Authority for Projected Sewer Line, LBP-77-44, July 7, 1977	141
Order Denying Petition for Reconsideration of July 7, 1977, Initial Decision, LBP-77-56, September 15, 1977	478
ROCHESTER GAS AND ELECTRIC CORPORATION	
(Sterling Power Project, Nuclear Unit 1), Docket 50-485	
Initial Decision, LBP-77-53, August 26, 1977	350
VERMONT YANKEE NUCLEAR POWER CORPORATION	
(Vermont Yankee Nuclear Power Station), Docket 50-271	
Initial Decision Approving Amendment to Operating License to Authorize Enlargement of Spent Fuel Pool Storage, LBP-77-54, August 30, 1977	436
WASHINGTON PUBLIC POWER SUPPLY SYSTEM	
(WPPSS Nuclear Project Nos. 3 and 5), Dockets STN 50-508 and STN 50-509	
Memorandum and Order, LBP-77-49, August 1, 1977	257
THE WASHINGTON WATER POWER COMPANY, et al.	
(Skagit Nuclear Power Project, Units 1 and 2), Dockets STN 50-522 and STN 50-523	

Initial Decision Granting Pre-LWA Authority for Road Construction Except for a Zone 150 Feet West of Weisman Creek, and Except for the Areas Requiring Tree Removal, and Denying Pre-LWA Authority for Projected Sewer Line, LBP-77-44, July 7, 1977	141
Order Denying Petition for Reconsideration of July 7, 1977, Initial Decision, LBP-77-56, September 15, 1977	478
WESTERN FARMERS ELECTRIC COOPERATIVE, INC., et al. (Black Fox Station, Units 1 and 2), Dockets STN 50-556 and STN 50-557	
Order Ruling on Motions for Summary Disposition and Listing Board Questions, LBP-77-46, July 20, 1977	167

INDEXES

Case Name Index	I-1
Legal Citations Index	I-5
Cases	I-5
Regulations	I-13
Statutes	I-17
Subject Index	I-19
Facility Index	I-35

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Jerome E. Sharfman

In the Matter of

Docket Nos. STN 50-518
50-519
50-520
50-521

TENNESSEE VALLEY AUTHORITY

(Hartsville Nuclear Plant
Units 1A, 2A, 1B and 2B)

July 11, 1977

The Appeal Board denies the applicant's petition to reconsider and to delete portions of ALAB-409, 5 NRC 1391 (June 7, 1977).

Messrs. Herbert S. Sanger, Jr., General Counsel, David G. Powell, Assistant General Counsel, and Alvin H. Gutterman, Knoxville, Tennessee, for the applicant, Tennessee Valley Authority.

MEMORANDUM AND ORDER

The Tennessee Valley Authority has petitioned for reconsideration of ALAB-409, 5 NRC 1391 (June 7, 1977), in which we denied its motion to strike the intervenors' exceptions to the initial decision authorizing the issuance of construction permits for the four units of the Hartsville facility. LBP-77-28, 5 NRC 1081 (April 28, 1977). The petition does not seek a change in the result but, rather, simply the deletion of those portions of ALAB-409 which criticized the conduct of TVA counsel. We are told that the criticism was unwarranted because it was based upon a misapprehension of the precise nature of the position which TVA was endeavoring to advance in the motion to strike the exceptions.

We have carefully compared what TVA now maintains was its intended line of argument with that which was said by it in its motion to strike. Giving counsel the benefit of all possible doubt (as is appropriate in the circumstances), we can find nothing in the motion to strike which might have suggested to a

reasonable reader that TVA was espousing therein the theories which its reconsideration petition has developed at some length. Prior filings of TVA counsel in this and other nuclear licensing proceedings reflect that they are well able to express their client's views on legal issues with sufficient clarity that the central points being made are not totally obscured. We are thus left with the conviction that what confronts us is in reality not an elaboration upon, or refinement of, arguments previously advanced but, instead, an entirely new thesis tailored to meet those comments in ALAB-409 which counsel wish to have deleted. For this reason, reconsideration is *denied*.¹

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

¹ Because TVA does not ask us to alter the result reached in ALAB-409 (*i.e.*, the denial of the motion to strike the intervenors' exceptions), it is unnecessary to dwell here upon the merits of its new arguments. Suffice it to say that we remain unpersuaded that the exceptions offend the strictures of 10 CFR § 2.762(a).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Dr. W. Reed Johnson

In the Matter of

Docket Nos. 50-282
50-306

NORTHERN STATES POWER
COMPANY

(Spent Fuel Pool
Modification)

(Prairie Island Nuclear Generating
Plant, Units 1 and 2)

July 12, 1977

Upon applicant's motion for directed certification under 10 CFR §2.718(i), seeking resolution as to whether a licensing board has "authority to grant interim authority for those portions of operating license amendment activities which do not involve matters in controversy," the Appeal Board holds that the Licensing Board's ruling in LBP-77-42, 6 NRC 131 (July 5, 1977), has rendered the question academic insofar as the instant proceeding is concerned.

Motion for directed certification denied.

RULES OF PRACTICE: APPELLATE PROCEDURE

The Appeal Board has the power to direct the certification of legal issues raised in proceedings still pending before licensing boards. 10 CFR §2.718(i); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-271, 1 NRC 478 (1975).

RULES OF PRACTICE: APPELLATE PROCEDURE

The Appeal Board will not direct certification of issues that have been rendered academic by subsequent developments.

Messrs. Gerald Charnoff and Jay E. Silberg, Washington,
D. C., for the licensee, Northern States Power Company.

Ms. Jocelyn F. Olson and Mr. John-Mark Stensvaag, Roseville, Minnesota, for the intervenor, Minnesota Pollution Control Agency.

Ms. Ellen B. Silberstein for the Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

1. The Licensing Board has before it the application of the Northern States Power Company (licensee) for an amendment to its operating licenses for Units 1 and 2 of the Prairie Island Nuclear Generating Station. The amendment would enable the licensee to undertake a modification to the facility's spent fuel storage pool; more specifically, to replace the existing spent fuel storage racks having a capacity for 198 fuel assemblies with new storage racks having a capacity for 687 assemblies. In addition to the licensee, the parties to the proceeding are the Minnesota Pollution Control Agency (MPCA) and the NRC staff. MPCA filed a successful petition for leave to intervene in response to the published notice advising that the Commission was giving consideration to the approval of the proposed modification. 42 Fed. Reg. 2140 (January 10, 1977).

The spent fuel pool is divided into two compartments, connected by a transfer canal through which fuel assemblies may be shifted from one compartment to the other. On April 25, 1977, three days after the prehearing conference was held, the licensee moved the Licensing Board for the immediate issuance of an order authorizing the Director of Nuclear Reactor Regulation to permit the commencement of the work necessary to enlarge the spent fuel capacity of the smaller of the two compartments. The motion pointed out that the staff had already evaluated and given its approval to the proposed modification and that, but for the intervention of MPCA, no hearing would have been required. As the licensee construed MPCA's filings, that agency was primarily concerned "with the situation as it will exist after fuel has been placed into the expanded storage capacity, or at most, after the racks have been installed in the small pool" — and not "about the process of installing the new storage racks." In these circumstances, the licensee maintained, it was within the Board's power to grant the requested relief in advance of the evidentiary hearing on the proposed modification.

Both MPCA and the NRC staff opposed the motion. Without explicitly stating whether and to what extent its concerns related to the installation of new racks in the small compartment, MPCA expressed a strong objection to any part of the project being allowed to proceed before the Board had completed its review of the entire project. For its part, the staff agreed with the licensee that there were substantial practical reasons why the new racks should be promptly

installed in the small compartment. Nonetheless, it took the position that MPCA's objection, coupled with the fact that the licensee "had conceded that MPCA Contention 17 could be 'marginally construed' as" being related to installation of the racks in the small pool,¹ meant that the Licensing Board would first have to make "favorable findings on those matters in controversy" relating to that work—either following an evidentiary hearing or by way of summary disposition.

On May 13, 1977, the Licensing Board entered an order denying the motion. LBP-77-33, 5 NRC 1267. It concluded, without regard to whether there was an existent and unresolved controversy respecting the portion of the proposed modification in question, that the Commission had neither explicitly nor implicitly authorized licensing boards to grant the relief sought.

After unsuccessfully attempting to persuade the Licensing Board to refer its ruling under 10 CFR §2.730(f), the licensee promptly moved before us for directed certification. 10 CFR §2.718(i); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-271, 1 NRC 478 (1975). As framed by the licensee, the question it sought to have certified was whether a licensing board has the "authority to grant interim authority for those portions of operating license amendment activities which do not involve matters in controversy." We were told that this question was both novel and of recurring importance "given the multitude of license amendments which may become the subject of contested hearings." Additionally, the licensee maintained, both its interests and the public interest would suffer if the question were not definitively decided at this interlocutory stage.

2. The licensee's formulation of the question decided against it in the Licensing Board's May 13 order was fair enough. As previously noted, that Board did not hinge its determination of a lack of authority to grant the requested relief upon a finding that the MPCA had put into contest any issue relating to the installation of new racks in the small compartment—rather it squarely held that in no circumstances do licensing boards have such authority. Further, as also seen, the MPCA had not grounded its opposition to the licensee's motion upon the existence of any such contest. In these circumstances, it was perfectly reasonable for the licensee to proceed before us on the assumption that, were we to answer the question it sought to have certified differently than had the Licensing Board, the staff would be given the green light to allow installation of the racks in the small compartment to move forward.

But developments occurring since the certification motion was filed (on June 3) have overtaken that motion and rendered the question raised therein

¹ Contention 17 reads:

The Licensee has failed to supply sufficient information to assess the occupational radiation dosage to workers who will be engaged in the activity of rearranging stored spent fuel and installing new spent fuel storage racks.

academic insofar as this proceeding is concerned. The evidentiary hearing on the entire proposed modification took place between June 14 and June 17. Three days after it ended, the licensee filed a new motion below in which it asked the Board (1) to divide its license amendment application into two parts; and (2) to declare that the first part (relating exclusively to installation of new racks in the small compartment) was uncontested. That motion was denied by the Board in an order dated July 5. LBP-77-42, 6 NRC 131. The basis for the denial was that there were in fact at least two matters in controversy which related to the installation of the racks in the small compartment: (1) the "occupational exposures of the workers who would be involved in that activity"; and (2) the necessity for the staff to prepare an environmental impact statement before the proposed modifications were approved. In short, there has now been a determination of the Licensing Board which strips the question brought to us by the licensee of an essential ingredient—*i.e.*, the assumed absence of a controversy over the portion of the proposed modification respecting which early approval to begin work is desired.

The judgment of a licensing board with regard to what is or is not in controversy in a proceeding being conducted by it is entitled to great respect; in any event, the Board's assessment in this case is beyond serious challenge. This being so, the certification motion must be denied. We are not in the business of deciding abstract questions. Moreover, given the existence of a contest relating to rack installation in the small compartment, there is no room for doubt that the *result* reached by the Licensing Board in its May 13 order was correct. Indeed, we do not think that the licensee would contend otherwise; once again, since the outset its endeavors to obtain early approval to start work in the small compartment rested on the articulated premise of a want of controversy.

3. One further observation is warranted. The Licensing Board has ruled on the interlocutory matters coming before it with commendable dispatch. We trust that it will similarly approach the task of deciding the merits of the case. At this juncture, we do not know (and would not presume to speculate upon) whether the record adduced below, judged in the light of governing legal doctrine, calls for approval of the expansion of the capacity of the spent fuel pool. If it does, however, there would appear to be safety reasons—in addition to the economic and plant reliability consideration relied upon the licensee—why that approval should not be unduly delayed; *i.e.*, why the installation of the new racks in the two compartments should proceed well before Unit 2 comes up for refueling in the fall. We see no present need to elaborate upon the point because we have every confidence that the Board below will act with all possible expedition.

The motion for directed certification is *denied*.

It is so ORDERED.

**FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD**

**Margaret E. Du Flo
Secretary to the Appeal Board**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Jerome E. Sharfman, Chairman
Michael C. Farrar
Richard S. Salzman

In the Matter of

Docket No. 50-389A

FLORIDA POWER & LIGHT COMPANY

(St Lucie Nuclear Power Plant,
Unit No. 2)

July 12, 1977

Applicant appeals the Licensing Board's decision (LBP-77-23, 5 NRC 789 (1977)) granting the intervenors' petition for leave to intervene out-of-time and ordering that an antitrust hearing be conducted. The Appeal Board holds that the Licensing Board's determination that good cause existed for the untimely intervention petition was not abusive of its discretion.

Decision affirmed.

ATOMIC ENERGY ACT: ANTITRUST JURISDICTION

The Commission must hold a hearing on whether licensing construction of a nuclear power facility "would create or maintain a situation inconsistent with the antitrust laws" if the Attorney General so recommends or an interested party files a timely petition to intervene. Atomic Energy Act, Section 105c; 42 U.S.C. §2135(c).

ATOMIC ENERGY ACT: ANTITRUST JURISDICTION

When an antitrust hearing under Section 105c is being conducted, the Commission may not issue a permit to construct the nuclear facility until the antitrust proceeding is completed, unless the parties consent to its issuance.

RULES OF PRACTICE: NONTIMELY INTERVENTION PETITIONS

Licensing Boards have broad discretion in ruling on whether to grant untimely intervention petitions under 10 CFR §2.714(a). *Nuclear Fuel Services*,

Inc. (West Valley Reprocessing Plant), CLI-75-4, 1 NRC 273 (1975); Pacific Gas and Electric Co. (Stanislaus Nuclear Project, Unit No. 1), LBP-77-26, 5 NRC 1017, affirmed, ALAB-400, 5 NRC 1175 (1977).

EVIDENCE: QUANTUM OF PROOF

In ruling upon appeals from licensing board decisions granting intervention, credit must generally be given to the facts recounted in the papers supporting the petition to intervene to the extent they deal with the merits of antitrust issues. Insofar as the facts relate to the excuse for untimely filing, where they are not controverted by opposing affidavits, they must be taken as true.

EVIDENCE: ARGUMENTS OF COUNSEL

Arguments of counsel are not evidence and may not be accepted as such.

RULES OF PRACTICE: NONTIMELY INTERVENTION PETITIONS

A satisfactory explanation for failure to file on time does not automatically warrant the acceptance of a late-filed intervention petition. In addition, the four factors specified in 10 CFR §2.714(a) must be considered. However, where the lateness has been satisfactorily explained, a lesser demonstration on these factors is necessary.

Messrs. J. A. Bouknight, Jr., Washington, D.C., and John E. Mathews, Jr., Jacksonville, Florida, argued the cause and filed a brief for the applicant, Florida Power and Light Company, *appellant*.

Mr. Robert A. Jablon, Washington, D.C., argued the cause for the intervenors, Fort Pierce Utilities Authority, *et al.*, *appellees*; with him on the brief was Mr. David A. Giacalone, Washington, D.C.

Mr. Lee Scott Dewey argued the cause and filed a brief for the Nuclear Regulatory Commission staff.

DECISION

Opinion of the Board by Mr. Salzman, in which Messrs. Sharfman and Farrar join:

Florida Power & Light Company ("the company" or "FP&L") applied in 1973 for permission to build a second nuclear-powered generating station at its St. Lucie site. The site is on Hutchinson Island, which lies in the Atlantic Ocean off the east coast of Florida south of the City of Fort Pierce. Twenty-one Florida municipalities or municipal utility commissions and the Florida Municipal Utilities Association jointly petitioned the Commission in 1976 for an antitrust hearing on the St. Lucie 2 application and for leave to intervene out-of-time in that hearing.¹ The Licensing Board found good cause for the municipalities' failure to file on time and held that an antitrust hearing was warranted. Accordingly, it ordered one conducted, with petitioners as joint intervenors. LBP-77-23, 5 NRC 789 (1977).² The company appeals.³

I

Under Section 105c of the Atomic Energy Act of 1954, as amended, 42 U.S.C. §2135(c), a hearing on whether licensing construction of a nuclear power facility "would create or maintain a situation inconsistent with the antitrust laws" is called for if the Attorney General so recommends or an interested party requests one and files a timely petition to intervene.⁴ When an antitrust hearing is convened, a permit to construct the project may not be awarded without the parties' consent until the proceedings are completed.⁵

The Commission's practice—embodied in its rules and reflective of Congressional purpose—is to seek the Attorney General's advice early on and to notice the opportunity for interested persons to petition for leave to intervene and request a hearing on the project's antitrust aspects promptly after his advice is

¹ The Petitioners were the Fort Pierce Utilities Authority of the City of Fort Pierce, the Gainesville-Alachua County Regional Electric Water and Sewer Utilities, the Lake Worth Utilities Authority, the Utilities Commission of the City of New Smyrna Beach, the Orlando Utilities Commission, the Sebring Utilities Commission, and the Cities of Alachua, Bartow, Bushnell, Chattahoochee, Daytona Beach, Fort Meade, Key West, Leesburg, Mount Dora, Newberry, Quincy, St. Cloud, Tallahassee and Williston, Florida. The cities of Bushnell, Chattahoochee, and Williston subsequently withdrew from the proceeding.

² The Licensing Board's decision also dealt with petitions to intervene and requests for antitrust hearings filed by these same municipalities in connection with three of the company's operating power reactors: St. Lucie, No. 1, and Turkey Point, Units 3 and 4. That aspect of the decision is not involved in this appeal.

³ The company's interlocutory appeal is authorized by Section 2.714a of the Commission's Rules of Practice, 10 CFR §2.714a.

⁴ *Kansas Gas and Electric Company* (Wolf Creek, Unit No. 1), ALAB-279, 1 NRC 559 (1975) ("Wolf Creek I").

⁵ *Toledo Edison Co.* (Davis-Besse, Unit 1), ALAB-323, 3 NRC 331 (1976); *Louisiana Power and Light Co.* (Waterford Station, Unit 3), CLI-73-7, 6 AEC 48, 50 fn. 2 (1973).

received. The underlying idea is to afford sufficient time for completion of any antitrust proceedings before the construction permit is ripe for issuance.⁶ (A proposed project's health, safety and environmental aspects are considered at a separate hearing.)⁷ To that end, when the Commission publishes the Attorney General's advice and notices the opportunity for antitrust hearing in the Federal Register, it limits the time for filing intervention petitions as a matter of right to a period of thirty days after publication.⁸

Failure to petition within that thirty-day period is not necessarily fatal to a request for an antitrust hearing. Until the Commission elects to review a decision authorizing a construction permit or the time specified in the rules for it to undertake that review expires,⁹ a licensing board retains jurisdiction to grant late intervention petitions for "good cause" within the meaning of 10 CFR §2.714(a).¹⁰ Consequently, even where an acceptable excuse for failure to file on time is not forthcoming, a licensing board has discretion to allow intervention if other considerations warrant it doing so.¹¹

II

The St. Lucie 2 construction permit application was filed on May 14, 1973, and the Attorney General's advice respecting its antitrust ramifications was

⁶ See *Davis-Besse*, *supra*, ALAB-323, 3 NRC at 338-342; *Public Service Co of Indiana, Inc.* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-316, 3 NRC 167, 170-71 (1976); 10 CFR § 2.104(d); 10 CFR Part 2, App. A, § X(e).

⁷ See *Marble Hill*, *supra*, ALAB-316, 3 NRC at 167.

⁸ See Section 105c(5), 42 U.S.C. § 2135(c)(5), and 10 CFR Part 2, App. A, § X(d).

⁹ *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), ALAB-381, 5 NRC 582, *review declined*, *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2) March 31, 1977 (unpublished); see CLI-77-13, 5 NRC 1303 (June 15, 1977).

¹⁰ The regulation provides in pertinent part:

§ 2.714 Intervention

(a) . . . Nontimely filings will not be entertained absent a determination by the Commission, the presiding officer or the atomic safety and licensing board designated to rule on the petition and/or request that the petitioner has made a substantial showing of good cause for failure to file on time, and with particular reference to the following factors. . .

(1) The availability of other means whereby the petitioner's interest will be protected.

(2) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.

(3) The extent to which petitioner's interest will be represented by existing parties.

(4) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

¹¹ *Nuclear Fuel Services, Inc.* (West Valley Reprocessing Plant), CLI-75-4, 1 NRC 273, 275 (1975); *Pacific Gas and Electric Co.* (Stanislaus Nuclear Project, Unit No. 1), LBP-77-26, 5 NRC 1017, *affirmed*, ALAB-400, 5 NRC 1175 (1977).

rendered on November 14, 1973. Notice of that advice and of opportunity to petition for an antitrust hearing and for leave to intervene was duly published by the Commission on November 21, 1973. 38 Fed. Reg. 32159. That notice also fixed a December 28, 1973, deadline for filing intervention petitions.

The municipalities' petition was filed 31 months later on August 6, 1976, and was referred in the course of Commission practice to a Licensing Board for consideration. Before that Board, both the company and the staff opposed the petition (the staff has since changed sides and now supports intervention). In doing so, however, neither party challenged the Board's jurisdiction to entertain the petition or to grant the relief requested. Nor, for purposes of opposing intervention, did the other parties dispute the municipalities' standing or the legal sufficiency of their antitrust contentions.¹² The only issue presented to the Licensing Board was whether it should allow late intervention under the standards of 10 CFR §2.714. After briefing and argument, that Board overruled the company and staff objections and granted the petition.

Although the Licensing Board touched on all the relevant considerations, three appear pivotal to its decision to allow intervention. The first was its conclusion—based largely on uncontradicted affidavits supporting the intervention petition—that the Orlando Utilities Commission (one of the utilities petitioning to intervene)¹³ had good excuse for not filing its St. Lucie intervention petition until 1976. This rests on findings that Orlando forebore intervening in 1973 because misled by the company into believing itself promised an opportunity to participate in certain other nuclear power plants the company was planning, and intervened in 1976 when the company announced it would not allow such participation. The second was a shortage of fossil fuel beginning in late 1973 and

¹²In substance, the petition alleges that the company has a monopoly over nuclear power in Florida and has sought to reduce competition by acquiring competitors, refusals to deal and illegal territorial restrictions. See LBP-77-23, 5 NRC at 792. See also App. Tr. 148. The company denies the truth of those allegations. That question, of course, was not before the Licensing Board and is not before us. It is a matter for proof about which we intimate no views.

¹³As noted earlier, some 21 municipal utilities joined in the petition. Intervention was sought jointly, all petitioners raising identical contentions and all represented by the same counsel. For purposes of being allowed to intervene late, petitioners' case was presented in terms of the excuses of the Orlando Utilities Commission and those of the City of New Smyrna Beach. The latter were rejected by the Licensing Board. One of the reasons for that rejection, with which we are in essential agreement, was that New Smyrna Beach's grievance is the asserted breach by the company of a St. Lucie 2 license condition, a matter which calls for a proceeding to enforce the condition, not an antitrust hearing. See LBP-77-23, 5 NRC at 795. Inasmuch as the basic antitrust issues to be tried would be the same whether Orlando were allowed to intervene alone or in concert with its Florida brethren, for purposes of this appeal we will assume (as did the Board below) that if Orlando may intervene, the others may follow.

becoming increasingly severe until the petition was filed in 1976, which in the Board's opinion was a good excuse for filing late.¹⁴ The third was the agreement of Orlando and the other intervenors to allowing the St. Lucie 2 construction permit to issue before their antitrust contentions were heard, thereby eliminating any need to hold up construction of that plant pending resolution of those contentions.¹⁵

The Board below in essence treated the latter consideration as tilting the fourth factor under Section 2.714(a)—delay—in intervenors' favor; the remaining three factors—availability of other means to protect intervenors' interests, the extent to which intervenors would aid in developing a sound record, and whether other parties would represent their interests—it considered either neutral or as aiding intervenors.

III

1. In resolving cases coming before us on appeal from rulings on untimely intervention petitions, two considerations play key roles in our deliberations. The first is the Commission's admonition in *West Valley, supra*. There we were told that the intervention regulation (Section 2.714(a) of the Commission's Rules of Practice) was purposely drafted with the idea of "giving the Licensing Boards broad discretion in the circumstances of individual cases." 1 NRC at 275. Consequently, we are free to reverse a decision granting a tardy petition to intervene only where it can fairly be said that the board's action was abusive of the discretion conferred by Section 2.714(a).¹⁶

The second consideration flows from the principle that the propriety of the board's action must be measured against the backdrop of the record made by the parties before it. Accordingly, on appellate review we must generally credit the facts recounted in the papers supporting the petition to intervene to the extent that they deal with the merits of the antitrust issues.¹⁷ Insofar as the facts relate to the excuse for untimely filing, where they are not controverted by opposing affidavits we must take them as true.

Any reluctance we might have had in doing so in this case was dispelled at oral argument. Company counsel there acknowledged that the failure to traverse intervenors' affidavits basically followed from the company's choice of litigation tactics. App. Tr. 114, 158-160. Counsel for the company conceded that we must

¹⁴ 5 NRC at 797.

¹⁵ See fn. 5, *supra*. Permits to construct Unit 2 of the St. Lucie facility were granted by the NRC Director of Nuclear Reactor Regulation on May 2, 1977, and that matter, too, is before us on appeal by different intervenors. See *Florida Power & Light Co. (St. Lucie, Unit No. 2)*, ALAB-404, 5 NRC 1185 (May 31, 1977) (on motion for stay of construction).

¹⁶ The company agrees that this is the test (App. Tr. 125).

¹⁷ *Wolf Creek I, supra*, 1 NRC at 562 and cases there cited at fn. 2.

accept Orlando's affidavits as true for present purposes (App. Tr. 114, 130), but contended that the record as a whole neither justified Orlando's asserted reliance on company "promises"¹⁸ nor excused its failure to intervene in 1973.¹⁹ The Company says that the opposite conclusions drawn from the record by the Licensing Board are unsound and we should, therefore, overturn its decision to grant intervention and an antitrust hearing as arbitrary and abusive of its discretion.

2. We frankly admit that we approached this case with some skepticism. We very much doubted that any petitioner 31 months late could mount a case for intervention, much less a convincing one (a doubt unrelieved by intervenors' prolix brief). The Board below, however, expressly and unequivocally found that "Orlando's claim that it would have submitted a timely intervention petition were it not for [the company's] promises and the proposed license conditions is credible."²⁰ Having no reason to suspect that Board of being any more credulous than ourselves, we perused the record with interest to see the nature of the foundation which underlay what to us seemed a surprising conclusion.

The principal underpinnings we discovered were two affidavits by Mr. Harry C. Luff, Jr., assistant general manager of the Orlando Utilities Commission;²¹ the Attorney General's 1973 and 1976 antitrust advice letters to the Commission, the former respecting St Lucie, Unit 2, and the latter evaluating the company's South Dade proposal; the antitrust conditions placed in the St. Lucie 2 construction permit by the Commission; and certain public announcements by

¹⁸ In its briefs (p. 31) and at oral argument (App. Tr. 133) the company denied making any promises to the municipal utilities, but stated that, because Mr. Bivans of FP&L does not recall some of the statements attributed to him he "won't say Mr. Luff [of the Orlando Utilities Commission] is not telling the truth about that." App. Tr. 160. Be that as it may, arguments of counsel are not evidence and may not be accepted as such. This is no mere technicality. The company's decision not to proffer counter-affidavits left the Board below (and leaves us) to speculate whether the company witness was unwilling to swear to what counsel now represents; or whether the representations said to have been made were heard by many others who would so swear if intervenors' affidavits were challenged; or whether counsel's assertions are indeed the case. Without counter-affidavits, the choice lies between accepting the accuracy of those on file or engaging in the speculation just described. For manifest good reason the law requires the former result. See *Adickes v. Kress & Co.*, 398 U.S. 144, 157-58 (1970); *Daiflon, Inc. v. Allied Chemical Corp.*, 534 F.2d 221, 226-27 (10th Cir. 1976), *certiorari denied*, ___ U.S. ___ (1977); *United States v. Gazda*, 499 F.2d 161, 164 (3rd Cir. 1974).

¹⁹ App. Tr. 130.

²⁰ 5 NRC at 796.

²¹ One affidavit by Mr. Luff dated July 27, 1976, was appended to the petition to intervene in this case; another dated April 13, 1976, was initially filed in NRC Docket No. P-636-A, the antitrust proceeding (now suspended) on the company's proposed South Dade nuclear facility. The latter was resubmitted in this case without apparent objection. To distinguish between them we shall refer in this opinion to the former as the "Luff July affidavit" and to the latter as the "Luff April affidavit."

senior company (*i.e.*, FP&L) officials. Fairly read, these reveal the following relevant facts and circumstances.

(a) Beginning in 1972 and continuing into 1973, officials of Florida public and private electric utilities, including executives of the Orlando Utilities Commission and Florida Power and Light Company, were actively meeting to discuss (*inter alia*) the future joint development in that state of large nuclear generation projects. The company was represented at these meetings by Mr. Ernest L. Bivans, a vice president of FP&L. During the course of those discussions, the possibility was raised of converting the second nuclear unit which the company planned to build at its St. Lucie site into a joint project by several utilities. On behalf of the company, Mr. Bivans objected to doing so because he said that the generating capacity of the St. Lucie 2 project was needed by FP&L for its own system. Mr. Bivans coupled the reason why the St. Lucie 2 plant was inappropriate for joint development with a specific representation that the company was favorably disposed to joint development of other projects. He expressly "assured the other participants at the meetings of Florida Power and Light's willingness to share future generating capacity, both nuclear and nonnuclear."²²

Several of the participating utilities (including Orlando) took up Mr. Bivan's representations. The immediate result was that the series of meetings just described

culminated in an exchange of correspondence initiated by Florida Power and Light on May 1, 1973, as to the interest of Orlando Utilities Commission, Florida Power Corporation and Jacksonville Electric Authority in purchasing capacity from generating units in three alternate expansion plans in the 1979-1982.²³

As did the other utilities mentioned, Orlando responded affirmatively to FP&L's inquiry, particularizing in its letter to FP&L the extent of its intended participation in terms of the generating capacity it desired to acquire.²⁴ The company did not return a written answer to those proposals and in late 1973 Orlando officials followed up their letter with oral inquiries to learn why not. Company representatives explained that the reason "for Florida Power & Light's lack of response was the constitutional prohibition against joint ownership by municipal and investor-owned systems in Florida." The company gave Orlando no other reason for its failure to respond and expressed no change of heart about sharing its next planned nuclear facility with it, were the constitutional obstacle mentioned overcome.²⁵ A move was then afoot in the state legislature to eliminate

²² Luff April affidavit, pp. 3-4.

²³ *Id.* at 4.

²⁴ *Ibid.*

²⁵ *Id.* at 4-5.

that barrier; this was accomplished in 1974 and necessary enabling legislation enacted in 1975.²⁶

(b) Contemporaneously with the events just described—i.e., late 1973—the Attorney General was reviewing the company's St. Lucie 2 application for anti-trust implications. As the Board below observed, that official's recommendation that no antitrust hearing was required was not unconditional. His letter of November 13, 1973, provided in pertinent part that

our antitrust review led us to the following conclusions: (1) [Florida Power & Light Company] is the dominant electric utility in Florida and because of its ownership of transmission, has the power to grant or deny other systems in its area the access to coordination—and thus the nuclear power—needed to compete in bulk power supply and retail distribution markets; (2) there is some indication Applicant's dominance may have been enhanced through conduct inhibiting the competitive opportunities of the smaller systems in its area; and (3) construction and operation of St. Lucie, No. 2, and the sale of power therefrom to meet Applicant's load growth and compete with the smaller systems in its area could create or maintain a situation inconsistent with the antitrust laws if access to nuclear generation were denied those smaller systems.

After further elaborating those concerns, the Attorney General's letter concluded

In view of the consideration Applicant is now giving to the question of access by other entities to nuclear generation, and the probability that participation in St. Lucie, Unit No. 2, will be made available to certain of these entities,⁸ the Department does not at this time recommend an anti-trust hearing. Considering that issuance of the construction permit for St. Lucie, Unit No. 2, is not contemplated until early in 1975, we believe it reasonable to ask the Commission to abide the outcome of Applicant's 90-day consideration prior to ultimately deciding whether or not to hold an antitrust hearing.

⁸In this connection we note also that Applicant will almost certainly apply to the Commission for licenses to construct and operate additional nuclear generation units. Further questions concerning the opportunities of its neighboring systems (including systems other than Homestead, New Smyrna Beach, and Seminole) for access to the benefits of nuclear generation may be ripe for resolution in the antitrust review of such license applications.

(c) The company and the NRC staff thereafter entered into negotiations concerning antitrust conditions appropriate for incorporation in the St. Lucie 2 construction permit, reaching agreement on February 26, 1974. A number of

²⁶*Id.* at 6; Affidavit of O. R. Fagan, April 14, 1976 (see App. Tr. 6, 9-10).

conditions were inserted in the St. Lucie 2 license as a result; the one particularly relevant to the problem before us is number 4. This condition mandated that smaller utilities adjacent to the company's service area be notified when FP&L's next nuclear project "reached the stage of serious planning, but before firm decisions have been made as to the size and the desired completion date of the proposed nuclear unit."²⁷ We do not understand it to be disputed that during the period of which we write, Orlando was aware of the Attorney General's comments, of the proposed licensed conditions, and that the company was planning nuclear plants in addition to St. Lucie, Unit No. 2.²⁸

(d) By letter dated March 31, 1975, the company advised Orlando (and other neighboring utilities) of its plans to develop and install in southern Florida a nuclear power generating facility in the 1100-1300 Mw range. Orlando responded within 2 weeks, apprising the company of its desire to participate in that proposed "South Dade" nuclear plant. Not until March 30, 1976, however, was Orlando told of the company's firm decision against developing South Dade jointly. (The same letter contained a suggestion that the company might be interested in the joint development, at an unspecified future time and at an unspecified site, of some other, yet unplanned, nuclear facility.)²⁹

(e) On April 14, 1976, the Orlando Municipal Utilities Commission and others timely petitioned the Commission for an antitrust hearing on FP&L's South Dade application, seeking as part of its request for relief the right to participate in St. Lucie 2. On August 6, 1976, Orlando (and others) filed the instant petition for a similar hearing and for leave to intervene out-of-time in connection with the St. Lucie 2 application itself.

(f) The foregoing, coupled with the assertion that the fossil fuel crisis was not critical for Florida electric utilities in 1973 but had become so by 1976,³⁰ constitutes Orlando's excuse for not seeking an antitrust hearing on the St. Lucie 2 application in 1973.

3. The Licensing Board, after noting that the company did not challenge Orlando's explanation either directly or factually, accepted the recital as a credible explanation and a satisfactory excuse on Orlando's part for not petitioning to intervene and seeking an antitrust hearing in 1973.³¹ The company takes

²⁷The full condition reads as follows: "4. At a time when licensee plans for the next nuclear generating unit to be constructed after St. Lucie, No. 2, has (*sic*) reached the stage of serious planning, but before firm decisions have been made as to the size and desired completion date of the proposed nuclear unit, licensee will notify all nonaffiliated utility systems with peak loads smaller than licensee's which serve either at wholesale or at retail adjacent to areas served by applicant that licensee plans to construct such nuclear unit."

²⁸ App. Tr. 137; Luff affidavit, p. 4. The comments were published in the Federal Register. 38 Fed. Reg. 32159 (November 21, 1973).

²⁹ Luff July affidavit, p. 1.

³⁰ See, e.g., Luff April affidavit, pp. 2-3.

³¹ LBP-77-23, 5 NRC at 796.

strong issue with that conclusion, arguing in essence that the Board has drawn impermissible inferences from the facts. Succinctly stated, the company's position is, first, that the St. Lucie "license condition was carefully drafted not to commit FP&L in any respect to offer or negotiate participation in its next nuclear unit" but merely to give early notice so that the other utilities would have no future excuse for tardiness in asserting whatever rights to participate they might claim³² and, second, taking everything in Mr. Luff's affidavits as true, no responsible utility executive could have reasonably assumed that Orlando had been promised any right to share in the company's next nuclear plant.³³

After careful study, we are not prepared to say that the Board erred in crediting Orlando's reliance on the company's representations. To be sure, as the company stresses, it never specifically agreed to share South Dade (or any other future nuclear facility) in exchange for Orlando's forbearance from intervention in *St. Lucie 2*. And the condition inserted in its permit to construct St. Lucie 2 required the company to provide early warning of its next planned nuclear plant, not a right to share in its construction. But, viewed from Orlando's perspective, we can see how the company's actions formed a pattern which gave the latter impression.³⁴

Thus, at the close of 1973, when the decision whether to intervene in the St. Lucie 2 application had to be made, the record before us indicates that Orlando would have been aware of the following: (1) active discussions in progress among Florida utility executives looking toward future joint development of large electric power plants; (2) proposed joint development of St. Lucie 2 rejected by FP&L because its planning for that plant had progressed too far; (3) a public representation to a meeting of Florida utility executives by an FP&L vice president that the company was willing to engage in joint development of its future plants, both nuclear and nonnuclear; (4) FP&L was planning additional nuclear capacity; (5) FP&L had, as a followup on the discussions mentioned, solicited information from Orlando about how large a share of the generating capacity of planned future generating plants it was interested in obtaining; (6)

³² FP&L appellate brief, p. 31 fn. 48.

³³ As counsel phrased it at oral argument (App. Tr. 130): "Orlando Utilities Commission . . . is a big municipal utility company. Mr. Luff is a man in a commercial context who is doing something that seems to me quite incredible. It seems to me incredible that taking as true everything that is in his affidavit, and then looking at the license conditions that were actually adopted and at the rest of the record, that he would have sat back there confident that he would be offered, that he had been promised an opportunity to participate in that plant."

³⁴ The record before us leaves no room for doubt that Orlando did in fact believe this to be the case; the pivotal question as we see it is whether that belief was reasonable in the circumstances presented.

FP&L representatives had told Orlando that only a technical legal barrier (then in the process of removal) was holding up the company's response to Orlando's proposal for joint development of future generating plants; (7) the Attorney General's recommendation against an antitrust hearing on St. Lucie 2 was made in light of (among other things) the company's expressions of willingness to grant other utilities access to nuclear generation from its future facilities, and, finally, (8) this Commission had conditioned the company's permit to construct St. Lucie 2 to require "early warnings" to Orlando and others of FP&L plans for its next nuclear facility.³⁵

To be sure, as the company suggests, public officials more astute (or less trusting) than those running the Orlando Utilities Commission in 1973 might well have sought written confirmation of the company's representations before foregoing intervention in *St. Lucie 2*. That to have done so would have been a wiser course can easily be perceived with the clarity that hindsight provides. But, whatever else may be said of it, Orlando's forbearance did not rest on mere coffee house chatter. Nothing in the record compels the conclusion that it was "incredible" (to use the company's term) for Orlando to have relied on the spoken word of a vice president of Florida Power & Light. To the contrary, such reliance was understandable (if perchance naive) in circumstances where the oral representations were made openly, directed to electric utility executives convened to discuss the subject, and, (from all that appears) from the mouth of one clothed with authority to speak.

Nor should the "early warning" provision of the St Lucie license conditions necessarily have alerted Orlando that the company's expressed willingness to engage in joint development of nuclear power was something less than firm. It is to be recalled that the reason the company itself gave for not wanting to share St. Lucie 2 was that the plant had gotten beyond the early planning stage, with the result that the interests of other utilities could be accommodated only at the expense of FP&L's own (see p. 15, *supra*). Thus, in context, the "early warning" conditions imposed by the Commission (and accepted by the company) were quite consistent, indeed in line with the representations that the company was prepared to allow others access to its next nuclear plant. Certainly that condition gave no express warning to Orlando and we find no fault in the Licensing Board's refusal to interpret it as doing so.³⁶

³⁵ This condition was actually inserted some six weeks after the time to intervene in *St Lucie 2* had expired, but when an application to intervene out-of-time would not have been especially late.

³⁶ At 5 NRC at 796, fn. 5, the Board below said, in reference to this condition: "It is true that the relevant license condition . . . provides only for notification to smaller utilities and does not promise participation in the next nuclear unit. There is no basis upon which

Continued on next page

In short, in light of the considerations described, we cannot say that the Licensing Board abused its discretion in excusing Orlando for failing to petition for intervention in 1973. In reaching this result we do not imply that the company deliberately set about to mislead Orlando (or anyone else) into foregoing intervention. The record does not compel any such conclusion and we do not suggest it to be the case. But certainly as perceived by those on the outside, the company's actions and representations indicated a willingness to join with Florida municipal electric utilities in the development of nuclear power facilities. Had FP&L indicated in 1973 what it made clear in 1976—that it was going to develop its next nuclear power plant unilaterally—we harbor little doubt that Orlando (if not the Attorney General) would have demanded an antitrust hearing on the St. Lucie 2 application at that earlier time.

As Orlando's excuse for nonintervention in *St. Lucie 2* rested on its assumption that it would be allowed reasonable access to the company's next nuclear facility, the excuse continued valid only so long as that assumption remained a reasonable one. In other words, Orlando could not withhold petitioning beyond the point at which it became manifest that FP&L would not share development of South Dade with it. The record, however, indicates that the company made a firm decision against developing South Dade jointly only in March of 1976, or if made earlier, that it did not disclose it before then. This is the clear thrust of the Attorney General's antitrust advice letter of March 2, 1976, about that proposed nuclear plant. That letter noted that, in accordance with the condition imposed in FP&L's St. Lucie 2 license, the company had given notice on April 1, 1975, of its intention to construct the South Dade nuclear facility and had received a number of responses (including one from Orlando)³⁷ from utilities evincing interest in participating in that plant. The Attorney General's letter contained the further observation that his office had

understood, relying upon information earlier submitted by FP&L in connection with the instant license application, that discussions were in progress to develop a participating agreement concerning this facility. Recently, however, FP&L advised us that our information was in error and that in July 1975 it had submitted corrected information to your Commis-

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the Board can determine the significance of this feature. On one hand it seems that the careful lawyers involved in drafting these commitments would not leave such an important consideration to chance. On the other hand the notification procedure must have had some purpose other than advising the smaller utilities that they would not be permitted to participate in the next nuclear project, or perhaps to keep in touch with old friends in the industry. In the absence of a better explanation, the Board believes it is reasonable to assume that the notification provision suggests that at least the opportunity would be afforded to negotiate participation in the nuclear unit."

³⁷ Luff July Affidavit, p. 1.

sion (which, according to our records, was not transmitted to us). *We were surprised to learn that [FP&L] has neither responded to these indications of interest, nor as yet, determined what, if any, form of access to the units now applied for it is willing to make available to other, smaller electric systems.* [FP&L] is not prepared to commit itself at this time to accept reasonable license conditions offering the opportunity for access to those smaller systems.³⁸

Even at that writing the Attorney General was uncertain whether the company has decided definitely to exclude the smaller systems or was merely contemplating that possibility. Nothing in the record suggests that Orlando should have been more certain than the Attorney General about what the company then had in mind. At all events, on March 30, 1976, the company got around to responding to the expression of interest in South Dade which Orlando had made known to FP&L the year before. This time the company was not equivocal and, according to Mr. Luff, stated "that FP&L had decided to proceed independently with development of the South Dade project and to utilize the project's generating capability to meet its own needs."³⁹ At that point, obviously, Orlando could no longer rely on any earlier representation that FP&L would grant it access to South Dade. As noted, Orlando responded two weeks later on April 14, 1976, with a timely petition to intervene and a request for an antitrust hearing on FP&L's application to construct that nuclear facility. Expressly included in that petition was a request for relief in the form of

(2) a fair share entitlement in St. Lucie, Unit No. 2, through direct participation alone or in combination with others through unit power purchasing.

Thereafter, on August 6, 1976, Orlando joined in the instant petition seeking an antitrust hearing on the St Lucie 2 application itself. Given the somewhat unusual circumstances of this case, we find that Orlando acted with reasonable promptness and did not unduly delay challenging the company's exclusive right to St. Lucie 2 once the company made clear that it would not grant Orlando access to its next nuclear plant voluntarily.⁴⁰

³⁸ Attorney General's letter of March 2, 1976, p. 3 (emphasis supplied).

³⁹ Luff July affidavit, p. 1.

⁴⁰ To be sure, there was delay between the April filing in *South Dade* and the August filing in *St Lucie 2*. We find this of no moment. The former amply served to put FP&L on notice that its sole right to the entire generating capacity of St. Lucie 2 was under challenge in a timely filed intervention petition. Accordingly, the extra four months before the formal filing of a petition in *St. Lucie 2* therefore did not significantly prejudice the company, Orlando having agreed that a construction permit for St. Lucie 2 could issue before completion of the antitrust hearings.

4. A satisfactory explanation for failure to file on time does not automatically warrant the acceptance of a late-filed intervention petition. As the Licensing Board correctly appreciated, it "nevertheless must consider the four factors specified under Section 2.714(a) of the Commission's Rules of Practice."⁴¹ We have also recognized, however, "that where the lateness has been satisfactorily explained a much smaller demonstration on these factors is necessary."⁴² Such is the situation here and the "four factors" give us little pause.

The first involves the availability of other means to protect the petitioners' interests. The Board below found this to militate in petitioners' favor because the Federal Power Commission, the Federal Trade Commission and the courts lack jurisdiction to provide access to nuclear generation. The Board also held that these same parties' intervention in the *South Dade* proceeding before this Commission, which involves another of FP&L's proposed nuclear plants, was inadequate. Taking the *South Dade* proceeding first, the Board's fears have clearly been confirmed; construction of that plant has been cancelled by the company.⁴³ As for remedies before other administrative agencies, we agree that they are unsatisfactory. The Power Commission does not deem itself capable of affording relief commensurate with that available here; for one thing, the FPC concededly lacks the power to order "wheeling," a key remedy expressly sought here. See *Otter Tail Power Co. v. United States*, 410 U.S. 363 (1973).^{43a} No private cause of action will lie under the Federal Trade Commission Act; only the FTC itself can enforce that statute.⁴⁴ Attempting to persuade that Commission to go to bat for these municipalities is hardly the equivalent of an independent right to initiate suit. Moreover, we are unaware of any antitrust action ever undertaken by the FTC involving charges of monopolization in the electric utility industry and none has been cited to us. We think it unrealistic to assume that intervenors will be able to induce that Commission to enter this thicket.

There remains the matter of relief via an antitrust proceeding in the courts. The company assures us that the courts can give any relief we can. It is FP&L's position that if the Federal courts can dissolve a company as a result of an antitrust suit, they can order the lesser remedy of access to nuclear power (App. Tr. 150). While it cites no cases directly in point, we accept that proposition. But

⁴¹ 5 NRC at 799; accord, *West Valley*, CLI-75-4, 1 NRC 273 (1975).

⁴² *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 2), ALAB-384, 5 NRC 612, 616 (1977).

⁴³ Statement of Mr. Marshall McDonald, President of FP&L, dated February 21, 1977 (Appendix B of the municipalities' appellate brief).

^{43a} See also, *Northern California Power Agency v. FPC*, 514 F.2d 184 (D.C. Cir.), certiorari denied, 423 U.S. 863 (1975), upholding an FPC determination that it lacked jurisdiction over the size of a nuclear generating unit or over the allocation of bulk power generated therefrom.

⁴⁴ *Holloway v. Bristol-Myers Corp.*, 485 F.2d, 986, (D.C. Cir. 1973); *Carlson v. Coca-Cola Company*, 483 F.2d 279 (9th Cir. 1973).

the barrier to such relief is higher in court than before us. In an NRC proceeding, a remedy is available under Section 105c to an intervenor who can demonstrate the existence of a "situation inconsistent with the antitrust laws." According to the Joint Committee which drafted the provision, "[t]he concept of certainty of contravention of the antitrust laws or the policies clearly underlying these laws is not intended to be implicit in this standard."⁴⁵ In the Federal courts, as the company acknowledged, the municipalities would have to prove an actual violation of the Sherman Act, a more difficult undertaking (App. Tr. 149-50, 168). On the other hand, this factor is described in Section 2.714(a) as "[t]he availability of other means whereby the petitioner's interest will be protected." The rule does not say that the "other means" must be equivalent in every respect to the intervention sought. Arguably, this factor weighs against late intervention if the "other means" are substantial. We need not resolve this matter in this case, however. Here, even were we to say that this factor weighs against intervention, it would not outweigh the good excuse intervenors had for late filing and the fourth factor which, as we indicate below, weighs in intervenors' favor.

The second and third factors—the extent to which petitioners' participation would assist in developing the record and whether other parties would represent their interests—the Board ruled not directly applicable because those appear to contemplate intervention into an ongoing proceeding. As the Board noted, in the circumstances here, without intervention there would be no hearing, no record, and no parties to protect intervenors' interests.

The final factor is the extent to which petitioners' participation would broaden the issues or delay the proceeding. The Licensing Board found the first consideration under this factor inapplicable here "because, unless the petition [to intervene] is granted, there will be no issues." The Board considered the second consideration the more important and implied that, absent the municipalities' agreement to allow issuance of the St. Lucie 2 construction permit (see p. 13, *supra*), it would have resolved this factor against them and perhaps decided against granting the intervention petition. We agree that this was a proper consideration for the Board below to have taken into account. Petitioners' excuse for tardiness was hardly so strong as to overcome the consequences of delaying the start of construction of this nuclear facility, which all parties to this proceeding agree is sorely needed.

Nevertheless, the applicant contends that forcing it to participate in an antitrust hearing at this late date, even with a construction permit in hand, is highly injurious to it. The company stresses that antitrust litigation is long and costly. This is scarcely persuasive. A judicial antitrust proceeding, the remedy to which the company would relegate intervenors, would be at least as long and costly. The company does not give us any other example of actual hardship

⁴⁵H.R. Rep. No. 91-1470 (also S. Rep. No. 91-1247), 91st Cong., 2nd Sess., 14 (1970).

which it will suffer if it must go to trial. Rather, if falls back on the argument that allowing the antitrust proceedings to commence at this late stage was abusive of the Board's discretion because it will mean that "the additional antitrust conditions, if any, that might ultimately be imposed upon the [company] would not be known for years after the construction permit were granted." This, the company says, ignores "the objective of fixing antitrust conditions and establishing the applicant's obligations as early as possible" which the framers of Section 105c intended (Br. pp. 11, 20).

At first reading, this argument conflicts with the company's earlier claim that it is always open to an antitrust suit by Orlando in Federal court, which could grant that utility access to its nuclear plants (see p. 22, *supra*). Thus, whether Orlando intervenes here or there, the company cannot now achieve that certainty for which it thirsts. Be that as it may, whatever merit the company's argument may have in other circumstances,⁴⁶ it has little currency here. It was the company's own actions and statements which, at bottom, are the reason its antitrust responsibilities were not settled earlier.

5. We conclude with the reminder that the question before us is not whether we find good cause for the untimely intervention. The issue is, rather, whether the Licensing Board's actions granting the petition and ordering an antitrust hearing on the ground that such cause had been established were abusive of its discretion. Given the record made before that Board, we cannot find that it exceeded the reasonable leeway allowed it in these matters under the Commission's rules. Accordingly, the decision below must be *affirmed*.⁴⁷

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E Du Flo
Secretary to the Appeal Board

⁴⁶ See, *South Texas, supra*, CLI-77-13, 5 NRC at 1321.

⁴⁷ We have intentionally refrained from commenting on the various anticompetitive acts charged. The merits of those assertions are matters for trial; we intimate no views on their proper disposition.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARDS

Michael C. Farrar, Chairman (Docket 50-271)*

Alan S. Rosenthal, Chairman (Dockets 50-443 and 444)

Dr. John H. Buck

Dr. Lawrence R. Quarles (Docket 50-271)**

In the Matters of

VERMONT YANKEE NUCLEAR POWER
CORPORATION
(Vermont Yankee Nuclear Power
Station)

Docket No. 50-271

PUBLIC SERVICE COMPANY OF NEW
HAMPSHIRE, et al.

Docket Nos. 50-443
50-444

(Seabrook Station, Units 1 and 2)

July 18, 1977

In response to ALAB-392, 5 NRC 759 (April 21, 1977), an intervenor filed a motion seeking (1) a determination that the values in the interim S-3 tables tip the cost-benefit balance of the Vermont Yankee and Seabrook facilities in favor of abandonment; and (2) certification to the Commission of the question of whether the interim S-3 tables should be used in light of the President's recent policy statements concerning nuclear power. The Appeal Board (1) finds no compelling reason to certify the intervenor's question to the Commission and hence denies that request; (2) determines that the cost-benefit balance for Vermont Yankee is not tipped in favor of abandonment of the facility by the environmental impacts quantified in the interim fuel cycle rule; and (3) reserves for its decision on the merits of the pending *Seabrook* appeals the fuel cycle issues relating to that facility.

*Mr. Farrar is also a member of the Appeal Board in Dockets 50-443 and -444.

**Dr. Quarles participated in the deliberations on the matters considered in this opinion and indicated his general agreement with the conclusions which are reached herein. He did not, however, review the final version of the opinion.

RULES OF PRACTICE: APPELLATE PROCEDURE

The Appeal Board exercises its authority to certify a question to the Commission under 10 CFR §2.785(d) sparingly. Absent a compelling reason, it will decline certification.

Messrs. John A. Ritsher, Thomas G. Dignan, Jr., and R. K. Gad, III, Boston, Massachusetts, for the Vermont Yankee Nuclear Power Corporation and Public Service Company of New Hampshire, *et al.*

Mr. Anthony Z. Roisman and Mrs. Karin P. Sheldon, Washington, D.C., for the New England Coalition on Nuclear Pollution.

Messrs. Joseph F. Scinto, Myron Karman and Edwin J. Reis for the Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

By its order of April 1, 1977,¹ the Commission directed us to determine the impact of its just promulgated interim uranium fuel cycle rule² on the environmental cost-benefit balances which had been struck for each of ten nuclear facilities specified in that order. As the first step in the carrying out of that direction, we entered our own order three weeks later³ in which, *inter alia*, we announced that we would entertain further submissions by a party or parties with respect to any of either those ten facilities or three other facilities which still had uranium fuel cycle questions pending before us. The submissions were to "be confined in scope to an assignment of reasons why, in light of the interim rule, the cost-benefit balance for the facility or unit in question tips, or might tip, in favor of abandonment of the facility." 5 NRC at 765.

The only party which accepted that invitation was the New England Coalition on Nuclear Pollution, an intervenor in the licensing proceedings involving the Vermont Yankee and Seabrook facilities.⁴ Its filing was not, however, re-

¹ CLI-77-10, 5 NRC 717.

² The interim rule issued on March 14, 1977. 42 Fed. Reg. 13803.

³ ALAB-392, 5 NRC 759 (April 21, 1977).

⁴ The staff and licensees filed papers setting forth their views on certain questions relating to the application of the interim rule which had been posed in ALAB-392 on behalf of some Appeal Panel members. These questions are addressed in Mr. Farrar's concurring opinion, *infra*.

stricted to the impact of the interim rule (and, more particularly, the numerical values assigned in revised Table S-3 for the spent fuel reprocessing and waste disposal phases of the fuel cycle) upon the cost-benefit balances for those reactors. Rather, although contending that application of the interim rule would tip the balance against both Vermont Yankee and Seabrook, the Coalition's primary point is that we should certify to the Commission the following question

Should the cost-benefit balance for individual reactors be restruct using the interim S-3 Table values issued on March 14, 1977, in light of the statement by President Carter on April 7, 1977, that the fuel cycle scenario upon which those values were based is being indefinitely deferred?

By way of elaboration, the Coalition tells us that

On April 7, 1977, and again on April 20, 1977, the President of the United States announced as national policy the indefinite deferral of any plutonium recycling, thus effectively cancelling the fuel cycle scenario upon which the current interim S-3 Table is based. Legal principles, logic and national policy dictate that the Appeal Board not go through the essentially meaningless process of evaluating the impact on the cost-benefit analysis for an individual facility of the interim S-3 Table which is based upon a fuel cycle scenario which is inconsistent with the decision of the President of the United States.

The documents underlying the interim S-3 Table, NUREG-0116 and 0216, include brief discussions of some fuel cycle options which do not include plutonium recycle. However, only the S-3 Table itself is adopted as the rule and that Table does not include any analysis of the no recycle scenario. In addition, both NUREG-0116 and 0216 candidly admit that the data on the no-recycle scenarios is seriously defective.

Responses to the Coalition's submission were filed by the applicants/licensee in the two proceedings and the NRC staff. Those parties oppose the certification request and also disagree with the Coalition's assessment of the impact of the interim rule upon the cost-benefit balances for these facilities.

A. Although our authority to certify a question to the Commission is beyond doubt (10 CFR §2.785(d)), we have more than once observed that "such authority should be exercised sparingly." See *e.g. Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-211, 7 AEC 982, 984 (1974); *Consolidated Edison Co. of New York* (Indian Point Nuclear Generating Station, Unit 3), ALAB-186, 7 AEC 245, 246 (1974) and cases there cited. Thus, "[a]bsent compelling reason, we will decline to certify a question to the Commission." ALAB-211, *supra*, 7 AEC at 984.

A compelling reason for certification is not discernible here. It is an absolute certainty that the Commission is fully aware of the statements of the President upon which the Coalition relies. And we may fairly presume that, if it were of the view that those statements affected in some manner the continuing validity of its interim uranium fuel cycle rule, the Commission would have initiated itself the appropriate steps to bring about the necessary revisions. The ink on the interim rule was barely dry when the President announced on April 7 his policy looking to an indefinite deferral of "the commercial reprocessing and recycling of the plutonium produced in U. S. nuclear power programs." It is thus scarcely likely that the Commission's memory of the content of the interim rule had by then dimmed to such an extent that any bearing which that new policy might have had on the rule would have been overlooked.⁵

B. As the Coalition of necessity acknowledges, Vermont Yankee is a fully constructed and operating reactor. If its abandonment at this juncture would—or even might—necessitate the construction of some alternative generating facility in order to meet power demands, revocation of its operating license could not possibly be justified by the environmental impacts of the uranium fuel cycle as quantified in Table S-3 of the new interim rule. When the then Atomic Energy Commission promulgated the original Table S-3 in 1974, it characterized those impacts as "relatively insignificant." See ALAB-392, *supra*, 5 NRC at 760. Although the interim rule now in force has brought about some revisions in the portions of the table relating to the spent fuel reprocessing and waste disposal phases of the fuel cycle, in its April 1 order (CLI-77-10, *supra*) the Commission took pains to

...restate our belief, expressed in the statement of considerations accompanying the interim rule, that the values in the old rule and those in the interim rule are not substantially different and, therefore, although conceivable, it appears unlikely that use of the interim rule values rather than those in the original rule could tilt a cost-benefit balance against a facility, thus requiring suspension of an outstanding license or permit, or denial of a permit that would otherwise have been approved.

5 NRC at 717b. On the other hand, heavy economic costs (and perhaps environmental ones as well) would attend upon the construction of the substitute

⁵ Both the companies and the staff challenge the correctness of the Coalition's premise that the interim rule does not encompass the option of no recycling of plutonium. We are pointed to the statement in footnote 1 to Table S-3 to the effect that:

The contributions from reprocessing, waste management and transportation of wastes are maximized for either of the 2 fuel cycles (uranium only and no recycle).

Although this statement would appear to undercut the ground assigned for the certification request, we prefer to rest our denial of the request on the considerations which we have set forth in the text above.

facility. Additionally, there would be the matter of fulfilling power demands pending completion of that facility—which also might well bear, at minimum, a high price tag.

The Coalition tells us, however, that there is no current need for the power that is being generated by Vermont Yankee. It relies on a January 1, 1977, report of the New England Power Pool (NEPOOL) for the proposition that, were the generating capacity of Vermont Yankee to be unavailable from now until 1980, New England would still have adequate reserve margin to meet its needs.⁶ In this connection, the Coalition insists that, because of what it considers to be a present “national policy that nuclear power should be used as a last resort,” the continued operation of Vermont Yankee cannot be justified on the basis that it might serve as a substitute for an existing fossil fuel generating plant.

The licensee’s rejoinder is that it appears from an affidavit of the Chief Engineer of the Vermont Public Service Board submitted to the Licensing Board last September⁷ that a six-month shutdown of Vermont Yankee would increase the cost of electrical energy to Vermont Yankee’s wholesale customers in Vermont by an amount approaching \$24 million and to New England ratepayers in total by approximately \$50 million. The licensee also disputes that the President’s announced policy forecloses the use of nuclear facilities for the purpose of conserving petroleum. For its part, the staff has appended to its response to the Coalition the affidavit of Richard E Weiner, an electrical engineer in its Antitrust and Indemnity Group who is responsible for “coordinating and conducting in-depth analys[es] of the planning, operating and coordinating functions of many types and sizes of electric utilities throughout the country.” According to Mr. Weiner, oil-fired units would have to be used to make up the lost generating capacity of Vermont Yankee. This would entail an economic penalty in terms of increased costs of approximately \$186,000 per day and an additional daily consumption of 19,000 barrels of oil.

We need not pass judgment here on the precise degree of accuracy of these estimates. It is enough to conclude, as we do, that the environmental impacts assigned by the interim rule to the uranium fuel cycle are far too small to justify the summary elimination of more than 500 MWe in existing generating capacity. In this regard, we do not understand the President to have decreed as a matter of national policy, either in the statements upon which the Coalition relies or elsewhere, that already constructed and operating nuclear facilities are now to be

⁶ The Coalition regards the post-1980 need for the facility to be “speculative.”

⁷ Affidavit of Gordon B. Stensrud, dated September 30, 1976, attached to the memorandum of law filed by the State of Vermont on the same date in response to the Licensing Board’s order of August 13, 1976. In that memorandum, Vermont opposed the suspension or modification of the Vermont Yankee operating license pending the promulgation of a new interim fuel cycle rule.

abandoned in favor of other nonnuclear energy sources (which may not even be presently available).

In thus holding that Vermont Yankee's status as a fully built facility is determinative here, we do not overlook the fact that the Natural Resources Defense Council sought unsuccessfully to raise uranium fuel cycle issues with regard to this facility as far back as 1971. See ALAB-56, 4 AEC 930 (1972). But even then it was too late in the day, for the facility had been essentially constructed and was in an operating license proceeding. Stated otherwise, had the interim rule been in place in 1971 and applied to Vermont Yankee at that time, the result necessarily would have been the same as that reached today. Thus, the passage of time has not been prejudicial to the Coalition.

C. In contrast to Vermont Yankee, the Seabrook facility is still in the early stages of construction. It is also still before us on the appeals taken from the initial decision of the Licensing Board authorizing the issuance of construction permits. LBP-76-26, 3 NRC 857 (1976). Because several of the issues which remain to be decided on those appeals relate to the NEPA cost-benefit balance for Seabrook, it is appropriate that we consider and decide the fuel cycle question along with them.

For the foregoing reasons, we (1) *deny* the Coalition's request for certification; (2) *determine* that the cost-benefit balance for Vermont Yankee is not tipped in favor of abandonment of the facility by the interim fuel cycle rule; and (3) *hold* for our decision on the merits of the pending *Seabrook* appeals the fuel cycle issues relating to that facility.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

Concurring opinion of Mr. Farrar:

Table S-3, as revised by the interim rule, contains an entry not found in the original version of the Table. Specifically, it now includes under radiological effluents a new category called "transuranic and high level wastes (deep)," to which the value of eleven million curies is assigned for each year of operation of a typical reactor. I was one of those concerned over what this value was intended to represent and how it was to be used in striking the cost-benefit balance for a

particular facility. That concern led to the inclusion of footnote 7 in ALAB-392, 5 NRC 759, 765 (April 21, 1977).

To be sure, the Table describes the radiological effluents as "Buried at Federal Repository." But in proposing, *inter alia*, to add the new entry to the Table, the Commission had stated that "uncertainties" exist "[w]ith respect to risks from long-term repository failure."¹ This left unclear how to apply the Table in individual proceedings. In weighing the eleven million curies per year in the balance against the benefits to be derived from a particular plant, were we to assume that the waste remains in place through the centuries, or were we to assume that some or all of the radioactivity might escape?

It begs the question to suggest, as some have done,² that without any thought we could simply apply the value in question (along with all other values in the Table) "as given." For that is precisely the question: what has been "given?" Obviously, for purposes of a NEPA analysis the expression "eleven million curies buried at Federal Repository" can represent different things, for the environmental impact associated with it depends on whether or not the radioactivity is understood to be safely contained.³ Accordingly, at the time ALAB-392 was issued, I had some question about the nature of the consequences that we should assume might flow from the existence of the high level radioactivity postulated by the Table.

I have now come to the conclusion that, regardless of any uncertainty it perceives on the matter, the Commission intends those charged with applying Table S-3 to assume that the eleven million curies of waste generated in each year of a typical reactor's operation remain in place in the postulated repository and do no damage whatsoever. Based on that reading of the Table, I join the decision of my colleagues, who I understand are of a similar view as to its meaning.⁴

I came to this conclusion because, although the Commission referred to the uncertainties concerning waste repository failure in proposing the interim rule, it

¹ 41 FR 45849, 45850-51 (October 18, 1976).

² In nearly every proceeding covered by ALAB-392, the interested utility company filed a response to the question raised by footnote 7. The NRC staff filed a single response applicable to all proceedings.

³ Thus, it misses the mark to argue that the Commission's decision to promulgate an interim rule in the face of uncertainties eliminated any question there might be about the validity of the value under discussion. It is not its validity that is in question; it is its meaning. "Eleven million curies" can be the correct figure whether or not any release from the repository is associated with it.

⁴ In *Vermont Yankee*, where the reactor is operating, it is so late in the day that it may make no difference how the Table is read. Because this is the first time we have had occasion to apply the revised Table, however, I believe it appropriate to set forth my understanding of it.

indicated when it adopted that rule that it meant us to discount these uncertainties entirely. Two of its statements in particular convince me this is so.

In the first place, the Commission said that the reports of the Task Force which did the spadework on this subject "contain a detailed analysis of the impacts of waste management . . . and provide a sufficient informational basis for the interim rule promulgated herein."⁵ This statement can be read—and no one has argued to the contrary—to reflect the requisite Commission endorsement, on an interim basis, of the Task Force's conclusion that, insofar as risks of repository failure are concerned, "possible releases in the long term (after repository decommissioning) will be negligible . . ."⁶

Secondly, that reading is supported by the Commission's nearly contemporaneous further suggestion that the values in the new interim rule are not substantially or significantly different from the values in the original Table S-3.⁷ In that connection, the original Table S-3 contained no entry whatsoever for high level wastes. The only way to conclude that there is no substantial difference between (1) not mentioning high level waste at all and (2) representing it in terms of eleven million curies per average reactor per year, is to assume that the waste remains in place permanently and presents no threat at all to human safety or the environment.

I conclude that this is the assumption under which the Commission has directed us to operate. We are, of course, bound by the Commission's directives. Those who believe that greater recognition should be given to the hazard they perceive to be presented by high level radioactive waste must go elsewhere to present their challenge to the assumptions embodied in the interim rule and the current version of the Table: their recourse is to the pending administrative proceeding on the adoption of a permanent rule or to the judicial arena. We can afford them no remedy.

Mr. Rosenthal and Dr. Buck have authorized me to state that, although they were not among those members of the Appeal Panel who had sponsored footnote 7 in ALAB-392, they are in substantial agreement with the foregoing views.

⁵ 42 FR 13803, 13805 (March 14, 1977).

⁶ See the Environmental Survey (NUREG-0116), §2.4.2, p. 2-12.

⁷ See CLI-77-10, 5 NRC 717 (April 1, 1977); compare 42 FR at 13806 (March 14, 1977).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Michael C. Farrar

In the Matter of

Docket Nos. 50-443
50-444

PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, et al.

(Seabrook Station, Units 1 and 2)

July 26, 1977

Upon review of exceptions filed by 8 parties to the initial decision authorizing issuance of construction permits (LBP-76-26, 3 NRC 857), the Appeal Board agrees with the result reached below (with one modification) but finds erroneous several procedural rulings and supplements a number of the findings of the Licensing Board. Upon *sua sponte* review of noncontested matters, the Appeal Board determines that further consideration of steam generator tube integrity is warranted but should await a forthcoming ruling in another proceeding in which the matter is being examined in some depth.

Authorization of construction permits affirmed; jurisdiction retained with respect to steam generator tube integrity.

LICENSING BOARD: RESOLUTION OF ISSUES

Licensing boards have a duty not only to resolve contested issues but to articulate in reasonable detail the basis for the course of action chosen.

LICENSING BOARD: RESOLUTION OF ISSUES

A decision need not refer individually to every proposed finding, but it must sufficiently inform a party of the disposition of its contentions. Where testimony which is reasonable on its face and sponsored by well qualified witnesses is presented, a board which is not accepting that testimony has an obligation to explain that course of action.

APPEAL BOARD: SCOPE OF REVIEW

Despite deficiencies in a Licensing Board decision, the Appeal Board need not necessarily reverse it. The Appeal Board is authorized to make different or supplementary findings of its own and can even base its decision on grounds completely foreign to those relied upon by the Licensing Board, so long as the parties had a sufficient opportunity to address those new grounds with argument and, where appropriate, evidence.

ATOMIC ENERGY ACT: LICENSING STANDARDS

Insofar as safety considerations are concerned, the Atomic Energy Act and the Commission's implementing regulations establish basic standards which, if met, entitle an applicant to a construction permit.

NEPA: COST-BENEFIT BALANCE

NEPA does not establish minimal environmental standards; rather, the environmental review mandated by NEPA entails a balancing of costs and benefits.

EXCLUSION AREA: SIZE

There theoretically is no minimum or maximum size for an acceptable exclusion area. But the area must be large enough that, given the plant's design, an individual located on its boundary will not, in the event of a postulated accident, receive a radiation dose in excess of a specified reference value.

LOW POPULATION ZONE: SIZE

There theoretically is no minimum or maximum size of a low population zone. It must be large enough that, given the plant's design, persons on its outer boundary will not receive more than a specified radiation dose in the event of an accident. But it may not extend beyond the area that can be protected by emergency measures. And its maximum size is governed by the "population center distance" concept.

SITE SUITABILITY: EVALUATION

Evaluation of a proposed site in terms of neighboring population concentrations (both in the low population zone and in nearby population centers) must take into account not only the anticipated population at the inception of plant operation but, as well, predictable population growth in at least the early years of that operation.

SITE SUITABILITY: EVALUATION

There is flexibility in the manner in which the criteria of 10 CFR Part 100 may be applied to a particular site; site evaluation may take into account factors beyond the technical aspects of the exclusion area, low population zone, and population center distance.

SEISMIC AND GEOLOGIC CRITERIA: SCOPE OF INQUIRY

In determining a safe shutdown earthquake under 10 CFR Part 100, Appendix A, historically recorded earthquakes are utilized unless a larger earthquake is found to be warranted as a result of particular types of geological and seismological data.

RULES OF PRACTICE: REOPENING OF PROCEEDINGS

In normal circumstances at least, a request for reopening of the record must be accompanied by a showing that the outcome of the proceeding might be affected thereby. *Vermont Yankee*, ALAB-138, 6 AEC 520, 523 (1973).

COMMISSION PROCEEDINGS: RES JUDICATA/COLLATERAL ESTOPPEL

Where another agency has primary jurisdiction over a question and has acted in a judicial capacity to resolve disputed issues of fact properly before it, and where the parties interested in such issues before the NRC participated in the proceeding before the other agency, the NRC will not hesitate to give *res judicata* or collateral estoppel effect to the findings of the other agency "to enforce repose." *United States v. Utah Construction and Mining Co.*, 384 U.S. 394, 421-22 (1966).

ATOMIC ENERGY ACT: SCOPE OF INFORMATION REQUIRED FOR LICENSING (FINANCIAL QUALIFICATIONS)

Under the Commission's regulations, a construction permit applicant need not show that it has the funds in hand to build its proposed plant but only that it has "reasonable assurance" of obtaining those funds. 10 CFR §50.33(f).

ATOMIC ENERGY ACT: SCOPE OF INFORMATION REQUIRED FOR LICENSING (FINANCIAL QUALIFICATIONS)

Where state regulatory bodies have considered and approved a nuclear plant, an applicant may rely on potential future rate increases as part of its showing of its financial qualifications to construct such plant.

ATOMIC ENERGY ACT: SCOPE OF INFORMATION REQUIRED FOR LICENSING (FINANCIAL QUALIFICATIONS)

The financial qualifications inquiry contemplated by the Commission's regulations centers upon whether funds can be obtained and not on the price of or difficulty in obtaining them.

NEPA: JURISDICTION

The Commission has legal authority to review the offsite environmental impacts of transmission lines and to order a change in transmission routes selected by an applicant. *Greenwood*, ALAB-247, 8 AEC 396 (1974); *Wolf Creek*, CLI-77-1, 5 NRC 1 (1977).

NEPA: NEED FOR POWER

A nuclear plant's principal benefit is the electric power it generates. Absent some "need for power," justification for building a facility is problematical. *Duke Power Co.* (Catawba), ALAB-355, 4 NRC 397, 405 (1976).

NEPA: CONSIDERATION OF ALTERNATIVES

An application is not to be "denied on the basis of a comparison between the applicant's proposed site and an alternative site unless the alternate site appears to be obviously superior to the proposed site." CLI-77-8, 5 NRC 503, 514 (1977).

NEPA: CONSIDERATION OF ALTERNATIVES

In considering whether an alternate site is obviously superior to the proposed site, in situations where the prehearing NEPA review process has not been lacking in integrity, the cost and time required to complete a plant at each of the alternate sites should be taken into account.

RULES OF PRACTICE: SUBPOENA

The Commission's Rules of Practice preclude a board from declining to issue a subpoena on any basis other than that of a lack of "general relevance" of the testimony sought; a board is specifically prohibited at that stage from attempting to determine the admissibility of evidence. 10 CFR §2.720(a).

RULES OF PRACTICE: CROSS-EXAMINATION BY INTERVENORS

Irrespective of the announced scope of a reopened hearing, permissible inquiry at such hearing (through cross-examination) extends to every matter within the reach of prepared testimony submitted by an applicant and accepted by the Board.

NEPA: CONSIDERATION OF ALTERNATIVES

The NEPA evaluation of alternatives is subject to a "rule of reason"; application of that rule "may well justify exclusion or but limited treatment" of a suggested alternative. CLI-77-8, 5 NRC 503, 540 (1977).

ADMINISTRATIVE PROCEDURE ACT: PRESIDING OFFICER

The Administrative Procedure Act requirement that the official who presides at the reception of evidence must make the recommended or initial decision (5 U.S.C. 554(d)) includes an exception for the circumstance in which that official becomes "unavailable to the agency." When a licensing board member resigns from the Commission, he becomes "unavailable."

NEPA: COST-BENEFIT BALANCE

The environmental effects assigned to the uranium fuel cycle by the Commission's interim rule are extremely small and could not possibly serve to call for the abandonment of any particular nuclear facility unless the cost-benefit balance for that facility was otherwise in virtual equipoise.

TECHNICAL ISSUES DISCUSSED

Population center distance requirements; safe shutdown earthquake (intensity; resulting vibratory ground motion); alternate site consideration; transmission lines (environmental impacts; costs); need for power (reliability; substitution).

Mr. Thomas G. Dignan, Jr., Boston, Massachusetts (with whom **Mr. John A. Ritsher**, **Ms. Eleanor D. Acheson**, and **Mr. R. K. Gad, III** were on the briefs), for the applicants, Public Service Company of New Hampshire, *et al.*

Messrs. Anthony Z. Roisman and **David S. Fleischaker**, Washington, D.C. (with whom **Ms Karin P. Sheldon**, Wash-

ington, D.C., was on the briefs), for the intervenor, New England Coalition on Nuclear Pollution.

Mr. Robert A. Backus, Manchester, New Hampshire, for the intervenors, Seacoast Anti-Pollution League, the Audubon Society of New Hampshire, and the Society for the Protection of New Hampshire Forests.

Mr. Norman C. Ross, Brookline, Massachusetts, filed a brief for the intervenor, Donald B. Ross.

Mr. Donald W. Stever, Jr., Assistant Attorney General of New Hampshire, Concord, New Hampshire, for David H. Souter, Attorney General of New Hampshire.

Ms. Ellyn R. Weiss, Assistant Attorney General of Massachusetts, Boston, Massachusetts, for the Commonwealth of Massachusetts.

Messrs. Michael W. Grainey and Richard C. Browne (with whom **Mr. James M. Cutchin, IV**, and **Ms. Marcia E. Mulkey** were on the briefs), for the Nuclear Regulatory Commission staff.

DECISION

Opinion of the Board (Mr. Farrar dissenting in part and from the result):

The Licensing Board rendered an initial decision authorizing, by a divided vote, the issuance of construction permits for Units 1 and 2 of the Seabrook Station, a nuclear power facility to be located in the town of Seabrook, near the seacoast in southern New Hampshire.¹ Each of those reactors, the first of which is planned for service in the early 1980's, will be initially operated at a net power level of 1194 MWe. This proceeding has been the object of considerable public attention, and several public and private organizations and individuals have inter-

¹ LBP-76-26, 3 NRC 857 (1976). Construction permits CPPR-135 and CPPR-136 were issued on July 7, 1976 (see 41 Fed. Reg. 29230 (July 15, 1976)).

vened. Eight separate appeals from the initial decision are before us,² challenging a number of the Licensing Board's rulings as well as its ultimate result (in whole or in part).

The appellate review of the initial decision has already produced a number of interlocutory decisions and orders. On several occasions, both we and the Commission have considered motions for suspension of the permits, founded upon a variety of grounds. And both we and it have found varying degrees of merit to these motions. See ALAB-338, 4 NRC 10 (July 14, 1976); ALAB-349, 4 NRC 235 (September 30, 1976), *vacated*, CLI-76-17, 4 NRC 451 (November 5, 1976); ALAB-356, 4 NRC 525 (November 8, 1976), *review declined*, CLI-76-24, 4 NRC 522 (November 17, 1976), *corrected*, CLI-76-25, 4 NRC 607 (December 3, 1976); ALAB-366, 5 NRC 39 (January 21, 1977), *modified*, CLI-77-4, 5 NRC 31 (January 24, 1977), *further modified*, CLI-77-5, 5 NRC 403 (February 7, 1977), *further modified*, CLI-77-6, 5 NRC 407 (February 17, 1977), *affirmed with modifications*, CLI-77-8, 5 NRC 503 (March 31, 1977). We need not rehearse here the content or background of those decisions. It suffices to record that, by virtue of our direction in ALAB-366 (as modified by the Commission), most construction activities at Seabrook were suspended several months ago pending the outcome of further Licensing Board proceedings.³

The suspension had been prompted by a decision last November of the Regional Administrator of the Environmental Protection Agency, in which he withdrew his earlier tentative approval of the facility's once-through cooling system. In light of that decision, and for the reasons detailed in ALAB-366, we ruled that the construction permits could not remain in effect during the period required for additional Licensing Board exploration of how, from an environmental standpoint, the Seabrook site with cooling towers might compare with the alternate sites in northern New England previously considered by that Board. Essentially upholding our ruling, the Commission directed the Licensing Board also to compare the Seabrook site (assuming alternatively the use of once-through cooling and cooling towers) with possible alternate sites in southern New England. CLI-77-8, *supra*.

Shortly after the evidentiary hearing on the remand was completed, the EPA Administrator reversed the decision of the Regional Administrator and reinstated the approval of the once-through cooling system. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), Case No. 76-7 (June 17,

² These appeals were taken by the Seacoast Anti-Pollution League and Audubon Society of New Hampshire (SAPL-Audubon); the Society for the Protection of New Hampshire Forests (Forest Society); the New England Coalition on Nuclear Pollution (Coalition); the Commonwealth of Massachusetts; David H. Souter, the Attorney General of the State of New Hampshire; David N. Ross; the applicants; and the NRC staff. Needless to say, the respective appellants have raised different issues.

³ See 42 Fed. Reg. 19534 (April 14, 1977).

1977). This brought about a motion by the applicants to reinstate the construction permits. In ALAB-416, 5 NRC 1438 (June 29, 1977), we determined that in no circumstances could the motion be granted prior to Licensing Board decision on the southern New England site inquiry. That decision was rendered on July 7, 1977. LBP-77-43, 6 NRC 134. In a separate order entered today, we are granting the motion and lifting the suspension. ALAB-423, 6 NRC 115.

This decision encompasses essentially all those issues presented by the appeals from the initial decision which were not already considered and decided in ALAB-366. The single exception is the question, raised by several of the parties, respecting whether under existing Commission regulations an applicant must concern itself with emergency planning for areas outside of the facility's low population zone. That question received a negative response in ALAB-390, 5 NRC 733 (April 7, 1977), rendered in both this proceeding and another proceeding in which the emergency planning issue had likewise surfaced.

For the reasons that follow, we find ourselves in substantial agreement with the *result* reached by the Licensing Board on the various contested issues—although, as will also appear, several of its procedural rulings were erroneous and, in addition, it has proved necessary to supplement the Board's findings in a number of areas with findings of our own based upon an independent examination of the record. Subject to one modification (pertaining to the low population zone), we are affirming that result. In addition, we have performed our customary *sua sponte* review of the portions of the decision below not involved on the appeals. Although that review has disclosed no need for corrective action, there is a matter not raised either below or before us—that of steam generator tube integrity—which warrants our further consideration. Accordingly, jurisdiction is being retained over that matter to await our ruling in another proceeding in which we have been examining the subject of steam generator tube integrity in some depth.

I. SUFFICIENCY OF LICENSING BOARD DECISION

One theme which pervades many of the exceptions is the inadequacy of the Licensing Board's explication of the basis for its conclusions on a number of the issues decided by it, as well as of the reasons why it had rejected the contrary views advanced by some of the expert witnesses. SAPL-Audubon criticizes the decision as being "inadequate" and "incomplete," and as failing to "deal with all of the issues raised in a responsible way." It falls short, they claim, of adhering to the requirement of the National Environmental Policy Act (NEPA) that responsible scientific views adverse to "the official Agency opinion" be considered, or to the Administrative Procedure Act requirement that an adjudicatory board address "all the material issues of fact, law, or discretion presented on the record" (5 U.S.C. 557(c)). The Coalition describes the decision as "total-

ly devoid of reasoned decision-making" on "virtually every contested issue." Massachusetts advances much the same criticism.

By way of specific examples of these alleged shortcomings, our attention is called, *inter alia*, to the Board's failure to mention the testimony of Charles Tucker concerning regional growth for the Seabrook area, the testimony of Gordon MacDonald comparing the reliability of coal and nuclear plants, or the testimony of Dr. James R. Nelson analyzing the financial capability of the applicants. The Board is likewise faulted for not having discussed two alternate transmission line routings which were suggested by the Forest Society and endorsed by Dr. Salo in his dissenting opinion.

We long ago reminded licensing boards of their duty not only to resolve contested issues but "to articulate in reasonable detail the basis" for the course of action chosen. *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-104, 6 AEC 179 (1973). We, as well as the parties, should be able "readily to apprehend the foundation for the [Board's] ruling" (*id.*, at fn. 2). For it is a well accepted principle of administrative law that "the orderly functioning of the process of review requires that the grounds upon which the administrative agency acted be clearly disclosed and adequately sustained." *SEC v. Chenery Corp.*, 318 U.S. 80, 94 (1943). *Cf. Greater Boston Television Corp. v. F.C.C.*, 444 F.2d 841, 851-3 (D.C. Cir 1970), *certiorari denied*, 403 U.S. 923 (1971); *WAIT Radio v. FCC*, 418 F.2d 1153, 1156 (D.C. Cir. 1969). See also *Permian Basin Area Rate Cases*, 390 U.S. 747, 792 (1968). A board must do more than reach conclusions; it must "confront the facts." *Wingo v. Washington*, 395 F.2d 633, 636 (D.C. Cir. 1968).

A board's obligation in this regard does, of course, have some limits. We have previously held that a decision need not refer individually to every proposed finding; it "meets the requirements of the Administrative Procedure Act and the Commission's Rules of Practice if it sufficiently informs a party of the disposition of its contentions." *Wisconsin Electric Power Co.* (Point Beach Nuclear Plant, Unit 2), ALAB-78, 5 AEC 319, 321 (1972); see also *Union of Concerned Scientists v. AEC*, 499 F.2d 1069, 1094 (D.C. Cir. 1974), affirming, as to this point, *Boston Edison Co.* (Pilgrim Nuclear Power Station), ALAB-83, 5 AEC 354, 371 (1972); *cf. Trustees of Columbia University in the City of New York*, ALAB-62, 5 AEC 266, 267 (1972). In some areas, the Board below appears to have satisfied these requirements. But, as will become apparent in our subsequent discussion of particular issues, in other areas its decision manifestly fell far short of meeting the applicable standards. In particular is this so with respect to the Board's lack of reference to (much less discussion of) evidence contrary to that which it accepted. Much of the contrary evidence was reasonable on its face and sponsored by well qualified witnesses; if it was not to be accepted, the Board had some obligation to explain why not.

Despite these deficiencies, the decision below need not necessarily be re-

versed. A reviewing court would be permitted to let a decision stand if its "path can be 'discerned' even if the opinion 'leaves much to be desired.'" *WAIT Radio v. FCC*, *supra*. We can go still further, for we have authority to make factual findings on the basis of record evidence which are different from those reached by a licensing board. See 5 U.S.C. 557; *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 NRC 397, 402-05 (October 29, 1976), and cases there cited. We are also authorized to issue supplementary findings of our own. *Point Beach*, ALAB-78, *supra*, 5 AEC at 322 n. 14; *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-73, 5 AEC 297, 298-300 (1972). Indeed, we can even base our decision on grounds completely foreign to those relied upon by the licensing board, so long as the parties had a sufficient opportunity to address those new grounds with argument and, where appropriate, evidence. *Niagara Mohawk Power Corp.* (Nine Mile Point Nuclear Station, Unit 2), ALAB-264, 1 NRC 347, 354-55 (1975). The resolution by us of the questions which were inadequately treated in the initial decision depends, therefore, on the state of the record bearing upon each such question.

We might add that, notwithstanding our authority to do so, we normally would be reluctant to search the record to determine whether it included sufficient information to support conclusions for which the Licensing Board itself failed to provide adequate justification. Rather, a remand (very possibly accompanied by an outright vacation of the result reached below) would be the usual course. In this case, the very protracted nature of the proceeding, and the concomitant desirability of bringing it to an end, have led us to depart from that course. Given the resultant drain on our time—at the expense of seasonable disposition of other matters on our docket equally deserving of prompt attention—there is no assurance that even such considerations will carry the day in future.⁴

II. REACTOR SITING CRITERIA (POPULATION)

In considering whether to issue construction permits, the Commission is called upon to evaluate the site on which a nuclear facility is proposed to be located. That assessment includes two different types of review: safety and environmental. Those reviews are disparate in their focus.

Insofar as safety considerations are concerned, the Atomic Energy Act and the Commission's implementing regulations establish basic standards which, if met, entitle an applicant to a construction permit. *Maine Yankee Atomic Power*

⁴It should be noted in this connection that the original SAPL-Audubon motion for a stay of the initial decision was filed before their counsel had even read that decision and, therefore, neither did nor could bring our attention to deficiencies in the Board's coverage of the issues raised by the respective parties.

Co. (Maine Yankee Atomic Power Station), ALAB-161, 6 AEC 1003, 1006-7 (1973), *remanded on other grounds*, CLI-74-2, 7 AEC 2 (1974), *further statement of Appeal Board views*, ALAB-175, 7 AEC 62 (1974), *affirmed sub nom., Citizens for Safe Power v. NRC*, 524 F.2d 1291 (D.C. Cir. 1975). With respect to site suitability, the Commission's safety standards are set forth in 10 CFR Part 100.

On the other hand, the National Environmental Policy Act does not establish minimal environmental site standards which must be satisfied as a condition precedent to licensing. As we pointed out in ALAB-366, the environmental review mandated by that statute entails a "balancing of costs and benefits, rather than [a] measuring . . . against absolute environmental standards . . ." 5 NRC at 62.⁵

Among the site suitability related issues raised in this proceeding were the environmental matters (related to the proposed cooling system) which we treated in ALAB-366 and the safety question (related to emergency planning outside of the low population zone) which we disposed of in ALAB-390. We turn here, and in Parts III and IV of this decision, to other such issues which still remain before us.

A. The site evaluation criteria of 10 CFR Part 100 focus in part on the relationship of the site to neighboring population concentrations. This relationship is analyzed in terms of three concepts: the exclusion area, the low population zone (LPZ), and the population center distance.

The "exclusion area" is the area immediately surrounding the reactor, "in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area" (§100.3(a)). Theoretically, there is no minimum (or maximum) size for an acceptable "exclusion area." But the area must be large enough that, given the plant's design, an individual located on its boundary will not, in the event of a postulated accident, receive a radiation dose in excess of specified reference values (§100.11(a)(1) and fn. 2).

The LPZ is the area immediately surrounding the exclusion area "which contains residents the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident" (§100.3(b)). As in the case of the

⁵We do not read the Commission's references in CLI-77-8, *supra*, to the *per se* environmental suitability or acceptability of particular sites (see e.g., 5 NRC at 514-15, 518, 521-22) as inconsistent with this analysis. For the Commission made no attempt to modify the similar analysis we had undertaken in ALAB-366, the decision under review (see our discussion at 5 NRC 60-63). In context, the Commission undoubtedly was referring to environmental suitability or acceptability as measured against the benefit to be derived from the facility—i.e., the ultimate cost-benefit balance for the facility (see CLI-77-8, 5 NRC at 518, n. 14).

"exclusion area," there theoretically is no minimum (or maximum) size of an LPZ. It too must, however, be large enough that, given the design of the plant, persons on its outer boundary will not receive more than a specified radiation dose in the event of an accident (§100.11(a)(2)). At the same time, it may not extend beyond the area that can be protected by emergency measures. Additionally, its maximum size is governed by the remaining population-related concept of "population center distance"—i.e., "the distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents" (§100.3(c)). That distance must be "at least one and one-third times the distance from the reactor to the outer boundary" of the LPZ (§100.11(a)(3)). In other words, the LPZ cannot extend beyond three quarters of the distance between the facility and the population center.⁶

The "exclusion area" for the Seabrook facility consists of the territory included within two overlapping circles (3000 feet in radius) centered at each of the containment buildings, which are 500 feet apart (SER, §2.1; 3 NRC at 863). The staff concluded that the applicable safety requirements as to the exclusion area had been satisfied (SER, §2.1, p. 2-11; SER, Supp. 4, §2.1, p. 2-3) and the Licensing Board endorsed this view. 3 NRC at 865. The LPZ proposed for the facility is "the area encompassed by a circle of radius 1.5 miles," and the Board held that this LPZ "meets the guideline radiation doses of 10 CFR Part 100." *Id.* at 875. These matters were not in serious dispute before the Licensing Board. Instead, the controversy there focused upon two questions: (1) whether there exists a "population center" closer to the reactor than the one identified by the applicants and approved by the staff; and (2) whether it is feasible to evacuate people in the vicinity of the reactor in the event of an accident. We now turn to these questions.

B. Agreeing with the applicants and the staff, the Licensing Board found Portsmouth, New Hampshire to be the nearest "densely populated center containing more than about 25,000 residents." 3 NRC at 875-77.⁷ That city is about 12 miles from the Seabrook site. No party disputes that, if Portsmouth were the nearest "population center," the population center distance criterion of 10 CFR §100.11(a)(3) would be satisfied, for its nearest boundary is much farther from the reactor than is required. The disagreement, both before the Licensing Board and on appeal, instead concerns whether Portsmouth in fact is

⁶We have previously discussed exclusion-area and LPZ requirements in some detail. See *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-248, 8 AEC 957, 961-66 (1974); *id.*, ALAB-268, 1 NRC 383 (1975); *id.*, ALAB-308, 3 NRC 20 (1976). See also ALAB-390, *supra*, 5 NRC at 736-38.

⁷Portsmouth had a 1970 population of "about 25,717" (SER, §2.1, p. 2-10).

the nearest population center—i.e., whether there is a center containing more than “about 25,000” residents which is closer to the site than Portsmouth.⁸

In concluding that Portsmouth is the nearest population center, the Board utilized 1980 population figures for various surrounding communities. In so doing, it made no reference to population figures for later years supplied by Charles Tucker, the Planning Director for the Southeastern New Hampshire Regional Planning Commission (and also ignored post-1980 predictions furnished by the applicants). Beyond that, in its use of the 1980 estimates, the Board applied the concept of “weighting” the transient population,⁹ as advocated by the applicants and staff. Both of these aspects of the Board’s analysis are challenged.

1. The Seabrook reactors are proposed for service in the early 1980’s, and the period of their licensed operation would run well beyond the year 2000. Yet, as just noted, the Licensing Board consistently analyzed the population of surrounding communities in terms of projections for 1980. It specifically made findings with respect to the 1980 population of the “beach area” near the site, as well as of the towns of Hampton, Hampton Falls and Seabrook (in New Hampshire) and Salisbury and Amesbury (in Massachusetts), and it rejected those communities as population centers on the basis of those 1980 figures. It made no mention whatsoever of projected population for those communities in later years.

The 1980 figures were those supplied by the applicants in their Preliminary Safety Analysis Report (PSAR) (including supplements) and the staff in its Safety Evaluation Report (SER), augmented by testimony presented at the hearing. Those sources provide extensive information on resident population at various distances from the site for the years 1970 and 1975, as well as projections of resident population at ten-year intervals for the years 1980-2020. See PSAR, Tables 2.1-1, 2, 3, 2.21-2, 2.21-4, S13.9-1, Figs. 2.1-5, 6, 7, 8, 9, 10, 2.21-2, S13.9-1; SER, Table 2.1-1, Figs. 2-4, 2-5;¹⁰ App. Dir. Test. No. 6, fol. Tr. 2495;

⁸In discussing the population center distance, the Safety Evaluation Report notes that the applicants had identified additional communities nearer to the site than Portsmouth which had 1970 populations well under 25,000: Amesbury, Mass., 4 miles away, with a 1970 population of 11,388; and Newburyport, Mass., 6 miles distant, with a 1970 population of 15,807. The SER recognized that certain projections indicated that these towns could grow to about 25,000 during the 40-year life of the plant, but it concluded that, even if Amesbury were the population center, “the proposed facility would still meet the criteria of 10 CFR Part 100 with respect to the LPZ and population center distance” (SER, p. 2-11). No party has expressed any disagreement with this conclusion.

⁹“Weighting” refers to the discounting of nonpermanent population in proportion to the length of time during the course of the year that the persons are not present in the area.

¹⁰The text of the SER refers to certain graphs (Figs. 2-4 and 2-5) as setting forth “1970” cumulative population figures; the graphs themselves state that 1980 figures are being presented. We assume that the latter designation appearing on the graphs is accurate.

App. Exh. 7; Grimes (staff), prepared testimony, fol. Tr. 4403. The PSAR deals with transients in somewhat less detail but includes estimated average daily summer population at two beach areas within 5 miles of the site at 5-year intervals from 1970 to 2020¹¹ (see PSAR, Table 2.1-3A), and summer resident and overnight transient, and daily transient, population for 1980 (Tables S13.9-2 and 3, Figs. S13.9-2 and 9-3). Further, the estimated transient and permanent population for the Seabrook and Hampton Beach areas as of November 1973, and for various radial sectors as of 1980, is provided (PSAR, Tables 2.1-9 and 10; Table S13.9-4). The SER also includes calculations for both resident population and resident plus "weighted transient" population. It discusses (at p. 2-9) information provided by the applicants as to the magnitude of transient population in the vicinity of the site ("information primarily consist[ing] of 1970 population . . . that could be supported by the total number of summer cottages, apartments, hotels and motel rooms, cars, and boats within an area of three miles of the proposed site").

Information on transient population in years after 1980 is more meagre. The material submitted by the applicants is limited to a brief description in a report prepared by consultants, which concludes (primarily upon the basis of beach attendance data from 1970-74 and lack of currently existing "firm" plans for construction) that, absent "major changes," peak population associated with the beaches is not likely "to experience a significant increase beyond 1980" (App. Exhibit 7, pp. 3-18, 19). The staff testimony expressed the same conclusion, without extended discussion (Grimes, *supra*, at p. 9).

The only witness who presented specific predictions for both resident and transient population of various communities for years beyond 1980 was Mr. Tucker. Applying four alternative assumptions concerning future development, he set forth projections for the Hampton-Seabrook beach areas and for Hampton Beach itself in 1995. Using the same assumptions, he also supplied figures for the towns of Hampton, Hampton Falls and Seabrook (which he described as a "single population center") for 1985 and 1995 (NECNP Exh. 12, p. 8).

2. Our prior decisions clearly establish—and we therefore would have thought that no further discussion of the point would become necessary—that the evaluation of a proposed site in terms of neighboring population concentrations must take into account not only the anticipated population at the inception of plant operation but, as well, predictable population growth in at least the early years of that operation. That is so with respect to population both in the low population zone (*Long Island Lighting Co.* (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 848 (1973)) and in nearby population centers

¹¹ The two beach areas were (1) the sum of Hampton Beach, North Beach, and Seabrook Beach; and (2) Salisbury Beach. No specific summer population figures were provided by the applicants for individual communities within the first of these beach areas.

(*Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-248, 8 AEC 957, 959-61 (1974)).

The *San Onofre* case is strikingly parallel to this one. There, we overturned a licensing board ruling that a particular community was not to be deemed a "population center" because its current population was only about 18,000; we found a "strong likelihood" that, during the first few years of reactor operation (if not before), the community would likely have a population of "more than about 25,000." We explained that ruling in terms which are as applicable here as there:

Part 100 does not specify the precise time at which the number of persons within a potential population center is to be measured. But, the purpose of the Part 100 criteria being to ascertain whether a particular site is suitable for reactor operation, it would make little sense to look only at the size of the population as of the time of the construction permit proceeding (several years prior to reactor operation). At the very least, consideration should also be given to the best available estimates as to what will be the population in the general vicinity of the reactor during the early years of actual operation.

8 AEC at 959-60 (footnotes omitted).

As noted above, the Licensing Board confined itself to 1980 population estimates. The applicants attempt to justify the Board's failure to make findings as to the post-1980 population of neighboring communities on the theory that the Board "obviously" adopted the prognostication of their consultant that, as of 1980, the populations of the beach area would reach a saturation point and not increase thereafter for a number of years. That line of reasoning is unpersuasive. For one thing, we are very loathe to read into any initial decision findings on a crucially important and strenuously contested issue which are not contained therein. Moreover, in this instance, the record would not permit resort to such a dubious practice.

To begin with, the applicants' no-growth evidence is not as unqualified as they would have us believe. The consultants' report (see p. 46 *supra*) states only that "[u]nless . . . major changes take place, peak population associated with beaches is not likely to experience a significant increase beyond 1980" (App. Exh. 7, p. 3-19). The changes which the report has in mind are those such as major razing of existing structures, relaxation of limitations on developing marshlands, modification of existing zoning and subdivision regulations, and construction of parking facilities outside the beach area with provision of transportation to that area. As a basis for concluding that those changes are not likely to occur, the report cites, without extended discussion, *inter alia* (1) the already developed status of the area; (2) a zoning ordinance passed in 1974 by the Town of Seabrook; (3) the lack of consideration (at the time the May 1975 report was

being prepared) by certain local agencies of any "plans for expansion of parking facilities at Hampton Beach State Park or Salisbury Beach State Reservation"; (4) little variation in peak beach attendance from 1970-74; and (5) the absence of "firm plans for construction of new hotel, motel, or camping accommodations" (*id.* at pp. 3-18 and 3-19).

On the other hand, Mr. Tucker gave a cogent explanation both for the lack of current building plans and for his prediction that expansion in the future would take place. He stressed that the transient population using the beach was restricted not by a lack of space on the beach itself but, rather, by the limited availability of nearby parking. He mentioned a variety of means for increasing available parking and opined that "[s]ignificant action on one, or all of these plans is highly likely by 1995" (NECNP Exhibit 12, p. 4). He also indicated that current development planning at Hampton Beach had been limited by the expiration in 1997 of 99-year leases given by the Town of Hampton, which owns the major part of the land at Hampton Beach, to the Hampton Beach Improvement Co., developer of the land. He expressed the view that, because of the reluctance of lessees to make capital improvements useful to them for only a relatively short period, it was likely that, within five years, the term of the leases would be extended or the land sold—bringing about extensive new development (*id.*, p. 6).

This analysis of future development and population trends by the Planning Director for the Regional Planning Commission with jurisdiction over the Seabrook area appears to us to have considerable substance and clearly could not have been dismissed by the Board below *sub silentio* in favor of a brief conclusory statement supplied by the applicants' consultants almost as an afterthought. Findings which resolve the differences between the testimony were required. Because the Board below failed to make these findings, we would ordinarily remand the case to it for further record development and decision on post-1980 population projections. There is no need to do so here, however, for as we explain below, we can dispose of the issues presented on other grounds, without regard to that particular matter.

3. The intervenors presented essentially two theories in support of their view that there exist (or will exist in the relatively near future) population centers much closer to the reactor than Portsmouth. The first is the so-called "doughnut" theory—*i.e.*, that the reactors (and the nearby marsh) are in effect a hole in the center of a ring of surrounding population. Utilizing their prognostication of post-1980 developments, there would be—without considering seasonal residents or transients—over 25,000 persons more or less permanently ensconced within a few miles of the reactor in several towns contiguous to one another.

The second theory is that the people on and in the vicinity of the beaches represent, in and of themselves, a population center. The validity of this theory depends, in part, on whether it is appropriate to "weight"—*i.e.*, to discount—the

summer crowds in proportion to the length of time they are expected to be present during the course of a year.

a. The people which the Coalition would have us group in its population "doughnut" reside in towns or areas which lie in different directions from the site. Although in its appellate brief the Coalition describes these towns collectively as a doughnut of "concentrated population around the plant," the Licensing Board found (and the record reflects) that "[s]alt marshes, strips of land along the beaches, and unpopulated and sparsely populated areas separate the major 'concentrations' of population by distances of one or more miles in both radial and azimuthal directions." 3 NRC at 876.

For the purposes of determining a population center, the Coalition would have us ignore the distances separating the various concentrations of population surrounding the plant. It relies essentially on requirements for conservatism which it believes must be employed in applying the criteria of 10 CFR Part 100. The Coalition asserts that conservatism requires a look at all of the population surrounding the site, "[g]iven the vagaries of the wind." "[U]sing the assumption that wind shifts may carry a radioactive cloud over several different quadrants during the course of an accident is," it asserts, "both reasonable and conservative."

The type of analysis is at odds with the objective underlying the concept of a population center distance. That concept is not used in site suitability determinations as a means of protecting individuals. That function is taken care of through the dose limitations and other protective requirements applicable up to the LPZ boundary. See ALAB-390, *supra*, 5 NRC at 736-38. Rather, the population center requirement is imposed to insure that the cumulative exposure dose to the population as a whole is kept within bounds in the event of a postulated major accident.¹²

Given this purpose, the fact that wind direction may shift is of no present moment. If such a shift occurs, the radiation dosage, while increasing in the sector corresponding to the new wind direction, will be reduced in the sector corresponding to the original wind direction. This being so, adding together the population in a number of sectors would make little sense.

This conclusion becomes clear upon analysis. For any specific number of people, the highest projected total dosages to the population as a whole will result if they are all located in one direction from the plant (and the wind is assumed to blow constantly in that direction). Thus, for example, if 25,000 individuals were to be found in a population center located in one general direction from the plant, and each were to receive a dose of "y" rem if exposed to the radioactive cloud for the entire period of its passage after an accident, the

¹²See statement of considerations for Part 100, 27 Fed. Reg. 3509 (1962), and also 40 Fed. Reg. 26526 (1975).

total population dose would be 25,000y. The same overall dose would not be encountered by two groups of 12,500 people living at the same distance but in significantly different directions from the plant. Assuming that, during the entire period of the radioactive cloud (assumed by the regulations to be 30 days), the wind shifted in such a fashion that each of the two groups was exposed to the plume for an interval of time sufficient to give it one-half of the maximum dose, the total population dose would be only 12,500y (*i.e.*, $12,500 \times 1/2y + 12,500 \times 1/2y$). In other words, a given number of persons who are congregated in one area (and thus might each receive the maximum dose occasioned by the accident) are more significant, in terms of the rationale behind the population center concept, than the same number of persons located in varying directions from the facility, all other things being equal.¹³

In collecting and analyzing population data, the staff and applicants dealt in terms of concentric circular areas surrounding the plant, dividing those circles into sixteen wedge shaped sectors, each covering an angle of $22\frac{1}{2}^\circ$.¹⁴ For some distance from the plant, there is essentially nothing but unpopulated marshland in the eastern half of those circles. Putting the beach to one side for the moment, the inland portions of the towns of Hampton Falls, Hampton and Seabrook, lying generally to the north and west of the plant, collectively cover eight or nine different sectors of the population grid,¹⁵ *i.e.*, they form a semi-circle around the facility. That entire area is now, and stands to be in the future, little affected by any influx of seasonal or daily visitors. Even if it be assumed that growth after 1980 in permanent population will result in there being more than 25,000 people within this area, it must be rejected as a population center. This is not because different political subdivisions are involved; for purposes of applying Part 100, political boundaries are inconsequential unless population

¹³ All other things will not necessarily be equal, and Part 100 does not assure that equal treatment will always be given to situations which are comparable in terms of total population dose. In other words, our use of the example in the text is not meant to suggest that the population center rule is a mathematically precise one. For, although in principle it is supposed to keep the total population dose to a level tolerable by society, no such level is set forth in the regulations and there is no requirement that calculations of potential total dose be made. We have on several prior occasions called attention to other difficulties we have had with the existing rule and the imprecision of the population center provisions can now be added to the list. Until amended by the Commission, however, we are bound to apply the rule according to its terms, at least in situations like the present one, where the result we reach is consistent with the spirit of the concept underlying the rule. In this connection, Part 100 is under present staff study which will likely culminate in a rulemaking proceeding.

¹⁴ See, *e.g.*, PSAR, figs. S13.9-1 to S13.9-4. This use of the $22\frac{1}{2}^\circ$ sectors was in conformity with Regulatory Guide 1.4, Revision 2 (June 1974), p. 1.4.3. The references in this opinion to particular sectors are to those identified in these figures.

¹⁵ *I.e.*, beginning generally southwest with sector 10 or 11 and continuing (past sector 16) through sector 2 to the north-northeast.

concentrations happen to respect those boundaries.¹⁶ Rather, it is because the people are so spread out, in terms of the ability of a postaccident radioactive plume to affect them, that there is no practical reason to group them together—and in no one general direction do the people number more than a small portion of 25,000.

We have, then, little difficulty in concluding that the landward portions of the towns do not constitute a population center. The areas in proximity to the beach, however, present a different question. There is no doubt that, at peak periods there, in excess of 25,000 people will be found in a densely populated area—indeed, no one disputes the claim that this area will be at times the most densely populated area in the State.

The question whether the beach and the closely contiguous areas housing the summer population¹⁷ qualifies strictly as a population center is open to different opinions. For the answer to this deceptively simple question turns on a number of disputed subsidiary issues including, *inter alia*: (1) the adequacy and validity of the projections in the record concerning future population increases in the beach environs; (2) the appropriateness of “weighting” summer residents and overnight and daily transients according to the length of their stay and, by so discounting them, thus reducing the number of people considered to be effectively present; and (3) the number of sectors (*i.e.*, the size of the angle) which ought to be considered in defining a population center. If we were to resolve all these questions in the applicants’ favor, it would turn out that the beach environs would not constitute a population center.

We believe it would not serve a useful purpose to take on each of these issues. For if we arrived at the conclusion that in theory the beach area did not qualify as a population center, we would be left with the nagging practical question—what account is to be taken of the large number of people on the beach? As we have held in an earlier opinion,¹⁸ no plans for their evacuation are required. Although adhering to that holding, we are nonetheless unwilling, in view of their proximity to the plant, to read Part 100 in such a crabbed fashion as to eliminate any need to review plant design with their welfare in mind.¹⁹ Nor is it necessary that we do so. For, by its terms, Part 100 makes it clear that it is not intended to furnish the final word in all situations. Specifically, it contains repeated admonitions that it is to be used flexibly—*e.g.*, it says plainly and at the outset that it was meant only as a “guide” (10 CFR §100.1(a)); it

¹⁶ See *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-248, 8 AEC 957, 960, fn. 7 (1974).

¹⁷ *I.e.*, sector 3 and the coastal areas south of it.

¹⁸ ALAB-390, *supra*.

¹⁹ See, in this connection, *Long Island Lighting Co.* (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 847-48 (1973).

goes on to explain that, in light of “[i]nsufficient experience and a “lack of certainty,” the Commission found it possible to provide only an “interim guide” which was “deliberately” made “flexible” (10 CFR §§ 100.1(b), 100.2(b)). And, significantly, in referring to the need to consider “[p]opulation density and use characteristics of the site environs,” the part tells us to include—but does not say to limit ourselves to—an evaluation of the exclusion area, low population zone, and population center distance. 10 CFR § 100.10(b).

In the circumstances, we believe we can best achieve the purposes of Part 100 simply by treating the beach environs as though they did constitute a population center. The next step is to ascertain the boundary of that center in closest proximity to the facility. The closest that the beach and the densely populated contiguous area approach the plant is at a point almost directly to the east, where Route 1A serves as the real boundary of the populated areas. The distance from the reactors to that point is approximately 1.67 miles.²⁰ We direct that it be treated as the population center distance.

What this means is that the presence of the people on the beach now must be taken into account in evaluating the adequacy of plant design. For as we have seen, the closer to the plant the population center is located, the smaller must be the LPZ. Because plant design must be such as to insure that the dose levels established in Part 100 are not exceeded at the outer boundary of the low population zone, the practical consequence is that additional safeguards may have to be built into the plant to make up for the reduction in distance at which doses are to be measured.

The LPZ proposed by the applicants had a radius of 1.5 miles. By reason of our alteration of the population center distance, the LPZ radius must now be reduced to approximately 1.25 miles. As it turns out, the record reflects that the plant is already well enough designed to meet the dose restrictions set forth in Part 100 even at that distance. (See Grimes, *supra*, p. 13). The distance between the LPZ and the leading edge of the densely crowded area will, in essence, serve as a buffer zone; it will insure that the radiation dosages the crowds might receive, by present definition not worrisome individually,²¹ will also not be of concern on a cumulative basis. This being so, no further steps need be taken by the applicants.

This is not the first time we have required a reduction in the size of a proposed exclusion area or low population zone. See *e.g.*, *San Onofre*,

²⁰ App. Dir. Test. No. 6 (fol. Tr. 2495), p. 11; see also Grimes, *supra*, pp. 12-13.

²¹ See ALAB-390, *supra*. As Mr. Farrar noted in his concurring opinion, the linchpin of our uniform holdings that emergency planning need not extend to persons outside of the LPZ was that, under the existing Part 100, those persons are to be deemed safe from exposure to dangerous levels of radiation (in an accident situation) even if they take no steps to protect themselves. 5 NRC at 750. See also Mr. Salzman's concurring opinion, *id.* at 748.

ALAB-248, *supra*, 8 AEC at 960-61; see also *Florida Power & Light Co.* (St. Lucie Nuclear Power Plant, Unit 2), ALAB-335, 3 NRC 830, 833-34 (1976). The Coalition argues, however, that it is impermissible for us to do so. It asserts that our function is simply to say "yea" or "nay" to the precise proposal put forth; if the proposal does not pass muster, we must decline to authorize any permit, remitting the applicant to run the gauntlet again by filing a new or amended proposal.

We do not perceive our role as being so limited, in connection either with the application of Part 100 or with any other safety question. To be sure, resolution of certain safety questions adverse to an applicant might sound the death knell for a plant. But in other instances a determination that a proposed design is inadequate can fairly take the form of a decision that a permit will issue on condition that the design be improved to the level which the evidence indicates will furnish reasonable assurance of safety. It would exalt form over substance to insist that we deny a permit outright rather than require the adoption of an improvement established to be satisfactory.

C. The remaining site suitability questions raised on appeal concern the Licensing Board's findings with respect to emergency planning (in particular, evacuation) in the event of a major accident. As earlier noted, in ALAB-390 we rejected the claim that emergency planning is required under existing regulations for areas outside of the LPZ. For this reason, we do not need to go into the sharply disputed issue respecting the evacuation of the beach areas or other territory likewise not encompassed by the LPZ. Rather, we can restrict our consideration to the evacuation of areas within the LPZ.

Obviously, the record information bearing upon this matter was developed in terms of a 1.5 mile LPZ, and not the 1.25 mile LPZ which we have just substituted for it. If, however, it has been established that evacuation or other protective measures are feasible in the larger LPZ, it perforce follows that such measures are feasible in the smaller one.

The applicants' evidence indicates that the permanent resident population within 1.5 miles of the reactors was 1519 in 1970 (PSAR, Fig. 2.1-9) and that it is projected to increase to 2209 in 1980 (*id.*, Fig. S13.9-1) and 8825 in 2020 (*id.*, Fig. 2.1-10).²² The applicants' estimate of the time required for evacuation of the LPZ was based on an assumed maximum of 9388 persons (including those, such as shoppers and workers, present on a transitory basis) (App. Exh. 8, p. 53). That number of persons was claimed to be evacuable from the LPZ to points beyond five miles from the reactors in 2 hours and 24 minutes (*id.*, p. 54). (No estimate was provided for the time required to evacuate persons to a point just outside the LPZ—the only evacuation which might be required—but, in any event, it would be a smaller time period).

²²As of 1980, the LPZ is not expected to include any summer resident and overnight transient population (*id.*, Fig. S13.9-2) or any daily transient population (*id.*, Fig. S13.9-3).

There is no direct evidence that the applicants have misgauged the time required for the LPZ evacuation. True, George L. Iverson, the New Hampshire state police captain in charge of the troop having jurisdiction over the Hampton Beach area (Tr. 3628) had expressed the belief that the applicants had underestimated, by a factor of as much as two, the period necessary to remove the much larger number of persons in the beach area (Tr. 3633, 3646). He had not, however, directed his attention to LPZ evacuation (Tr. 3741). For this reason, it is doubtful that his testimony can serve to discredit the applicants' estimate pertaining to it.

But were it nonetheless to be assumed that that estimate was in error by the same factor of two assigned by Captain Iverson to the beach area evacuation estimate, the fact would remain that the LPZ could be cleared of persons within five hours. The staff's evidence indicates that, in an eight-hour period following an accident, a person located on the *inner* boundary of the LPZ (*i.e.*, the outer boundary of the exclusion area) would receive a dose of 19 rem to the whole body and 173 rem to the thyroid (Grimes, fol. Tr. 4404, Table I dated June 27, 1975). This is well within the standard established by 10 CFR §100.11(a)(1). Farther out in the LPZ, the dose received during an eight-hour period would be smaller. And, of course, in a five-hour period the dose would be even less.²³

In these circumstances, we see no reason to disturb the Licensing Board's conclusions favorable to the applicants on the matter of emergency planning. 3 NRC at 875.

III. REACTOR SITING CRITERIA (SEISMIC)

The Commission's "reactor site criteria" specify, *inter alia*, that, in determining the acceptability of a site for a reactor, the Commission will take into consideration its physical characteristics, including its seismology and geology (10 CFR §100.10(c)). The criteria for evaluating these characteristics appear in Appendix A to Part 100.

Insofar as the Seabrook site is concerned, that Appendix requires that there be ascertained a "safe shutdown earthquake"—*i.e.*, one "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" and "which would cause the maximum vibratory ground motion at the site . . ." (10 CFR Part 100, Appendix A, § §III(c), V (a)). The vibratory ground

²³We note in passing that most of the persons residing in the LPZ are (and will continue to be) located in Hampton Falls and the nonbeach sections of the Town of Seabrook, in a south to west/northwest direction from the site (PSAR, Figs. 2.1-8, 2.1-9, 2.1-10). Evacuation from these areas would not use routes running through the beach areas (*id.*, Fig. 2.1-10a).

motion of that earthquake at the site must also be determined (*id.*, §V(a)). And the appendix goes on to require that the nuclear power plant be designed so that, "if the Safe Shutdown Earthquake occurs, certain [specified safety] structures, systems, and components will remain functional" (*id.*, §VI(a)).²⁴

The appendix also identifies certain of the investigations and steps required to ascertain the safe shutdown earthquake for a site and then to determine how an earthquake of that intensity would affect the proposed facility. Among other things, all "historically reported earthquakes which have affected or which could reasonably be expected to have affected the site" must be listed (*id.*, §IV(a)(5)). The epicenters or locations of highest intensity of those earthquakes are, where possible, to be correlated with tectonic structures any part of which is located within 200 miles of the site; where correlation with tectonic structures is not reasonably possible, the epicenters must be identified with tectonic provinces any part of which is located within 200 miles of the site (*id.*, §IV(a)(6)).²⁵ Using that information, the vibratory ground motion at the site of each earthquake is determined by assuming (1) that the epicenters of earthquakes related to a tectonic structure are situated at the point on the structure closest to the site; (2) that the epicenters of earthquakes identified with the tectonic province in which the site is located (albeit not with structures) are located at the site; and (3) that the epicenters of earthquakes identified with other tectonic provinces are situated at the closest point to the site on the boundary of the respective tectonic provinces (*id.*, §V(a)).

The Coalition raised questions concerning both the intensity of the safe shutdown earthquake for Seabrook and the vibratory ground motion produced by various intensities of earthquakes. The applicants and the NRC staff had taken the position that the safe shutdown earthquake for Seabrook had a maximum intensity of VIII (measured on the Modified Mercalli scale) and might result in that intensity at the site, and that "the SSE acceleration of 0.25g proposed for the Seabrook Station, Units 1 and 2, [is] an adequately conservative value" (Safety Evaluation Report (SER), Supp. No. 1, par. 2.5.3.2). The U.S. Geological Survey, which the staff had called upon for advice, independently had reached a similar conclusion (SER, Supp. No. 2, Appendix C, p. C-6).

The Licensing Board analyzed in considerable detail these seismic questions and reached the same result as had the applicants and the staff. 3 NRC at 868-71; 919-22. In doing so, the Board rejected the position of the Coalition

²⁴These are all generic requirements, applicable to the siting of every nuclear power facility.

²⁵For Appendix A purposes, "tectonic province" refers to "a region of the North American continent characterized by a relative consistency of the geologic structural features contained therein." A "tectonic structure" is "a large scale dislocation or distortion within the earth's crust." Appendix A, § III(h) and (i).

witnesses that the safe shutdown earthquake should be found to have, at a minimum, an intensity of Modified Mercalli IX and that such an earthquake would produce an acceleration at the site of .75g. The Board also rejected the Coalition's alternative claim that, if the safe shutdown earthquake were of the intensity of a Modified Mercalli VIII, the site acceleration would be .40g.

On appeal, the Coalition asserts that the Board made both legal and factual errors. Its claim that the Board failed to explain how its findings comported with guidelines in Appendix A is well taken; but the error, if any, is harmless. Beyond that, our review of the record indicates that, with limited exceptions resulting from a recent Commission modification of applicable guidelines, the Licensing Board both dealt sufficiently with the seismic issues raised by the Coalition and the testimony presented by it and reached the correct result. We need here add to the Board's discussion in only the following respects.

A. In evaluating the site's maximum earthquake potential—*i.e.*, for purposes of determining the safe shutdown earthquake—it is important to determine the appropriate province in which the site is located. Because of particular geologic characteristics of the Seabrook area, this task is not as simple as might be thought.

The New England tectonic province as described by the staff (Tr. 11893-94) extends roughly along the Atlantic coast and has both lowland and an upland section. The lowland section is about 40 miles wide and extends from the New England upland on the northwest to a submerged boundary with the Coastal Plain (lying beneath the ocean about 20 miles from the Seabrook site) on the southeast. The site lies in the central portion of this section. The western edge of the upland section extends approximately from southeast of Lake Champlain across the northern border of Maine. The entire section rises from an elevation of about 500 feet (on the east) to 2000 feet (on the west). 3 NRC at 869; SER Supp. No. 1, §2.5.1.

It has been noted in the literature that, cutting across the New England tectonic province and on into Canada, there is a "trend" in which a clustering of earthquake activity has been recorded (Tr. 11912-13). Known as the "Boston-Ottawa seismic belt," it traverses the Appalachian Mountains and extends from the "Canadian Shield"²⁶ through Montreal and Boston and then directly out to sea (SER, Supp. No. 1, §2.5.3.1). The staff's SER characterized the seismic activity within this "belt" as being "anomalous with respect to the New England tectonic province as a whole" (*id.* at p. 2-9).

The Board divided the belt into two regions, based on reported historical earthquake activity: the northern or northwestern region, "from upstate New York approximately to James Bay in Canada," and the southern or southeastern

²⁶ The Canadian Shield is also sometimes referred to as the Laurentian Shield or Grenville Province.

region in New Hampshire and Massachusetts. 3 NRC at 869. The northwestern region lies within the Grenville tectonic province. Between the two regions within the belt is the Green Mountains area which, the Board found, "appears to have exhibited little or no earthquake activity." As a result, the Board derived a structural basis for differentiating between the northwest and southeast regions of the belt and the intermediate mountainous area. It acknowledged that it was unable to correlate particular earthquakes with specific known tectonic structures. *Id.* at 870. But it nevertheless was able to correlate clusters of earthquake activity in the northwest with structural formations in that region, and similar clusters of activity in the southeast with structural formations in that other region. *Id.* at 869.

To determine a safe shutdown earthquake for the Seabrook site (which is in the southeast region of the belt), the Board considered only earthquake activity in that region. The Board determined the most severe disturbances to have been the Cape Ann earthquakes of 1727 and 1775, each of which it found to have had an intensity of VIII on the Modified Mercalli scale. It therefore concluded that the "maximum earthquake reasonably to be expected" in the region is a Modified Mercalli intensity VIII, which "can result in that intensity at the Seabrook site." *Ibid.*

The Coalition advances three different theories for its claim that the safe shutdown earthquake should at a minimum be a Modified Mercalli intensity IX. We will treat them *seriatim*:

1. First, the Coalition relies on the probabilistic hypothesis advanced by its witness, Dr. Michael Chinnery, who concluded that the probability of occurrence of an intensity IX earthquake at the site is approximately 10^{-3} /yr. Reasoning that the desired objective is a probability of no more than 10^{-7} (derived from safety goals enunciated by the staff in other contexts), the Coalition argues that 10^{-3} represents an unacceptable level of risk.

As we view it, there are several flaws in Dr. Chinnery's theory which undercut its usefulness in determining the maximum earthquake intensity at a given site. In his probabilistic approach, Dr. Chinnery went beyond reported historical earthquakes in a particular area and attempted to predict, through a form of statistical analysis, the probabilities of occurrence of various larger earthquakes in that area. In this connection, he considered recorded New England earthquakes as well as data from other areas asserted to be "similar" to New England—specifically, the Mississippi Valley and southeastern United States (Tr. 3975). In Figure 1 of his prepared testimony (NECNP Exh. 10), he plotted three curves showing the probability per year (inverse of return period) of various intensity earthquakes measured against the epicentral intensities. The resultant curves for the Mississippi Valley and southeastern United States lie closely together and are roughly parallel. They cover a range of intensities from III through IX. A similar plot for the New England area provided a curve running

from intensity II to intensity VII,²⁷ roughly parallel to the other two curves but with the probability per year of each size earthquake at least ten times less than for the other two areas.

In utilizing the data, Dr. Chinnery made two crucial assumptions: (1) that there is no limit to the intensity of earthquakes to be expected in any given area and, therefore, data from one area can be employed in determining the probability of earthquakes in another area; and (2) that the probability curves in his Figure 1 can be *linearly* extrapolated to higher intensities. But he gave no basis for either of these assumptions, and we know of none.

With regard to the first of these assumptions, Dr. Chinnery apparently believes that, for present purposes, the Mississippi and southeastern United States areas can be treated as "similar" to New England even though their earthquake frequencies are higher and greater intensities have been recorded in those regions. When pressed on cross-examination, however, he admitted that the type and age of the rocks in the area around Seabrook are entirely different from those in the other two areas (Tr. 4047-48), and that he had considered them "similar" only in that all three are not in the vicinity of the boundaries of the North American plate (Tr. 3976). He had given no consideration to, in fact admitted little specific knowledge of, the geology of either the southeastern United States or the Mississippi Basin areas (Tr. 3978).

On the other hand, Dr. Chinnery disclaimed any comparability between the California seismic situation and that of New England. One assigned reason was that, in California, large blocks of crust are in movement at the plate boundary while, in New England, the earthquakes occupy much smaller volumes (so he assumed) (Tr. 4022-24). Additionally, he noted that the frequency of major earthquakes in California is "a factor of about 40 greater" than in New England. Yet it appears from Dr. Chinnery's own statements that California has an historical earthquake intensity range equivalent to that in each of the southeastern United States and Mississippi Basin regions, and has an earthquake frequency occurrence rate only four times greater than those two regions.²⁸ This being so, we see no more reason to equate the New England area to the southeastern United States and the Mississippi Basin than to compare it to California.

Dr. Chinnery's second assumption rests on an even shakier foundation. As we have seen, his Figure 1 shows plots of probability of earthquake occurrence versus the intensity of the earthquake. In the range of intensities from II through VI, the curve for the New England area indicates an increasingly rapid decrease

²⁷ For this purpose, Dr. Chinnery assumed the Cape Ann earthquakes to be intensity VII (NECNP Exh. 10, p. 2 and Fig. 1; Tr. 3973-74).

²⁸ Dr. Chinnery stated that the frequency of earthquakes in California is 40 times greater than in New England (Tr. 4023). He also stated that the frequency of earthquakes in the Mississippi Basin and in the southeastern United States is an order of magnitude (10 times) greater than in New England (Tr. 3991).

in probability of the occurrence of earthquakes with increasing intensity. The limited data on intensity VII earthquakes, however, appear to show a sudden reversal of this curve. To obtain the probability of occurrence for higher intensity earthquakes, Dr. Chinnery merely extended a straight line generally between the points for intensities IV, V and VI and through the exact location of intensity VII (Tr. 4007-8). In other words, he gave full weight to only intensity VII and assumed a straight line roughly averaging the points for intensities IV, V and VI, even though the trend of those three points is obviously *not* linear. We are at a loss to understand the physical or mathematical basis for such an extrapolation, particularly in view of Dr. Chinnery's answer to a question from Dr. Salo in which he conceded:

I personally suspect that the data for intensities IV, V and probably VI are reasonably reliable. I cannot prove it, but it seems reasonable to me.

I wouldn't trust the point at intensity VII, because there are so few earthquakes that go to make up that data point.

Tr. 4056-57 (emphasis supplied).

Given this circumstance, an extrapolation normally would be made with a best-fit curve for intensities IV, V and VI and *not* with a straight line extension from intensity VI through the very suspect intensity VII. The result of the application of a best-fit curve would be that an intensity VIII would be the maximum and then only with a 10^{-5} or 10^{-6} probability of occurrence.²⁹

Even were these technical deficiencies in Dr. Chinnery's earthquake analysis to be disregarded, the question would remain whether resort to that analysis could be reconciled with Appendix A to Part 100. By its terms, the appendix focuses on "historically recorded earthquakes" and an evaluation of the "seismology, geology, and the seismic and geologic history of the site and the surrounding region." At the time of both the Licensing Board hearing and the initial decision, however, Appendix A also included the following clauses:

The magnitude or intensity of earthquakes based on geologic evidence may be larger than that of the maximum earthquakes historically record. . . .

In order to compensate for the limited data, the procedures . . . shall be applied in a conservative manner.

Those clauses had been the source of a petition for rulemaking which sought a

²⁹On this curve, an intensity IX would never be reached. If the less reliable intensity VII data point were used by fitting all of the data points (*i.e.*, IV, V, VI and VII) on a least squares basis, the probability of an intensity VIII earthquake would be less than 10^{-4} , and an intensity IX would still never be reached. In this connection, we have used the data points exactly as they are shown in that figure, and estimated a best-fit extrapolation using a french curve.

declaration that, in appropriate circumstances, earthquakes of higher intensity than those historically recorded could be taken into account—i.e., that the probabilistic theory (or some such approach) be sanctioned (40 Fed. Reg. 20983 (May 14, 1975)). Effective January 10, 1977, the Commission acted on the petition by issuing a clarifying amendment which, in effect, requires consideration only of historical earthquakes except where an assumption of the possible occurrence of higher intensity earthquakes were warranted by “geological and seismological data” (42 Fed. Reg. 2051). Examples of the types of data which might warrant selection of a larger earthquake were stated (in the statement of considerations) to be

- (1) Where the highest intensity of historically reported earthquakes is determined to have been experienced at the site taking into consideration site foundation conditions,
- (2) where seismicity in the immediate site vicinity is significantly higher than that generally existing in the tectonic province as a whole,
- (3) where there exists in proximity to the site [a] tectonic structure demonstrably like that found where larger earthquakes in the tectonic province have occurred historically.

Ibid. In short, under the clarification, there must be geological and seismological data to justify using a larger earthquake than otherwise required in determining the safe shutdown earthquake.

We find no such data in this record directly pertaining to the New England area. It may nonetheless be possible for Appendix A purposes to use the probabilistic approach to determine the probability of the occurrence of a certain intensity earthquake in one area from the data in a second area. To do this, however, complete *geological* data (e.g., rock type, age, type and magnitude of stress) must be available for both areas in question and must reflect that a close geological similarity exists; further, reliable seismological data must be at hand for at least one of the two areas. Dr. Chinnery’s analysis did not contain these ingredients. No attempt was made to demonstrate geologic or seismic similarities between New England and the southeastern United States or the Mississippi Basin areas pointed to by Dr. Chinnery.

In sum, Dr. Chinnery’s probabilistic theory, as presented on this record, is both technically deficient and inconsistent with Appendix A, and is hereby rejected.

2. The Coalition’s second ground for advocating the use of an intensity IX safe shutdown earthquake is that the earthquake which should be brought to the site (for analysis purposes) is the 1732 Montreal earthquake, which occurred in the Grenville province, within the northwestern cluster of earthquakes in the Boston-Ottawa “belt.” While the record reflects serious question as to its intensity (Tr. 11892-3), the parties have accepted it as an intensity IX event.

On the facts of this case, Appendix A would require the Montreal earthquake to be brought to the site for analysis purposes *only* if it were both in the same tectonic province as the site and either (1) incapable of being associated with any tectonic structure³⁰ or (2) associated with a structure demonstrably akin to a structure near the site. See pp. 55, 60, *supra*. Since that earthquake occurred in the Grenville province, it was not in the same province as is the site. Nonetheless, the Coalition would treat the Montreal earthquake as if it were in the same province; in its view, the entire Boston-Ottawa belt should be considered to constitute a single province. But this line of reasoning ignores the lack of continuity in seismic activity upon which the Board—properly, in our view—relied as creating two distinguishable areas. More specifically, there is a well documented seismic gap between the New Hampshire-White Mountain zone (in which the site is located) and the Montreal-Ottawa zone (Tr. 11889-91). This gap coincides with the Green Mountain Anticlinorium. The gravity level throughout the anticlinorium is consistently high; as one moves away from the anticlinorium into either of the two adjacent zones, seismic activity begins to increase (Tr. 12009-10).

Even if the situs of the Montreal earthquake were assumed to be in the same province as the Seabrook site, the Coalition's position would not be improved. The Montreal earthquake was concededly associated with a group of structures known as the Monterregion Hills intrusives. The Coalition claims that this structure is similar to the White Mountain intrusives, the group of structures associated with the environs of the Seabrook site. The record, however, does not bear out this claim.

The New Hampshire seismic zone correlates in a general spatial way with the White Mountain intrusives. But there is no one-to-one correlation between a particular earthquake and a specific structure, no causal relationship has been shown, and no surface faults have been located (Tr. 11913, 11918-19, 4021-22). The general trend of the higher seismic zone and of the intrusives is northwest-southeast. The intrusives in this area appear to have been emplaced in three episodes—the first about 220 million, the second 180 million, and the third 110 million years ago (Tr. 11954).

By contrast, Monterregion Hills is a younger set of intrusives, approaching 100 million years in age. These intrusives trend almost directly eastwest (*ibid.*). In addition, the Montreal-Ottawa region is characterized by the existence of the Ottawa-Bonnechere Graben (Tr. 11915).³¹ This Graben is essentially a parallel fault zone extending along the line of the Monterregion Hills intrusives toward

³⁰In our view, an earthquake which can be associated with a group of intrusives of similar age and characteristics is to be deemed to be associated with a tectonic structure for this purpose.

³¹A graben is a long crusted block. It is bounded by faults along its sides and is depressed relative to the surrounding area.

Ottawa. In other words, this region is characterized by both an extensive fault zone and young intrusives.

3. The Coalition's third reason for pressing for an intensity IX safe shutdown earthquake is that the 1755 Cape Ann earthquake (which all parties agree must be brought to the site for analysis purposes) was in fact of that intensity rather than the intensity VIII found by the Licensing Board. 3 NRC at 870. It acknowledges that the earthquake has been assigned different intensities by different researchers but observes that, in 1962, the author of the official publication of the Dominion Observatory of Canada listed the event as an intensity IX. Given these uncertainties, the Coalition argues that the conservatism inherent in Appendix A requires the designation of the safe shutdown earthquake as a Modified Mercalli intensity IX.

The uncertainties, however, are not as pronounced as the Coalition would have us believe. While records of old earthquakes are not as trustworthy as might be desired, and while the Canadian researcher did classify the Cape Ann earthquake as an intensity IX, other testimony reflects that the earthquake was very likely of intensity VII (Tr. 3283-4). Moreover, the record reflects that the Canadian researcher did not base his designation on a review of original sources (*ibid.*). Even Dr Chinnery did not dispute the VIII designation; indeed, for his plotting purposes, he assigned a VII to the earthquake.

Given these considerations, the record provides a sufficient basis for the Licensing Board's treatment of the 1755 earthquake as an intensity VIII earthquake, and we decline to upset its findings in this respect.

B. Having accepted the Licensing Board's determination that intensity VIII should be assigned to the Seabrook safe shutdown earthquake, we must still determine the maximum acceleration which might result from such an earthquake and which specified facility components must therefore be designed to withstand. The same basic data were used by all of the parties to determine the correlation between earthquake intensity and ground acceleration. Many of the data were collected by Dr. Mihailo Trifunac, who was a witness for the Coalition. All of the witnesses testifying on the intensity-acceleration correlation agreed that, for an intensity VIII earthquake, the mean value of the acceleration peaks is no greater than 0.25g.³² However, there was disagreement on whether that mean value—or instead some higher value—should be used in the design of the Seabrook facility.

Dr. Trifunac pointed out that there is a wide variation in the value of the acceleration peaks included in the calculation of the mean. He noted that the

³²Richard J. Holt, John R. Rand and Rev. David Linehan for the applicants (App. Dr. Test. No. 8, fol. Tr. 3221, p. 15); Mihailo Trifunac for the Coalition (NECNP Exh. No. 8, Appendix, p. 15 and Fig. 4); J.C. Stepp, S.M. Coplan and Nathan M. Newmark for the staff (Staff Dir. Test. fol. Tr. 2812, p. 7 and fol. 2813, pp. 4-5.)

standard deviation was approximately 50 percent of the mean value. He therefore suggested that the "reasonable upper bound" for the design horizontal acceleration should be the mean value plus one standard deviation, or approximately 0.4g. (NECNP Exh. 8, p. 3).

The other witnesses uniformly expressed the contrary view that 0.25g was an acceptable design value for the Seabrook facility. Dr. Newmark testified without contradiction that the highest acceleration peaks are associated with the highest frequency ground waves. These high frequency waves would be fully recorded by the relatively small and compact seismographs, but yet would have no significant effect on the large massive structures of a nuclear facility (Newmark Dir. Test., fol. Tr. 2813, p. 7). Thus, included in the mean of the acceleration peaks are a number of high frequency peaks which can be discounted insofar as this facility is concerned.

There is no reason not to credit this testimony. Beyond that, it serves as an adequate basis for the finding below of a 0.25g design value. True, Appendix A to Part 100 (in §VI(a)) requires the employment for design purposes of "the maximum vibratory acceleration at the elevations of the foundations of the nuclear power plant." Under any rule of reason, however, that requirement must be understood to have reference to *effective* maximum acceleration. So interpreted, the appendix does not proscribe the exclusion from consideration of high frequency waves which would not have any discernible impact upon the facility. And, if thus excluded, resort to the mean of the peak accelerations is totally reasonable.

Our conclusion respecting the acceptability of a 0.25g design value is buttressed by data supplied by Dr. Trifunac. He included in his prepared testimony a table entitled "Expected values and their standard deviations for peak acceleration, velocity and displacement as functions of Modified Mercalli intensities in the Western United States" (NECNP Exh. 8, Table III). In that table, the mean horizontal peak acceleration for an intensity VIII earthquake is given as 166.67 centimeters per second per second (cm/sec^2) with a standard deviation of 84.06 cm/sec^2 . This results in a value of 251 cm/sec^2 for the mean peak acceleration plus one standard deviation. Stated otherwise, adding one standard deviation to the average peak acceleration produces virtually the precise equivalent of 0.25g.³³

As Dr. Trifunac himself stressed, the standard deviation is employed to take into account the wide variations in the value of the acceleration peaks included in the calculation of the mean peak acceleration. Thus, it serves to compensate for the fact that the maximum peak acceleration will have a greater value than the mean. In short, the addition of the standard deviation to the mean provides

³³By definition, one "g" represents 980.665 cm/sec^2 . *Handbook of Chemistry and Physics* (53rd ed. 1972-1973), p. F-67.

(as Dr. Trifunac suggested) a "reasonable upper bound" for the design horizontal acceleration. See p. 63, *supra*.

Dr. Trifunac would not, however, apply the Table III data to the Seabrook site. Rather, as we have seen, he would add the standard deviation to a mean value of 0.25g rather than of .165g (*i.e.*, the equivalent of 166.67 cm/sec²). His justification for selecting the higher mean value seems to be that peak accelerations at hard rock sites (such as Seabrook) are considerably greater than those at alluvium sites (NECNP Exh. 8, pp. 15-25, Table V and Fig. 10). The values in Table III were derived from accelerations associated with varying geological conditions.

But it also appears that the increased peak accelerations at hard rock sites are occasioned by high frequency ground waves not recorded at alluvium sites (where they are strongly attenuated). As we have noted, high frequency waves do not affect heavy concrete structures. This was acknowledged by Dr. Trifunac in his discussion of the 1971 earthquake in the vicinity of the Pacoima Dam in southern California. Although that earthquake produced a peak acceleration of 1.25g, the dam was not damaged. Dr. Trifunac explained this in terms of the dam being "a very large concrete structure which is sensitive to very long [*i.e.*, low frequency] waves" (Tr. 3148). In this connection, he noted that the 1.25g acceleration was "representative" of high frequency waves (between 1 and 25 cycles per second) (*ibid.*).³⁴

C. During our appellate consideration of the initial decision, several motions have been filed with respect to seismic questions. On January 28, 1977, the Coalition filed a motion seeking summary reversal of the Licensing Board's determination on such questions and an additional hearing on related matters. In response, the staff also sought a reopening of the record, albeit not for the purpose of altering the result reached below.³⁵ The Coalition joined that request but, by motion filed on February 23, 1977, sought consideration of additional seismic material. We deny all of the motions. Only the last of them warrants discussion.

The February 23rd motion sought consideration at a reopened hearing of a not yet published article by Dr. M. F. Kane of the U.S. Geological Survey.

³⁴In further justification for the assignment of a 0.25g design value, Dr. Newmark called attention to several analytical conservatisms which will be utilized in the design of this facility. See 3 NRC at 922. There is a sharp dispute on the appeal respecting whether Appendix A proscribes reliance upon such factors. That question is not free from all doubt. But in the circumstances we need not resolve it here.

³⁵In normal circumstances at least, a request for reopening must be accompanied by a showing that the outcome of the proceeding might be affected thereby. See *e.g.*, *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-138, 6 AEC 520, 523 (1973).

According to the Coalition, that article supports its position that selection of a safe shutdown earthquake greater than intensity VIII is required.

The Coalition reads the Kane article as drawing a "correlation between measured magnetic anomalies—presumably caused by extensive mafic or ultramafic masses embedded in the crystalline basement—and seven major eastern North American earthquake areas," including the Cape Ann area. The magnetic anomalies are asserted by the author to define areas where seismic activity is likely to concentrate, and the dimensions of mafic/ultramafic plutons are said by him to be possibly related to the earthquake potential of the region: *i.e.*, the larger the pluton, the larger the earthquake. The Coalition reasons that, because the Charleston, South Carolina pluton and the Cape Ann pluton are comparable in size, an earthquake comparable to the intensity IX or X Charleston earthquake of 1886 might occur off the Cape Ann pluton.

This line of argument appears to ignore the express limitations of the Kane study. According to that study, in areas (such as the Cape Ann area) where large earthquakes have occurred there has also been the presence "of mafic-ultramafic masses as evidenced by gravity anomalies"—*i.e.*, plutons. But the study specifically concluded that "[t]he converse, however, does not hold." In short, the study does not appear to support the proposition for which the Coalition would have us use it—*i.e.*, that earthquake size can be predicted by analysis of the size of plutons. That being so, reopening the record to consider the implications of the study is not warranted.³⁶

IV. ALTERNATE SITE INQUIRY

A. With respect to questions of an environmental nature bearing upon the Licensing Board's acceptance of the Seabrook site, the Coalition, SAPL-Audubon and Massachusetts claim that there has not been an adequate analysis of alternate sites, as required by NEPA. The Board first noted that the applicants and staff had considered 19 alternate sites in New Hampshire and Maine, of which four were considered "preferred potential alternates to Seabrook." 3 NRC at 907. It then listed the salient characteristics (in terms of advantages and disadvantages) of these four sites (without giving any hint why *it* considered

³⁶We do not address at this time the dissenting views of Mr. Farrar with regard to our disposition of the seismic issues presented by the appeals from the initial decision. As Mr. Farrar has indicated, p. 106, *infra*, he is reserving a detailed exposition of his position for a supplemental opinion (in order not to delay unduly the release of the majority's decision). In the circumstances, it would seem appropriate to await that supplemental opinion before coming forth with a rejoinder. It suffices for the present to note that none of the considerations outlined in Mr. Farrar's dissent persuades us that we are wrong in the conclusions we have reached on the seismic issues.

these four superior to the others). Following this listing, the Board concluded (again without giving any reasons) that the Litchfield site³⁷ is superior "on balance" to the other alternatives and that "none of the alternatives [is] preferred over the Seabrook Site." *Id.* at 911.

The Licensing Board compared the various alternate sites with Seabrook on the assumption that once-through cooling would be used at Seabrook and that the most appropriate cooling system would be used at each of the alternate sites. See ALAB-366, 5 NRC at 59-60; CLI-77-8, 5 NRC at 512, 520. Although the uncertainties created by the EPA Regional Administrator's initial decision last November raised a question as to the sufficiency of this basis of comparison, the June 17, 1977, decision of the EPA Administrator approving the once-through cooling system at Seabrook eliminated those uncertainties.³⁸

Nevertheless, we agree with the intervenors that the Licensing Board's comparative analysis of the Seabrook site with once-through cooling and the 19 alternate sites was inadequate.³⁹ Without saying so, the Board in effect adopted the conclusions expressed by the staff but gave no reasons for pursuing that course. The Board failed even to refer to the reasons assigned by the staff in the FES and in direct testimony (fol. Tr. 10286). Although a board may utilize its expertise in selecting between alternatives, some explanation is necessary. For otherwise the requirement of the Administrative Procedure Act that conclusions be founded upon substantial evidence and based on reasoned findings "become[s] lost in the haze of so-called expertise." *Baltimore & Ohio R. Co. v. Aberdeen & Rockfish R. Co.*, 393 U.S. 87, 92 (1968).

Nonetheless, there are two considerations which permit us here to ratify the selection of the Seabrook site over the 19 alternate sites identified in the initial decision. The first is the Commission's recent clarification in CLI-77-8 of the standard to be used in evaluating alternate sites. The second is that the record is significantly more informative on the matter than the initial decision might suggest.

1. The site comparison standard which was employed by the Commission in CLI-77-8 may be given a shorthand description as one of "obvious superiority"—an application is not to be "denied on the basis of a comparison between the applicant's proposed site and an alternative site unless the alternative site appears to be obviously superior to the proposed site." 5 NRC at 514. Further, the comparison which is undertaken may reflect "the actual cost and time necessary to complete a facility at each of the locations in question." *Ibid.*

³⁷This site is located on the Merrimack River, about 10 miles south of Manchester (Final Environmental Statement (FES), Table 9.2, p. 9-8).

³⁸This assumes, of course, that the decision is not overturned on judicial review.

³⁹We leave for later discussion (see p. 73, *infra*) the matter of the Licensing Board's comparison of the Seabrook site with additional sites in a supplemental decision rendered on July 7, 1977. LBP-77-43, 6 NRC 134.

In formulating this standard, the Commission emphasized the extensive review which is given to alternate sites prior to the initiation of the adjudicatory proceeding. As it observed, that review commences prior to the filing of the application for the construction permit. For the applicant is required to develop environmental information, including that bearing on alternative sites (see Regulatory Guide 4.2, §§9.2 and 9.3), and to submit the results to the Commission in its environmental report (which becomes part of its application). 5 NRC at 523. During the development of this information at the preapplication stage, the applicant and NRC staff routinely hold conferences, so that the staff examination of alternate sites may also get underway before the application is transmitted to it. After the application has been formally docketed, the environmental report is made available to the public, comments are invited, supplementary information may be submitted and the staff undertakes the preparation of its draft environmental statement (DES). Additionally, the adjudicatory proceeding is usually noticed for hearing at this juncture and, as soon as contentions are identified, discovery may begin. Thereafter, the DES is completed and circulated for comment to various governmental bodies and the public. The DES includes the staff's formal position on site alternatives. Subsequently, a final environmental statement (FES) is prepared, and it includes the results of the staff's review of any additional information on alternate sites submitted through comments on the DES. Finally, at a point which the Commission characterized as coming "late in our licensing process" (*ibid.*), the environmental review of alternate sites receives its first adjudicatory consideration.

Against this background, the Commission concluded in CLI-77-8 that

Two significant realities of the NEPA process support the use of the standard of obvious superiority—the inherent imprecision of cost-benefit analysis and the probability that more adverse information has been developed respecting the closely examined proposed site than any alternates. The imprecision springs from the nature of the cost-benefit analysis the Commission must perform: in the nuclear licensing context the factors to be compared range from broad concerns of system planning, safety, engineering, economic and institutional factors to environmental concerns, including ecological, biological, aesthetic, sociological, recreational, and so forth. Much of the underlying cost-benefit data is difficult of articulation, much less quantification. Given these difficulties, any evaluation of a particular site must inevitably have a wide margin of uncertainty. If accurate overall assessments of these diverse factors were realistically available, one could appropriately employ a fairly strict standard of comparison and still have a high degree of confidence that the correct result had been reached. But where the data to be compared necessarily present a wide margin of uncertainty, one site must appear to be substantially "better." To reject an application—the only means available for indicating the preferability of an alter-

nate site—at this late stage in the licensing process requires substantial confidence that one's judgment is correct—a confidence that can only arise where an alternate site is obviously superior.

This conclusion appears the stronger when one considers that the applicant's proposed site comes before the Board after having been intensively studied by the applicant, staff and intervenors for a period of years. The applicant is required to have produced an inventory of information about the geology, hydrology, meteorology and ecology of the proposed site. Through this required monitoring it is hoped that every major environmental impact that may result from construction of the facility will have been located and the potential problems with the site will have been identified. The alternate sites to which the proposed site is compared have undergone no comparable study. Common sense teaches that the more closely a site is analyzed, the more adverse environmental impacts are likely to be discovered. It would, therefore, be mistaken to conclude that an alternate site which appeared marginally superior to the proposed site, would remain superior upon further investigation, considering all of the possible but unknown disadvantages of the alternate site. Nor does, as one intervenor has suggested, the solution to this problem lie in requiring more intensive analysis of alternate sites by applicants before they submit their applications. Absent a mechanism which would permit banking of any sites which might be previously approved—a mechanism this Commission has sought legislatively—the costs of that approach could not conscionably be imposed on private applicants and their ratepayers.

Our acceptance of the "obviously superior" standard for site selection derives, as well, from the reality of our situation in passing on license applications. The licensing process is structured for rejection or acceptance of the proposed site rather than choice of sites. If one of our licensing boards disapproves a proffered site, it lacks authority to require an application to be filed for a facility at another location. Rather, the applicant must choose to do so and the whole process of staff review leading to hearing must be rerun if the facility is to be at the alternate site. The Board's powers in this respect stand in contrast with its authority to require environmentally protective measures at the particular location site proposed in the application. In granting a proposed license, the Board may condition it upon some precautionary measures required at the chosen site. Such conditions are comprehended within the proposed licensing action; selection of an alternative site is not, and that influences the nature of the review. In sum, we think it appropriate that a licensing board refuse to take the proposed "major Federal action," *i.e.*, deny the requested license, not when some alternative site appears marginally "better" but only when the alternative site is obviously superior.

5 NRC at 528-30 (footnotes omitted).

In then describing the ingredients of an "obviously superior" determination, the Commission ruled that, in situations where the prehearing NEPA review process has not been lacking in integrity,⁴⁰ the cost and time required to complete a plant at each of the alternate sites should be taken into account. It noted that the process appeared to have worked properly in this case, although it left the door open for further scrutiny of this question. *Id.* at 533. On such scrutiny, we find no reason to take issue with the Commission's preliminary assessment.

2. Before applying the "obvious superiority" standard to the evidentiary record bearing upon the comparison of alternative sites, we must turn to a subsidiary factual question which necessarily inheres in that comparison: the effect on the marine environment of the once-through cooling system at the Seabrook site. Before the Licensing Board there was strong disagreement among the parties on this question and the Board itself was not of one view on it. The majority found that "operation of the plant with the proposed condenser cooling system will not have significant adverse environmental effect on the aquatic ecosystem with either of the two [proposed] intake locations." 3 NRC at 896. It also found that Seabrook operation would have no undue adverse affects on the harvestable clam populations or upon commercial and sports fishing in the area. *Id.* at 898-99. On the other hand, Dr. Salo, in dissent, expressed the view that such operation "would cause sufficient adverse impact on the aquatic biota, of commercial and recreational importance, so that other alternatives should be sought." 3 NRC at 940.

Obviously, the impact which a once-through cooling system at Seabrook would have upon the aquatic environment is relevant to both (1) the comparison of Seabrook with alternate sites; and (2) the striking of an ultimate cost-benefit balance for Seabrook (assuming no other site is found clearly superior). It does not follow, however, that it is necessary for us to come to grips with the difference of opinion between the Licensing Board majority and Dr. Salo on this purely factual matter—a task which would necessitate the evaluation of a substantial quantity of conflicting expert testimony. For a closely related purpose, the Environmental Protection Agency has now completed its own review of the nature and extent of the effect that the Seabrook once-through cooling system would have upon the aquatic biota in the area. Because of that agency's primary jurisdiction over such questions, we are justified in accepting the findings contained in the EPA Administrator's June 17, 1977, decision.

As we stressed in ALAB-366, the 1972 amendments to the Federal Water Pollution Control Act (FWPCA) left "to EPA and the states the decision as to the water pollution control criteria to which a facility's cooling system would be

⁴⁰Cf. *Florida Power & Light Co.* (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-335, 3 NRC 830 (1976), discussed in ALAB-366, *supra*, 5 NRC at 68-69.

held." 5 NRC at 52. The NRC will still consider water impacts, but only as part of its overall "balancing judgment"; "it cannot go behind either [EPA-imposed] standards or the determination by EPA or the state that the facility would comply with them." *Ibid.* In this case, EPA standards would result in a requirement for the use of some form of closed-cycle cooling unless that agency could make a finding, pursuant to Section 316(a) of the FWPCA, that such standards are "more stringent than necessary to assure the [protection] and propagation of a balanced, indigenous population of shellfish, fish, and wildlife . . . (*id.* at 50). EPA has made that finding.

For purposes of its NEPA evaluation, the NRC must accept the cooling system approved by EPA. SAPL-Audubon, those intervenors before us possessing the primary interest in the issues bearing upon cooling system impact, were also parties before EPA. Where, as here, that agency has acted "in a judicial capacity and resolve[d] disputed issues of fact properly before it which the parties have had an adequate opportunity to litigate," we will not hesitate to give *res judicata* or collateral estoppel effect to its findings "to enforce repose." See *United States v. Utah Construction and Mining Co.*, 384 U.S. 394, 421-22 (1966); cf. *Toledo Edison Co.* (Davis-Besse Nuclear Power Station, Units 1, 2, 3), ALAB-378, 5 NRC 557, 561 (March 1, 1977).⁴¹

EPA determined that, subject to certain discharge limitations it was imposing, once-through cooling would "assure the protection and propagation of a balanced, indigenous population of fish, shellfish and wildlife in and on the receiving waters." June 17 decision, slip op. p. 35. That determination explicitly took into account "the effects of the entire cooling system, including entrapment, entrainment, and discharge." *Ibid.* And it was grounded upon subsidiary findings such as (1) "significant environmental impacts cannot be anticipated in the area affected by the discharge" (*id.*, p. 25); (2) the "balanced indigenous population of shellfish, fish and wildlife in the Gulf of Maine within or proximal to Hampton Harbor will not be significantly affected" (*ibid.*); (3) "the overall impact of . . . entrainment on the population of all plankton [in the area] will not be significant" (*id.*, p. 26); (4) "given the small area to be impacted with a delta-T greater than 5°F, it is reasonable to conclude that local indigenous populations [of organisms] will not be significantly affected" (*id.*, p. 27); and (5) "there is no anticipated effect on wildlife, including birds, from this subsurface thermal discharge" (*id.*, p. 34).

The technical conclusions arrived at in the EPA decision were based in large part on the report of a panel of technical and scientific experts convened by the EPA Administrator to assist him in his review of the record (*id.*, p. 5). The

⁴¹The Commonwealth of Massachusetts apparently did not participate in the EPA proceeding, although it had an opportunity to do so. While its appeal to us encompassed cooling system issues, it did not introduce evidence, submit proposed findings, or actively participate in the resolution of such issues before the Licensing Board. That being so, Massachusetts cannot properly complain of our reliance on the facts determined by EPA.

decision (e.g., at p. 24) explicitly referred to that report.⁴² The report spelled out in detail the underlying data on which the factual findings in the decision rested. The decision and/or the accompanying report dealt with essentially all of the substantive questions brought to us by SAPL-Audubon and Massachusetts on their appeals. In this connection, EPA imposed specific conditions to mitigate potential backflushing problems which had been raised by SAPL-Audubon. It also required additional development of baseline data. But EPA explicitly rejected claims of SAPL-Audubon (also made here) that further studies of the effect of plant operations on wildlife or on the migratory patterns of finfish were necessary (*id.*, pp. 34, 38). And it dealt in detail with the multitude of assertions advanced by SAPL-Audubon (and Massachusetts before us) with respect to such matters as the impact of once-through cooling on the local clam population and the effect of cold shock on various types of marine life.

In short, EPA concluded that, taking into account the protective conditions it was imposing (which the applicants must observe), the marine environment impacts of once-through cooling are small. Those findings extend to the substantive matters raised here by SAPL-Audubon and Massachusetts. For the reasons already developed, we accept them without independent inquiry of our own into their record foundation. We thus conclude that the environmental effect of the once-through cooling system does not provide a basis for rejection of the Seabrook facility. Stated otherwise, that effect is not of itself sufficient in magnitude either to tilt the ultimate cost-benefit balance against the facility or to require (under the prevailing "obviously superior" standard discussed above) the choice of another site.

One final observation is appropriate on this aspect of the case. Although, for the reasons just set forth, we have given effect to the EPA judgment in preference to his contrary view, nonetheless Dr. Salo is deserving of commendation for his thoughtful analysis of the significant questions pertaining to the marine environment which the record presented. We do not know, of course, whether or not that analysis would have prevailed had there been no EPA involvement and it thus had been necessary for us to resolve the disagreement between the Board members through an independent evaluation of the conflicting testimony.⁴³ But it can be said that he fully discharged the responsibility vested in licensing board

⁴²The report, dated March 11, 1977, was entitled "A Technical Review of the 316a and 316b Determination in The Instance of the Seabrook, New Hampshire Application." It was circulated by EPA along with the decision.

⁴³The claims of SAPL-Audubon and the Coalition that the evidence upon which the Board's aquatic impact findings rest consists of data relevant to the "near" intake site originally proposed by applicants, and not to the "far" site eventually approved by EPA, are not well founded. While most of the data was initially developed in support of using the "near" location, there is substantial testimony bearing upon the applicability of the data to the "far" location, the differences in environmental impacts to be expected, and the costs of locating the intake at the "far" site. See, e.g., App. Dir. Test. No. 22, fol. Tr. 10546, at pp. 28-32, 47-48; Tr. 10587-90, 10647, 10691-92, 10771; Mattice, Dir. Test., fol. Tr. 10883, p. 12.

members to appraise critically the evidence placed before them on crucial issues.⁴⁴

3. Turning to the comparison of the Seabrook site (using once-through cooling) with the 19 alternate sites in northern New England which the FES has considered, we note first that the Licensing Board did not employ the "obvious superiority" test. Nor, apparently, did it take into account the relative costs associated with (1) constructing the plant at Seabrook and (2) starting anew with the planning for and then construction of a plant at another location. Rather, it applied a more unfavorable standard (from the applicants' standpoint); that of the preferability of one of the other sites. Manifestly, if the evidence supports the Board's finding that "none of the alternatives [is] preferred over the Seabrook site" it must follow that none of them is "clearly superior" to it.

Many reasons are to be found in the record—in particular, the FES—why each of the 19 sites examined were either (1) Unavailable or unacceptable *per se* (e.g., for safety reasons); or (2) less desirable on balance than Seabrook (FES §9.1.2). Among other things, a facility at any of the alternative sites would be more costly than one at Seabrook. For example, Rollins Farm, Fox Point and Dover Point are all so close to Pease Air Force Base that they would require substantial additional construction costs for the hardening of structures, raising their price well beyond that of Seabrook. Odiornes Point, Philbrick Pond, and Lamprey Pond are seacoast sites where safety or environmental conditions are less favorable than Seabrook. Several Maine sites were discounted because of the lead applicant's lack of eminent domain power in that state, as well as for environmental reasons. Gerrish Island (in Maine) lacks access to railroad service and is near a developing residential area. A number of inland sites, such as Litchfield, present problems relating to the availability of cooling water. Some of the sites (including Moore Pond) are so remote that substantial additional transmission lines would be necessary.

These reasons advanced by the staff for preferring the Seabrook site (assuming once-through cooling) over the various alternatives appear to be weighty. Before the Board below, the intervenors' response was essentially that the environmental impacts which would be associated with the Seabrook site out-balanced the drawbacks attendant upon use of at least some of the alternatives. The principal impacts relied upon related to the marine environment. But as we have determined (on the strength of the EPA findings), operation at Seabrook with once-through cooling will not significantly affect that environment.

⁴⁴Our reference to Dr. Salo's analysis should not be taken as an implied criticism of the analysis of the Board majority on the issue of the impact that the once-through cooling system would have upon the marine environment—an analysis which seems to us to have been equally thoughtful (and which, as it has turned out, produced the same general conclusion as the EPA Administrator has now reached).

B. As heretofore noted, on July 7, 1977, the Licensing Board rendered a supplemental initial decision. LBP-77-43, 6 NRC 134. In that decision, the Board addressed the question whether there were potential alternate sites in southern New England which were clearly superior to the Seabrook site.⁴⁵ It answered this question in the negative on the basis of an ultimate finding that "none of [the 9] alternative sites [considered] are viable alternative sites for the location of the base load capacity proposed at the Seabrook station." 6 NRC at 139. By reason of this finding, the Board found it unnecessary to make "an individual comparison of Seabrook with one or more of these sites . . ." *Ibid.*⁴⁶

Both the Coalition and Massachusetts have filed exceptions to the supplemental initial decision. Until all briefs in support of and in opposition to those exceptions have been received and studied by us, we of course cannot pass on their merits. At the same time, because that day is still at least several weeks away, we do not think it appropriate to hold in abeyance our determination of the discrete issues presented by the appeals from the Board's initial decision. Piecemeal adjudication may not be the favored practice in normal circumstances. But this proceeding has scarcely followed a normal course. In any event, the questions which are now ripe for decision have been before us for an appreciable period. The parties are entitled to have our disposition of them without further delay.⁴⁷

V. FINANCIAL QUALIFICATIONS

The Seabrook facility is to be jointly owned by a number of utilities. The projected shares of various participants were to be as follows:

Company	Ownership (%)
Public Service Company of New Hampshire	50.0000

⁴⁵In actuality, the Board also looked at two additional sites in Maine and one in Vermont.

⁴⁶In ordering the southern New England alternate site inquiry, the Commission had suggested the possibility that such an individual comparison might be unnecessary. CLI-77-8, *supra*, 5 NRC at 540.

⁴⁷The Licensing Board still must make findings on the comparison between the Seabrook site with cooling towers and the 19 alternate sites in northern New England. In ALAB-416, 5 NRC 1438 (June 29, 1977), we reserved judgment on the staff's suggestion that the EPA Administrator's June 17, 1977, decision rendered that inquiry moot. By unpublished order of July 15, 1977, we rejected the suggestion and directed the Licensing Board to make the findings as soon as practicable. The basis for this action was our agreement with the applicants that, should the EPA Administrator's decision be overturned on the petition for review of it which is now pending in the Court of Appeals for the First Circuit, crucial importance will attach immediately to the alternate site comparison involving the Seabrook site with a closed-cycle cooling system.

Company	Ownership %
The United Illuminating Co.	20.0000
The Connecticut Light & Power Co. (a subsidiary of Northeast Utilities)	11.9776
New England Power Co.	8.9430
Central Maine Power Co.	2.5505
Montaup Electric Co.	1.9064
Central Vermont Public Service Corp.	1.7971
New Bedford Gas & Edison Electric Light Co.	1.3539
Green Mountain Power Corp.	1.1673
Fitchburg Gas & Electric Corp.	0.1716
Vermont Electric Power Co. Inc.	0.1326
	<hr/> 100.0000

See 3 NRC at 859.

One of the sharply contested issues in this proceeding relates to the financial qualifications of these applicants. That issue arises under Section 182a. of the Atomic Energy Act, 42 U.S.C. 2232(a), which requires license applications to state specifically "such of the . . . financial qualifications of the applicant . . . as the Commission may deem appropriate for the license," and 10 CFR §50.33(f), which requires each construction permit application to contain:

Information sufficient to demonstrate to the Commission the financial qualifications of the applicant to carry out, in accordance with the regulations in this chapter, the activities for which the permit . . . is sought.

The regulation goes on to specify that the "information shall show that the applicant possesses the funds necessary to cover estimated construction costs and related fuel cycle costs or that the applicant has reasonable assurance of obtaining the necessary funds, or a combination of the two." In addition, an entity formed "for the primary purpose of constructing or operating a facility" must demonstrate "the legal and financial relationships it has or proposes to have with its stockholders or owners, and their financial ability to meet any contractual obligation to such entity which they have incurred or propose to

incur, and any other information necessary to enable the Commission to determine the applicant's financial qualifications."⁴⁸

Before the Licensing Board, the Coalition and Donald B. Ross contended that the applicants—and particularly the lead applicant, Public Service Co. of New Hampshire—lacked the requisite financial qualifications. In support of that claim, the Coalition presented two witnesses and Mr. Ross one. The testimony of one of the Coalition witnesses—Dr. James R. Nelson, Charles E. Merrill Professor of Economics at Amherst College—contained a particularly comprehensive and informed analysis of certain of the financial difficulties which would likely confront Public Service in its future endeavors to finance its share of the Seabrook facility. Nevertheless, without even acknowledging the existence of the testimony of Dr. Nelson or the other witnesses for the intervenors, the Board concluded that the applicants had "reasonable assurance of obtaining the necessary funds to cover construction costs and related fuel cycle costs and are financially qualified to design and construct Seabrook." 3 NRC at 868.

The Licensing Board hearings on the financial qualifications issue took place in May and June 1975. In December 1975, Northeast Utilities (the parent company of Connecticut Light and Power Co.) announced that it intended to sell its approximate 12% share of the project, and United Illuminating indicated that it wished to reduce its participation from 20% to 10%. Based on those developments, SAPL-Audubon (supported by the Coalition) sought to reopen the record on financial qualifications, but the Board declined to do so (see its memorandum and order dated February 2, 1976).

On February 13, 1976, SAPL-Audubon filed a renewed motion to reopen the hearing on the financial qualifications question, on the basis of asserted inconsistencies between the applicants' prior testimony on that subject in this proceeding and testimony later presented to the Federal Power Commission relative to a wholesale rate increase request. The Board found "no inconsistencies" between the applicants' testimony in each forum and denied the motion (memorandum and order dated June 25, 1976).

The Coalition and Mr. Ross take exception to the Board's financial qualifications ruling (as well as the underlying factual findings) and, in this respect, are joined by SAPL-Audubon and the Commonwealth of Massachusetts. SAPL-Audubon and the Coalition also appeal the Board rulings denying the two requests to reopen the hearings on the financial qualifications question.

A. We are told that the Licensing Board's conclusion that the lead applicant, Public Service Co., is financially qualified is contrary to the weight of the evidence. Central to this assertion are the undisputed facts that, in February 1974,

⁴⁸ Data and other information which an applicant must submit in support of its financial qualifications are outlined in 10 CFR Part 50, Appendix C.

the Moody's rating of that utility's bonds had been reduced from A to Baa⁴⁹ and that, during the period between 1974 and 1976, the company's stock had declined in price to substantially below book value. 3 NRC at 916.

The Board recognized these facts, and it also noted that, to fund a 50% share of the project, Public Service would be required to raise some 800 million dollars—approximately twice the company's total assets on December 31, 1974. From 1967-74, Public Service raised capital equal to 167% of its assets as of December 31, 1966, but that period was one in which the company still had its A bond rating. Nevertheless, despite the lowered rating, the Board found that, beginning in 1974, the company was being permitted to earn higher rates of return by the New Hampshire Public Utilities Commission; that it was "possible" that the company might regain its "A" rating in the future; and that there was "reasonable assurance" that the applicants could obtain the necessary funds to cover construction and related fuel cycle costs. The Board added that utilities with Baa ratings had marketed over \$800 million of bonds in the first quarter of 1975 (3 NRC at 868),⁵⁰ and it capped its discussion with the following observation:

The financial health of utilities, and their ability to raise funds, depends on a number of factors among which the more important are the volume of sales, rates, and capital structure. During the past year rate increases for utilities generally have been steadily granted and as the recession diminishes sales increase to some extent, thus improving the utilities' financial health.

Id. at 917 (transcript references omitted). It noted, however, that "the cost of money may be higher than originally projected" by Public Service.

1. We need not here dwell long on the intervenors' complaint of the failure of the Board below to have made any reference to the points raised and testimony presented by them. We have previously outlined the Board's responsibilities in this regard (see p. 41, *supra*) and, as on other issues, the Board's performance here fell short. Whether meritorious or not, intervenors' position was de-

⁴⁹ According to Moody's:

Bonds which are rated A possess many favorable investment attributes and are to be considered as upper medium grade obligations. Factors giving security to principal and interest are considered adequate but elements may be present which suggest a susceptibility to impairment sometime in the future.

A Baa rating is described as follows:

Bonds which are rated Baa are considered as medium grade obligations, *i.e.*, they are neither highly protected nor poorly secured. Interest payments and principal security appear adequate for the present but certain protective elements may be lacking or may be characteristically unreliable over any great length of time. Such bonds lack outstanding investment characteristics and in fact have speculative characteristics as well.

See SER, Supplement 3, p. D-18.

⁵⁰ In actuality, the period was "a little short of five months" rather than three months (Tr. 1700).

serving of full consideration and, if rejected, the Board had an obligation to explain why. As we have earlier noted, however, we are empowered to supplement the Licensing Board's findings and conclusions based upon our own appraisal of the record.

2. It is clear that, under the Commission's regulations, a construction permit applicant need not show that it has the funds in hand to build its proposed plant. All it need demonstrate is that it has "reasonable assurance" of obtaining those funds. 10 CFR §50.33(f). No party here interprets the applicable regulations otherwise.

What the intervenors do contend is that the applicants have not demonstrated that they have the requisite reasonable assurance. They attack the Board's favorable financial qualifications conclusions on the grounds (1) that it was improper for the Board to have given any weight to potential future rate increases; and (2) in any event, the applicants' prediction respecting the level of difficulty attendant upon raising necessary funds for construction (essentially accepted by the Board) was unduly optimistic.

These claims lose sight of one undeniable fact: the applicants here are public utilities which are under an obligation to render a public service and which are regulated by state regulatory bodies. Those bodies have considered and approved the Seabrook facility. The New Hampshire Public Utilities Commission (PUC) has issued a "Certificate of Site and Facility" for the plant. PUC Docket No. D-SF6205, Commission Report and Order No. 11,267, January 29, 1974. In doing so, it found, *inter alia*, that uncontradicted evidence "showed such a significantly lower cost from a nuclear plant than from a similarly sized fossil plant as to eliminate even considering a fossil plant unless the nuclear plant was beyond any possibility of becoming a reality." *Id.* at 9. Other state agencies have also reviewed and issued necessary permits for particular aspects of the Seabrook proposal. Given these considerations, it is scarcely likely that the PUC would stand in the way of the establishment of those rates necessary to enable Public Service to fulfill the obligations imposed upon it by its nuclear facility licenses.

Indeed, under governing legal principles, the PUC would be obliged to take these considerations into account and to allow Public Service to establish rates designed to cover such costs. The Supreme Court has enunciated this obligation in the following terms:

The rate-making process under the [Natural Gas] Act, *ie.*, the fixing of "just and reasonable" rates, involves a balancing of the investor and the consumer interests. . . . the investor interest has a legitimate concern with the financial integrity of the company whose rates are being regulated. From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. . . . the return to the equity owner . . . should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.

Federal Power Comm. v. Hope Nat. Gas Co., 320 U.S. 591, 603 (1944) (citations omitted).

Although the Supreme Court's frame of reference was the Federal Natural Gas Act, the PUC has recognized that the same principles apply in the sphere of state utility regulation. In its December 31, 1974, decision, granting Public Service a significant rate increase (effective January 1, 1975), it pointed to a ruling of the New Hampshire Supreme Court to the effect that

... basic utility law as enunciated by the United States Supreme Court in the *Bluefields* and *Hope* cases "... call[s] for a fair return upon the investment in the Company, including investments required in the immediate future." 113 N.H. at 508.

App. Exh. 4, p. 2. Further, in approving the Certificate of Site and Facility for the Seabrook project, the PUC explicitly stated that

As long as the capability exists to provide a utility commodity, it is our judgment that our duty requires us to see that *the service rendered will meet the customers' demands*, and will be just and reasonably priced. Within reasonable limits, *just and reasonable charges must reflect the cost of the service provided*.

Report and Order No. 11,267, *supra*, at p. 7 (emphasis supplied).

Significantly, the PUC's actions have spoken as loudly as its words. The rate increase granted in December 1974 not only recognized the necessity for Public Service to finance new generating facilities but approved rates designed to achieve that goal—rates projected as yielding a significantly higher return than had previously been authorized. Thus, the PUC had allowed a return on equity of 10.75% in August 1972, 11.0% in December 1973, and 14.0% in December 1974 (SER, Supp. No. 3, p. D-4).

We recognize that, as SAPL-Audubon point out, the December 1974 PUC rate decision included the caveat that "the revenues which we allow do not comprise a guaranteed profit to the Company or to its stockholders." App. Exh. 4, p. 9. The fact remains, however, that that decision permitted a substantial rate increase to a level described by the PUC as "sufficient to induce [a prospective investor] to place his money in the Company's stock" (*id.*, p. 8).

In short, it appears to us that the reality is that, as a matter of high probability bordering upon certainty, major public utilities will be permitted by state regulatory bodies to charge for electric power at rates sufficient to enable them to fulfill their obligations attendant upon construction of nuclear plants which the state has authorized. Such a reality need not be ignored. That being so, it was not improper for the applicants to have supported their showing of financial qualifications in part by relying on future, not yet obtained rate increases. And it was not error for the Licensing Board to have accorded weight to the prospect of such future rate increases.

The intervenors' other basic claim is that it will be more difficult for the applicants to raise the necessary funds than they had predicted and the Board had accepted. Among other things, the intervenors cite the increasing cost of the project—particularly with respect to the cost of funds to finance the project—leading to greater capital requirements than were analyzed by the Board. They also assert that, as reflected by the efforts of certain applicants to sell all or a portion of their project shares, the need for Seabrook has been overestimated; and that, as a result, financing of the project will be more difficult than projected by the applicants.

This all well may be true. But it does not perforce undermine the conclusion below that the applicants are financially qualified. To begin with, the purpose of the financial qualifications inquiry at the construction permit stage is, once again, to ascertain only that the applicants possess or have "reasonable assurance of obtaining" the necessary funds to cover estimated construction costs and related fuel cycle costs. Certainty need not be shown, and all contingencies need not be foreseen. Indeed, the Commission long ago recognized that its "regulations obviously do not require an applicant to have cash on hand to cover all possible contingencies of costs higher and revenues lower than estimates." *Power Reactor Development Co.*, 1 AEC 128, 153 (1959).⁵¹

None of the intervenors' witnesses went so far as to conclude that, even given the escalation in cost, the applicants would not be able to obtain the necessary funds. Although Professor Nelson foresaw problems in that regard, he declined to "say flatly" that the funds could not be raised (Tr. 1809). At bottom, his testimony, as well as that of Professor James O. Horrigan of the University of New Hampshire (for the Coalition) and Mr. Malcolm Pirnie, III, an insurance company investment officer (for Mr. Ross), was to the effect only that it would be more difficult and expensive to raise the funds than had been projected by the applicants. That being so, it is unnecessary for us to consider here the particular strengths and weaknesses of each witness' testimony. For the financial qualifications inquiry contemplated by the Commission's regulations centers upon whether the funds can be obtained and not on the price of or difficulty in obtaining them. Stated differently, the Commission's adjudicatory boards are not called upon to decide whether the equity or debt securities issued by a utility-applicant might be thought to constitute a good, poor, or indifferent investment by potential purchasers. All we need look into is an applicant's prospects for obtaining the requisite funds. Here too, the realities of utility regulation come into play.⁵²

⁵¹ The Commission's decision in that case was ultimately upheld by the Supreme Court. *Power Reactor Development Co. v. International Union*, 367 U.S. 396 (1961).

⁵² We would add only that we do not believe that the record warrants Mr. Farrar's suggestion that Public Service's financial condition is so precarious that there is a realistic possibility that it would cut corners in areas of safety concern. *Continued on next page*

B. Our consideration of the financial qualifications issue would be at an end were it not for the assertion of the intervenors that two developments subsequent to the evidentiary hearing below warranted a reopening of the record by the Licensing Board. See p. 75, *supra*. In addition, we have been urged to order a reopening on the basis of yet a third development which postdated the initial decision.

1. In our judgment, the desire of two of the Seabrook participants—Northeast Utilities and United Illuminating—to withdraw or reduce the level of their participation in the project did not justify a reopening of the record. What SAPL-Audubon and the Coalition wished to explore was whether Public Service might be required to assume some portion of the ownership shares being offered for sale and, alternatively, whether (assuming the shares were successfully sold) the purchasers would be financially qualified. The first portion of the proposed inquiry already finds its answer in the Joint Ownership Agreement, signed by all of the applicants. There has not been the slightest suggestion that either of the utilities in question has manifested in any way an intent to breach its obligation under the agreement to continue its financial participation in the project unless and until substitute participants are identified and approved by the Commission. Nor has it been suggested that either utility is financially unqualified to continue to meet its contractual obligations in the event that it is unable to obtain a purchaser. And since no purchaser as yet has been identified, it would hardly be fruitful now to go into the matter of the financial qualifications of new owners. Before any new owner were approved (and Northeast Utilities and United Illuminating relieved of their current obligations in whole or in part), the Commission would have to be satisfied as to its financial qualifications. More than that, a hearing could be requested on the application for a license amendment to reflect the change in ownership. See *Georgia Power Co.* (Alvin M. Vogtle Nuclear Plant, Units 1 and 2), ALAB-285, 2 NRC 209 (1975).

2. The second and third developments asserted to warrant reopening involve alleged inconsistencies between the testimony of a Public Service witness before the Licensing Board and statements made by the same company official before the Federal Power Commission and the New Hampshire legislature. Specifically, in purported contradiction of the assurance he had given the Licensing Board

Continued from previous page

It should also be noted in passing that much of what we have had to say with regard to the financial qualifications inquiry in the context of a regulated public utility would have no application in circumstances where the seeker of the nuclear license (e.g. an industrial concern interested in acquiring a source of steam for manufacturing purposes) did not enjoy such status and thus could not depend upon favorable regulatory action as a basis for obtaining necessary funds to carry out its responsibilities under the license.

with respect to Public Service's financial capability, the Vice President and Treasurer of the company (Robert J. Harrison) is claimed to have told the FPC (1) that the burden of constructing the Seabrook facility necessitated a substantial increase in the allowed return on equity capital, to enable the company to regain an A rating on its first mortgage bonds; and (2) that financing the debt portion of Seabrook with lower rated bonds "presents a serious marketing and interest cost problem." And, in the teeth of his asserted representation to the Licensing Board that Public Service had not relied upon the inclusion of "construction work in progress" (CWIP) in its rate base in formulating its plans to achieve the required financing for Seabrook, Mr. Harrison testified before a state legislative committee that the enactment of a pending bill precluding CWIP would mean that Public Service would be unable "to construct any base load additions to generating capacity including the Seabrook plant."

On a close analysis, what Mr. Harrison told the Licensing Board might possibly be reconciled with his testimony before the other bodies. For example, Mr. Harrison did stress to the Licensing Board that Public Service was anticipating rate increases to assist it in financing Seabrook (App. Dir. Test. No. 1, p. 6, fol. Tr. 1177; Tr. 1750); and, as we understand it, did not indicate to the FPC that, in the absence of the restoration of its former A bond rating, Public Service could not finance its share of the project. Nor, before the Licensing Board, did Mr. Harrison directly eschew reliance on CWIP as a source of funds for financing that share. Indeed, in a submission to the staff which was included in Supplement 3 to the Seabrook Safety Evaluation Report (at p. D-15), Public Service identified CWIP as one of the means by which outside financing of the construction of the plant might be facilitated.

Be that as it may, we find nothing in the statements made by Mr. Harrison before either the FPC or the New Hampshire legislative committee which might undercut the conclusions we have reached on the basis of the record adduced below. As described to us, the FPC testimony did not portend an inability on the part of Public Service to obtain the necessary funding for Seabrook—with or without the rate increases which might, *inter alia*, improve its standing in the investment community. And our earlier observations respecting recognition of the realities of the regulatory climate have direct application to the authorization of CWIP by the New Hampshire Public Utilities Commission if found necessary to enable Public Service to meet its obligations with respect to this PUC-approved project. In this connection, we know of no existing legal impediment in New Hampshire to such an authorization; the bill which would have barred CWIP (to which Mr. Harrison's testimony before the legislative committee had been addressed) was not enacted.

In these circumstances, it does not appear that a reopening of the record to consider the claimed testimonial discrepancies could effect a change in result on

the financial qualifications issue. This is dispositive of the matter. Our concern on these appeals is, of course, with the correctness of the outcome below.⁵³

VI. TRANSMISSION LINES

One of the environmental issues to which the Licensing Board devoted considerable attention involved the location of the transmission lines needed to serve the facility. Approximately three weeks of hearings were devoted to that issue. The Society for the Protection of New Hampshire Forests contended that resort to the routes proposed by the applicants would cause unreasonable environmental degradation, and suggested several alternate routes which it deemed preferable. In the initial decision, the Board considered many of these alternatives as well as others offered by the staff (or brought forth by the applicants at the staff's request). The conclusions it reached are challenged by the Forest Society and the applicants.

As developed in detail in the initial decision (3 NRC at 885-90), three different lines were proposed to connect the Seabrook site to the 345 KV New England Transmission grid. The Seabrook-Scobie Pond line would run generally westward from the facility, terminating at the Scobie Pond substation; the Seabrook-Newington line generally north; and the Seabrook-Tewksbury line generally to the southwest across the Massachusetts border to the Tewksbury substation.

The principal focus below was on particular segments of the Seabrook-Scobie Pond and Seabrook-Newington lines. The first of these lines was to cross the Pow Wow River-Cedar Swamp environs but the Licensing Board modified the proposed route to follow a "minimum circumference dogleg," which was a variant of a route suggested by the staff. The Seabrook-Newington line was to traverse an area known as Packer Bog and the Board found this route to be acceptable.

The applicants take exception to the Board's alteration of the route for the Seabrook-Scobie Pond line. In addition, they insist that the Board should not have directed them to use the route which they proposed for the Seabrook-Newington line. The Forest Society seeks a different route for both lines. We find that the Licensing Board properly balanced the various considerations bearing upon transmission-line routing and that the conclusions it reached should be upheld.

A. The applicants first argue that the Licensing Board was without legal

⁵³That is not to say that we are insensitive to the vice inherent in different stories being told to different legislative or regulatory bodies. At least in the absence of changed circumstances or other substantial cause, such a practice is worthy of condemnation even if, as seems to be the case here, perjury is not involved.

authority to order any change in the transmission routes which they selected. They recognize our previous holding that boards do indeed have such authority. *Detroit Edison Co.* (Greenwood Energy Center, Units 2 and 3), ALAB-247, 8 AEC 936 (1974). But they claim both that *Greenwood* should be overruled and that it does not govern this case.

The first of these claims has been now laid to rest by the Commission's recent decision in *Kansas Gas and Electric Co.* (Wolf Creek Nuclear Generating Station, Unit No. 1), CLI-77-1, 5 NRC 1 (January 12, 1977). There, the Commission affirmed our holding that the environmental effects of an offsite access road and a rail spur are within the NRC's regulatory jurisdiction. In doing so, it analogized the regulation of offsite access roads and railroads to that of offsite transmission lines and explicitly approved the reasoning which we earlier had enunciated in *Greenwood*. *Id.* at 7-8. And it emphasized that NRC authority to review such offsite impacts goes beyond merely factoring them into a final cost-benefit balance (as the applicants there had contended) and includes as well the authority "where necessary [to] impose license conditions to minimize those impacts." *Id.* at 8. That ruling requires rejection of the similar argument tendered by the applicants here.

In *Greenwood*, we left open the question "[w]hether the Commission may impose license conditions compliance with which would violate regulations of other state and local agencies . . ." 8 AEC at 946, n. 20. The applicants' alternative theory is that here (unlike in *Greenwood*) the Licensing Board's transmission line conditions do run afoul of state regulation in the form of certain rulings of the New Hampshire Public Utilities Commission and the New Hampshire Bulk Power Supply Facility Site Evaluation Committee.

We have examined the determinations of those agencies upon which the applicants rely. In our view, they do not, as the applicants would have it, constitute a conclusive direction that the transmission lines follow certain routes and none other. To the contrary, the Site Evaluation Committee confined itself to findings that "the site and facility of the proposed nuclear project at Seabrook, New Hampshire, and its associated transmission lines will not unduly interfere with the orderly development of the region [and] will not have an unreasonable adverse effect on esthetics, historic sites, air and water quality, the natural environment and the public health and safety." *Minutes of Meeting of Site Evaluation Committee*, July 27, 1973, at p. 3. Of greater significance, in authorizing the placement of the transmission lines along the routes proposed by the applicants to it, the Public Service Commission made it perfectly clear that the applicants were free later to seek approval of a different routing. *Certificate of Site and Facility*, Commission Report & Order No. 11,267, dated January 29, 1974, at pp. 9-10. In short, as matters now stand, it cannot be said that the applicants are confronted with an unalterable state demand that the transmission lines be placed in any particular location.

This being so, the question reserved in *Greenwood* is not here presented and thus need not be reached. Our *Greenwood* holding, as approved by the Commission in *Wolf Creek*, is fully applicable and confirms that the Licensing Board had legal authority to take the action which it took. We turn now to the question whether the Board reached an appropriate conclusion in exercising that authority.

B. The Pow Wow River-Cedar Swamp area has been portrayed in such terms as "unique," "unusual," "outstanding," "unspoiled," "peaceful," a "recognized scenic area" and "of regional significance."⁵⁴ Our examination of the record, supplemented by the tour which we took in the company of representatives of both the Forest Society and the applicants, convinces us that the area is one worthy of protection.

As described by the Licensing Board, what is involved is a natural area of about 1000 acres, recognized as significant by several regional and local governmental agencies. Approximately 10-15% of it is under the protective ownership of the Forest Society. Through its center flows the Pow Wow River, surrounded on both sides by an extensive freshwater marshland complex. The area includes relatively dense or pure stands of Atlantic White Cedar trees, a major portion of which is located on the Forest Society property. Across the marsh one can obtain an unobstructed view up to the forest edge, with no manmade structures save "a few earth-colored duck blinds used by frequent duck hunters in season." No artificial structures are visible above the trees. 3 NRC at 888-89.

The FES noted (§3.8.5) that the area "is comprised of a mix of river marsh abundant with submergent and emergent vegetation; white cedar, located on drained deposits; and upland hardwoods on adjacent higher grounds, presenting a diverse environment which heretofore has not been subjected to any substantial development." Some of the cedar trees are over 100 years old (Tr. 8187). Moreover, as the Board observed, the extensive river-marsh complex is "very uncommon in southeastern New Hampshire"; and the Atlantic White Cedar species, which is found only in the Atlantic Coastal regions of the United States, is "becoming increasingly scarce as its available habitat is reduced by economic development." 3 NRC at 888.

The area is used for recreational purposes by hunters, campers, canoeists and occasional youth groups (Tr. 8026, 8144-45, 8227-28, 8245-46, 8308, 8559, 8564-65, 9395, 9636-38). The Forest Society is developing nature trails and surveying and marking the trees on its property (Forests Exh. 4; Tr. 8230, 8243). It plans to use the area for educational purposes, scientific study, and "as an area of open space and passive recreation" (Tr. 8220). The Society conducts about 10 field trips per year for groups of up to approximately 30 persons (Tr. 9395). The Board noted, however, that

Except during the hunting season, it is a relatively uncrowded and peaceful

⁵⁴ Forest Exh. 1, pp. 2, 4; Forest Exh. 2, p. 3; FES, §3.8.5, 4.1.2; 3 NRC at 888-89.

area. As the population and economic development of this region increases, the recreational value of this relatively pristine area will increase.

3 NRC at 889.

We have described the Pow Wow River-Cedar Swamp area in some detail in order to place in context the issues concerning that area which we must resolve. The applicants wish to route the Seabrook-Scobie Pond line directly across one of the widest sections of the marsh, about midpoint along its north-south length, using two approximately 200-foot steel lattice-work towers (3 NRC at 889). The Board found that the towers and lines would be visible from most vantage points along the edge of the marsh as well as from the Pow Wow River (*ibid.*) and, in essence, agreed with the staff's conclusion that they would constitute "a major insult to a recognized scenic area" (*id.* at 890; FES, §4.1.2). It also found that the towers and lines across the marsh might have a significant adverse effect on migratory waterfowl. Further, it expressed reservations respecting the feasibility of the applicants' proposed construction methods designed to avoid the introduction into the swamp of either the tower structures themselves or the vehicles or equipment utilized in construction (see ER, §4.2.1). If not feasible, according to the Board, the result might be a "require[ment for] the placement of transmission structures in the marsh itself . . . and/or the movement of heavy equipment into this natural area." 3 NRC at 890, citations omitted.

The Board therefore ordered the applicants to route the Seabrook-Scobie Pond line over an alternative route: a minimum-circumference dogleg skirting the edge of the natural area. Wooden H-frame towers, designed to blend with the forest, are to be used. They are to be approximately 75 feet high, not visible above the top of the adjacent trees. Potential construction impacts would be alleviated. And, significantly, "[t]he dogleg [route] would not present any wide open vistas to visitors to the Pow Wow River-Cedar Swamp Natural Area." *Id.* at 889.

The applicants advance several reasons why they should not be required to route their line on the dogleg. Foremost is the added cost—about \$493,000 if their estimate is accepted (*cf.* Tr. 8934 with Tr. 8938-39), substantially less if the staff's analyses (using applicants' own data) are accepted (Tr. 8883-91, 9145-46; *Staff's Proposed Modifications of Applicants' Proposed Findings of Fact and Conclusions of Law*, dated December 18, 1975, at pp. 26-28). Also mentioned are the considerations that some cedar trees might have to be cut on the dogleg; that a route for off-road vehicles would have to be established; that herbicides would have to be used; and that there would be a visual impact on as many as three homes—effects which assertedly would not occur if the route straight across the marsh were utilized. Finally, the dogleg is described as producing some of the same effects—for example, a visual insult—as the proposed route, albeit to a somewhat lesser extent.

For its part, although regarding the minimum circumferential dogleg route as more acceptable than the one advocated by the applicants, the Forest Society would have us adopt an alternative route which would avoid the Pow Wow River-Cedar Swamp area altogether or, if not that, at least use a larger dogleg. Its preferred route, running to the north and west of the approved route and using existing transmission corridors for about 82% of its length, was endorsed by Dr. Salo, the dissenting member of the Licensing Board. It was opposed by the applicants because its additional length of 9 miles assertedly would cause electrical stability problems. Dr. Salo thought those problems could be "discounted considerably"; if they nevertheless proved unresolvable, the Forest Society's larger dogleg would in his view be the best choice. 3 NRC at 940-41. Use of that dogleg would cost about \$1,000,000 more than the applicants' proposal and some \$500,000 more than resort to the minimum circumference dogleg (Tr. 8933-39; Forests Exh. 2, Att. C).

In examining transmission line routing controversies, it must be borne in mind that no potential route is free of all impacts. Further, what to one person may be an acceptable impact may in the eyes of another amount to environmental degradation of enormous dimensions. As a consequence, infrequently if ever will there be universal agreement regarding what particular route is preferable. This consideration does not, however, affect this Commission's responsibility to pass judgment on the various alternatives to the end that the environmental aftermath of licensing may be minimized "to the extent reasonably practicable." *Greenwood*, ALAB-247, *supra*, 8 AEC at 944, and cases there cited. The discharge of this responsibility necessitates the making of as objective an appraisal as is possible of the nature and extent of the environmental implications of each alternative route and a weighing of the results of that appraisal against the other factors (economic and technical) which also must be taken into account. Here, this process leads us to conclude that there is no reason to disturb the Licensing Board choice of the minimum circumference dogleg.

Central to our rejection of the applicants' belief that the line should be allowed to cross the middle of the Pow Wow River-Cedar Swamp area is the special character of that area. It may well be that white cedar trees exist elsewhere, and that there are other marshes or swamps in New Hampshire. What makes this area "unique" is that it is the only one under protective ownership where pure stands of white cedar trees are combined with the "river marsh and the bog, the cedar swamp itself" (Tr. 8229, 9399, 9455-57). Beyond doubt, the presence of two 200-foot towers (Tr. 8505) and associated wires in the midst of the area would occasion a visual intrusion of considerable magnitude. Contrary to the belief of the applicants, by no means can that intrusion be equated to the visual impact that would attend upon the routing of the line on the minimum circumference dogleg—a routing which, once again, would not bring either the towers or the wires into the line of sight of most visitors to the area. True, at

least one—and perhaps three—private homes would be brought within the shadow of the line. It would appear, however, that this relatively limited impact could be readily reduced (even though not eliminated entirely) by a screen of trees or some other form of vegetation (Tr. 10127).⁵⁵

The other ingredients of the applicants' attack upon the Licensing Board's result are no more persuasive. The cost differential—at most slightly less than \$500,000—is not insignificant but, at the same time, is not to our mind sufficiently great to overcome the desirability of protecting the sanctity of the area. There is no indication in the record that the number of cedar trees which might have to be cut is appreciable; beyond that, what would be lost is a scattering of cedars interspersed among much more abundant hardwood trees rather than the stands of pure cedar which provide the area with its unique character (Tr. 10104, 10141). All of the other environmental impacts of routing on the minimum circumference dogleg appear to us to be *de minimis*.

Moving on to the Forest Society's suggested alternate routes, the record does not establish that the larger dogleg would be sufficiently environmentally superior to the minimum circumference dogleg to justify the additional \$500,000 cost. The principal comparative advantage assigned to the former was that it would result in a greater "buffer zone" between the natural area and outside development (Tr. 9411-12, 9457-58, 10151-52). But we find nothing in the record to suggest that, if located on the minimum circumference dogleg, the line would not itself provide a buffer adequate to protect against possible harmful encroachment upon the Cedar Swamp ecosystem.

The "northern route" preferred by the Forest Society does offer at least one environmental advantage in that, although several miles longer than any of the other proposed routes, it utilizes existing transmission corridors for over 80% of its length (Forests Exh. 3, p. A2). We are confronted, however, with the applicants' insistence that the employment of the northern route would occasion a stability problem—i.e., an inability in the event of an electrical fault to maintain synchronization between the various generating stations supplying power to the grid to which the particular transmission line is connected (FES, p. A-19). The uncontroverted evidence is to that effect (Tr. 8479, 8481, 8924-25 as corrected on 8957, 9098-9101). What is less clear is whether, and at precisely what additional cost, this problem might be overcome. It appears from the record, however, that in all events the northern route would be considerably more expensive.

Leaving aside the cost which would be involved in rectifying the stability problem, the appreciably greater length of the route would necessitate a much

⁵⁵ Although we are not placing a specific condition on the construction permits in this regard, we will expect the applicants to take all feasible measures to implement our suggestion.

larger number of towers. On the average, there would be 10.5 towers per mile (Tr. 9297). Wooden H-frame towers cost \$6,700 each (Tr. 8805); every time the line makes as little as a 2 degree change in direction, the applicants' practice is to use a steel tower which costs \$45,000 (Tr. 8644-48, 8805). Moreover, there would be some expense for the additional wire. In this connection the cost to the applicants of constructing a line between Newington and Deerfield, exclusive of right-of-way expense, ran to \$150,000 per mile (Tr. 8806). Here, the fact that the northern route would parallel an existing line for much of its length does not mean that little right-of-way acquisition would be necessary. To the contrary, between 85 and 125 feet of additional right-of-way width would have to be obtained for the portion of the northern route which paralleled an existing line (Tr. 8633, 9256). Otherwise, approximately 170 feet would be needed (Tr. 8600).

Still further, even though we do not know the precise cost of overcoming the stability problem (assuming that it is possible to do so), the evidence indicates that one step that would have to be taken would be additional insulation and H-frame bracing along the entire 38 miles of the northern route. This would add \$10,000 per mile to the cost of constructing the line (Tr. 9318-20).

What the matter thus comes down to is whether the environmental benefits attendant upon resort to the northern route would outweigh the increased cost and the possibly irremediable stability problem which such resort would entail. We conclude not. For one thing, as just seen, even where the northern route paralleled existing lines additional land would have to be taken to broaden the corridor. Secondly, use of the minimum circumference dogleg will provide a sufficient measure of protection to the sanctity of the Pow Wow River-Cedar Swamp area that it would not appear warranted in the interests of still further protection to incur both markedly greater expense and the risk of significant technical difficulties.

C. Packer Bog, through which the Seabrook-Newington line (as approved by the Licensing Board) is to pass, is located in large part in the Town of Greenland and to a lesser extent in the Town of Portsmouth, New Hampshire (Tr. 8043, 8046). In many respects it is similar to Cedar Swamp: *viz.*, a swamp area in which are interspersed some white cedar trees. The cedar trees are found in two concentrations, which taper off into the swamp in which are found mostly deciduous trees (Tr. 8046-47). One of these concentrations is a rather large pure stand of cedar (Tr. 10145).

The Chairman of the Portsmouth Conservation Commission testified under the sponsorship of the Forest Society. She stressed the "scientific interest [in] and educational value" of preserving the swamp area with its white cedar trees within the town limits of Portsmouth and noted that the Conservation Commission had acquired certain land areas (which included a small area of 2.1 acres in Packer Bog) to foster "the preservation of open space in its natural condition" (Forests Exh. 8, p. 3; attachment 1).

The applicants, following discussions with local groups (including the Portsmouth Conservation Commission), originally sought to avoid Packer Bog by skirting the southeasterly edge of that area, and it received permission from the New Hampshire Site Evaluation Committee to do so. But such a route would have traversed the land on which the major pure stand of white cedar lies, possibly requiring the removal of some of those trees (Tr. 8046-47, 8135). To obviate this possibility, the applicants asked the Licensing Board to approve an alternate route through the center of the Bog which would avoid the cedar trees and also result in construction on a higher and drier strip of land than that encompassed by the original proposal (Tr. 9044-49, 9128-29). The Licensing Board approved this alternate route. 3 NRC at 890.

On appeal, the Forest Society complains of this result. It urges that the Board should have chosen instead the route suggested by the Conservation Commission. That route jogs somewhat to the north and west of the approved route and would parallel existing transmission lines for a substantial portion of its length. It would avoid the Bog and the cedar trees altogether.

There apparently is no problem electrically or mechanically with this route (Tr. 8128-30), and the applicants conceded that it might cost less (albeit not by much) than either of the alternatives they were prepared to support (Tr. 9168-76). But use of it would require either (1) higher towers and wires which would be highly visible in the Town of Greenland through which the line would run (Tr. 8917, 9053); or (2) the acquisition of a wider right of way and a placement of the towers and wires which would have a significant visual impact upon residential properties in Greenland (Tr. 8918-19). The Licensing Board's rejection of the route was apparently grounded on these considerations. 3 NRC at 890.⁵⁶

As in the case of the Pow Wow River-Cedar Swamp area, we must balance the benefits and detriments of the various alternatives. Despite some similarities between the two areas, Packer Bog lacks the unique features of Cedar Swamp. Its cedar trees are less in number and in any event are not likely to be disturbed by the route approved by the Licensing Board. It has no river marsh. And it has no visual vistas comparable to those which the Pow Wow River-Cedar Swamp area offers, since it is already bounded on two sides by a road and a railroad track respectively.

Further, as our tour of the area confirmed, the interior of Packer Bog is relatively inaccessible to the general public, lacking any developed trails or paths. Indeed, one of the reasons its preservation is sought is to avoid the effects of human intrusion:

The creation of an access to human traffic into the heart of the swamp forest could, furthermore, have disrupting effects on the fragile plant community as well as on the deer population . . .

⁵⁶The Board failed to explain why it reached its conclusion, but it did recite a portion of a finding proposed by the applicants concerning the visibility of the line in Greenland.

Forests Exh. 8, p. 4.

Beyond these factors, the environmental costs of the Conservation Society's route are of some consequence. In particular, the visual impact on residences would be significant—not just on one house (or at the most three houses) as with the minimum circumference dogleg around Cedar Swamp, but rather on a number of old colonial houses (Tr. 8919, 9053). Local officials in the Town of Greenland indicated to the applicants that they objected to such a route (Tr. 8916-19), although the Chairman of the Portsmouth Conservation Commission testified that Greenland's Head Selectman had told her he knew of no such objection (Tr. 9608).

All things considered, the choice between the approved and the Conservation Society routes appears to be very close. In our judgment, however, the environmental effect upon the Packer Bog of use of the former is outweighed by the effect which the latter would have upon Greenland residents. This being so, we would not be justified in disturbing the Licensing Board's result.

VII. NEED FOR POWER

"Need for power" is a shorthand expression for the "benefit" side of the cost-benefit balance which NEPA mandates for a proceeding considering the licensing of a nuclear power plant. As we previously have pointed out:

A nuclear plant's principal "benefit" is of course the electric power it generates. Hence, absent some "need for power," justification for building a facility is problematical.

Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 NRC 397, 405 (October 29, 1976) (footnote omitted).

Strongly contested "need-for-power" issues are familiar to reactor licensing proceedings. See, e.g., *Tennessee Valley Authority* (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-367, 5 NRC 92, 94-101 (January 25, 1977); *Catawba*, ALAB-355, *supra*, 4 NRC at 405-14; *Niagara Mohawk Power Corp.* (Nine Mile Point Nuclear Station, Unit 2), ALAB-264, 1 NRC 347, 352-69 (1975). Such issues surfaced in this proceeding as well. The Coalition, SAPL-Audubon, and Massachusetts all contended that the applicants had not demonstrated that the facility was needed in the time frame for which it was to be built.⁵⁷

⁵⁷The applicants, of course, have the burden of showing that their demand projections are "reasonable and that additional or replacement generating capacity is needed to meet that demand." *Catawba*, ALAB-355, *supra*, 4 NRC at 405, quoting from *Energy Research and Development Administration* (Clinch River Breeder Reactor Plant), CLI-76-13, 4 NRC 67, 76-77 (August 27, 1976).

The Licensing Board rejected those claims on two grounds. First, it found that Seabrook "will be needed in the early to middle 1980's to meet anticipated loads in New England with appropriate reserve margin." 3 NRC at 902. Second, it found the plant to be justified on a substitution basis. *Ibid.* On appeal, both of these findings are challenged.

A. 1. Turning first to the need for the facility in order to insure the "reliability" of the applicants' systems (*i.e.*, their ability to meet power demands at all times), one or more of the intervenors claim (1) that the record demonstrates that demand growth in the region will be less than that projected by the applicants and relied upon by the Board; (2) that using the applicants' own data the plant will not be needed until late 1983 (rather than by the scheduled in-service date of June 1981); and (3) that, as Dr. Salo concluded in his dissent (3 NRC at 947), there is "considerable doubt" whether Seabrook will be needed "before 1985 or 1986." Furthermore, we are told that the applicants' need for power showing (which is based on need throughout the New England area) cannot be squared with the announced deferral of Unit 3 of the Millstone plant (in Connecticut) from 1979 to 1982⁵⁸ and Unit 2 of the Pilgrim plant (in Massachusetts) to 1982. Finally, the intervenors assert that the Board's findings of need for the facility in the early to mid-1980's are fatally tainted as a result of erroneous procedural rulings.

In accepting the applicants' claims as to need, the Board correctly dealt with most of the substantive objections to the applicants' need-for-power demonstration. Among other things, it pointed to the uncertainties inherent in demand projections, the likelihood that projections are likely to be skewed by circumstances such as recessions, and the undenied fact that the 1974-75 recession had had a significant negative effect upon the applicants' previously estimated load growth. And it properly concluded that, because of the impossibility of accurately predicting when recessions will occur, and the transitory nature of recessions, "undue weight should not be accorded them in forecasts." 3 NRC at 929. In these circumstances, the Board's declination to bestow great weight on forecasts of the intervenors which stressed the inaccuracy of applicants' recessionary predictions was not unreasonable.⁵⁹

Moreover, the Board recognized that the recessionary effects, as well as conservation efforts of various consumers and the rise in price of electricity, had resulted in reductions in the consumption of electricity. It concluded—and we

⁵⁸ Several of the co-owners of Millstone are also applicants here. See *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit No. 3), LBP-74-58, 8 AEC 187, 193, *affirmed*, ALAB-234, 8 AEC 643 (1974).

⁵⁹ Dr. Salo's estimate was based not on any analysis in the record but on his according great weight to uncertainties of prediction and the inaccuracies of the applicants' recessionary forecasts. For the reasons stated, we would give little weight to the latter factor at least.

concur—that the applicants had adequately taken account of these factors in its forecasts.

With regard to some of the points raised by the intervenors on appeal, we should add that the applicants' concession that the plant might not be needed until late 1983 (Tr. 12507-08) assumes that all other proposed units, including two nuclear units, will come on line on time. The applicants termed this assumption "optimistic . . . given past experience" (App. Dir. Test. No. 25, p. 5, fol. Tr. 12229). We agree with that assessment. Further, given the history of this proceeding, and the suspension which was imposed on construction last winter, it would seem doubtful at best that the projected on-line date of June 1981 (relied on by intervenors) is currently realistic. That being so, the observations we made in *Nine Mile Point* come into play here:

As with most methods of predicting the future, load forecasting involves at least as much art as science. The margin of error implicit in such predictions is *at least* of sufficient magnitude to encompass the two-year difference between the applicant's and the intervenors' forecasts.

ALAB-264, *supra*, 1 NRC at 365 (emphasis supplied; footnotes omitted); see also *Hartsville*, ALAB-367, *supra*, 5 NRC at 95.

SAPL-Audubon criticize the Licensing Board for its failure to have addressed the proposition offered by their witness, Richard D. Ely, III, that the need which Seabrook is to serve is in fact created by itself—*i.e.*, by the added reserve requirements engendered by utilizing a unit as large as Seabrook. In this connection, Robert O. Bigelow had testified on behalf of the applicants that, without the addition of large units, a 20% reserve would be required and that, with the Seabrook units, the reserve requirement would grow to 24.6% (Tr. 11525-26). Although the Board should have dealt with this question, its failure to have done so is not crucial. For it is clear that there is a ready and adequate explanation for the apparent anomaly: "the benefits of scale." In Mr. Bigelow's words:

As we go to larger units, all of our studies have indicated that while we have to pay a price of higher reserve, the substantially lower unit costs *more than compensate* for that, and we anticipate that *for a short period* at least when we have several new large units coming in simultaneously that we will require at least a 25 percent reserve [later refined to 24.6%] *for that period of time*.

Tr. 11525 (emphasis supplied), refined at Tr. 11526. Further, the record also indicates that part of the added reserve requirement was the result of the use of new, "immature" generating units (Tr. 12335). Accepting these explanations, we conclude that the self-justification is more apparent than real and, in any event, is transitory in nature.

2. Notwithstanding the foregoing, doubt attaches to the validity of the Licensing Board's finding that Seabrook is needed for reliability reasons in the early to mid-1980's and that, as a result, construction of the facility at this time is warranted. This doubt stems from two challenged procedural rulings of the Board, both of which we find to have been erroneous.

The Licensing Board was asked by SAPL-Audubon to issue a subpoena to David J. Lessels, Finance Director of the New Hampshire Public Utilities Commission (PUC). Mr. Lessels was willing to testify on behalf of SAPL-Audubon but, as a State employee, for apparent good reason he was unwilling to do so in the absence of a subpoena. His prepared written testimony (which is available to us as SAPL Exhibit 10 for identification) dealt principally with the subject of "price conservation" (*i.e.*, the elasticity of demand for electricity in the face of price changes in that commodity). It was derived largely from PUC records and, among other things, analyzed the historical growth rate of Public Service and its relationship at various times to weather conditions and the price of electricity.

The Board refused to issue the subpoena on the ground that Mr. Lessels was a "financial expert" whose "background is totally in the financial field" and his testimony "would not be informative or relevant to this proceeding" (Tr. 12220). That ruling was clearly erroneous.

In the first place, the Commission's Rules of Practice preclude a Board from declining to issue a subpoena on any basis other than that of a lack of "general relevance" of the testimony sought; the Board is specifically prohibited at that stage from attempting "to determine the admissibility of evidence." 10 CFR §2.720(a). In this instance, the proposed testimony was plainly of at least "general relevance"—whether or not Mr. Lessels was sufficiently qualified to sponsor it (*i.e.*, the testimony was admissible). For it went directly to the question of future power demands in Public Service Co.'s service area. Secondly, we are unconvinced that the testimony was inadmissible. Once again, much of it consisted of factual data drawn from PUC records; as a PUC official, Mr. Lessels certainly was qualified to present that data. This is not to say, of course, that the Licensing Board necessarily would have been obliged to attach great weight to any conclusions which he might have put forth on the basis of the data; *i.e.*, in assessing such conclusions it could take into account that his training was in finance and not in a discipline more directly related to load forecasting.

Our own examination of the proposed Lessel's testimony indicates, however, that its introduction into evidence could not have changed the result and, thus, the Licensing Board's error was harmless. The most that the testimony would have established (if credited) is that Public Service did not need additional base load generating capacity prior to 1984 and thus "to place new capacity of 1,150 MW, at high installed cost . . . in the period 1981-4 would result in an extreme economic burden on the New Hampshire customer" (SAPL Exh. 10, pp. 12-13). But, given the construction delays which have already occurred, it is

highly unlikely that the facility would be ready for operation prior to sometime in 1982 and, as earlier noted, the margin of error implicit in load forecasting is such that at least a two-year latitude is permissible. See p. 92, *supra*.⁶⁰

Turning to the other challenged procedural ruling, the Licensing Board (properly, in our view) had reopened the record to reconcile the applicants' need for power evidence with (1) public statements of two of the applicants that they were seeking purchasers for all or part of their shares in Seabrook (see pp. 75, 80, *supra*), and (2) the fact that another nuclear plant was being delayed.⁶¹ The applicants' projected growth rate for the New England area was calculated by adding together (and according appropriate weight) to the load forecasts of the individual participating companies. Because a reduction in projected power demands was one of the reasons assigned for the endeavor on the part of the two companies to sell, the intervenors sought to cross-examine applicants' witnesses on why the demand forecasts of *other* companies in the group had not also declined proportionately. They were not permitted to do so (see Tr. 12365-12392). The Board accepted the applicants' argument that the scope of the reopened hearing did not extend to the methods and techniques employed in arriving at the forecasts, a subject which had been examined earlier.

We agree with SAPL-Audubon that this ruling was improper. Permissible inquiry at the reopened hearing necessarily extended to every matter within the reach of the testimony submitted by the applicants and accepted by the Board.⁶² Among other things, that testimony discussed the "projected growth rate for New England" and the estimated peak loads for that region from 1976-77 through 1986-87 (App. Dir. Test. No. 25, pp. 1-2, Figs. 1-2, fol. Tr. 12229). Given the method by which the regional forecast was developed, the reasons why the Public Service component of that regional forecast did not decrease to the same extent as the component forecasts of other applicants were directly pertinent to this testimony. This is particularly evident in light of intervenors' claim, developed by their witness, that the applicants' New England demand forecasts were improperly biased through the weight given the forecasts of Northern Utilities in that region (SAPL Exh. 12, pp. 6-7). Failure to permit cross-examination on matters of this type violated the intervenors' "right

⁶⁰We note in passing that the Lessel testimony on the need for additional capacity has no relevance to the alternative basis on which construction of the plant was justified by the Board below. See pp. 95-99, *infra*.

⁶¹Licensing Board memorandum and order dated February 2, 1976. Although reopening the record on need for power, that order declined to do so on the financial qualifications issue.

⁶²The staff moved to strike a large part of the applicants' testimony as being beyond the scope of the reopened hearing (Tr. 12451-66, 12671-73, 12683-84). While the particular portions were not those which related to New England load forecasts, it is noteworthy that the Board did not grant any part of the staff's request.

to . . . conduct such cross-examination as may be required for full and true disclosure of the facts” (10 CFR §2.743(a)).

We are also unimpressed with the applicants’ argument that the intervenors’ failure to cross-examine on this subject at earlier hearings precluded them from such cross-examination at the reopened hearing. Their earlier “voluntary absence” reflected only the refusal of the Licensing Board to reschedule the hearings. Whatever the justification for that refusal, the reopening of the hearing had the effect of resurrecting all of the directly related aspects of the issue under review and allowing new evidence to be adduced on that issue. The cross-examination which would have occurred would not have been duplicative—because it had not been undertaken earlier—and was relevant to the direct testimony submitted at the reopened hearing. It should have been permitted.

We cannot say, of course, whether cross-examination would have completely discredited the applicants’ forecasts, or even seriously weakened them. For the intervenors’ own testimony includes certain factual inaccuracies as to the forecasts of southern New England utilities which, when corrected, narrow the gap between applicants’ and intervenors’ forecasts considerably. Nonetheless, because of the Board’s rulings, we would be reluctant to rely upon this testimony to establish that applicants had demonstrated a need for power. A further hearing would at the least be required. We are not requiring such a hearing, however, because of our conclusion that the record establishes the need for Seabrook prior to 1984 (the only period as to which there is any dispute) on a substitution basis. We turn now to that question.

B. The Licensing Board rested its need for power conclusions, insofar as they dealt with need during the early years of plant operation, as much on a substitution basis as on reliability-centered reasons. It found, *inter alia*, that the New England Power Pool (NEPOOL), in which each of the applicants is a participant, has adopted a policy of increasing its nuclear base load capacity so that, eventually, “nuclear plants would supply all base load, and fossil and hydroelectric capacity would supply cycling and peaking load.” 3 NRC at 900. The contemplation is that the nuclear portion of NEPOOL capacity would increase from approximately 17% to over 50% (App. Dir. Test. No. 23, p. 103, fol. Tr. 11106). The reason for this policy, as expressed by the Licensing Board, is that

New England has been and is heavily dependent on imported oil as fuel for its generating stations, and NEPOOL considers the supply of oil to be uncertain and believes that it should reduce its dependence on this fuel . . .

3 NRC at 900 (citations omitted). The Board also noted the applicants’ claim that substitution of nuclear for “fossil” plants is justified on economic grounds, and on the usefulness of fossil fuels for other purposes. It found that it would be “economically advantageous” to install Seabrook and that “the substitution of

nuclear fuel for fossil fuel is in the interest of conservation of fossil resources of widely varied usefulness." *Id.* at 902.

1. The intervenors attack the Board's use of the substitution theory on a number of grounds, but the one which warrants the closest look is the Coalition's claim that substitution of nuclear power for coal is not beneficial unless the coal will be used for some better purpose and is more expensive than nuclear. According to the Coalition, the record does not establish this to be so.

This argument overlooks the evidence cited by the Board (3 NRC at 932) which establishes that to a large extent the capacity of the nuclear units would be substituted for that of oil-fired units (Tr. 11310-13). The record indicates that in 1975 NEPOOL capacity was 19% nuclear (base load), 13% fossil (base load), 46% fossil (cycling), and 22% peaking and miscellaneous (App. Dir. Test. No. 14, p. 12, fol. Tr. 10162). While the evidence does not seem to reflect exactly how much of this fossil capacity is coal-fired and how much is oil-fired, most of it apparently is in the latter category (Tr. 6499).⁶³ Moreover, it is clear that the New England region is heavily dependent upon foreign oil for fueling its fossil generating stations (App. Dir. Test. No. 14, p. 17, fol. Tr. 10162; App. Dir. Test. No. 23, *supra*, p. 100; Tr. 11312, 11381-82; SAPL Exh. 11, p. 5). Thus, in looking at the substitution proposals, it is fair to assume that the "least efficient units" which would be displaced by Seabrook (App. Dir. Test. No. 23, *supra*, p. 98) are mainly (if not completely) oil-fired.⁶⁴

Just as significant, the record clearly reflects that, on a cost basis, substitution is amply justified. The applicants presented testimony to the effect that, even if Seabrook and other planned nuclear capacity were not needed for reliability purposes prior to 1990 (a proposition not advanced by any witness),

... the total cost of electrical energy in New England will be a little less than \$2 billion less with those plants in than if we didn't put them in and had to burn oil and coal on our existing plants, and catch up a little bit with a few gas turbines or low cost plants to meet peaks when we need them.

Tr. 11168-69. This conclusion was derived from studies undertaken by NEPOOL (App. Dir. Test. No. 23, fol. Tr. 11106, at pp. 14, 98; Tr. 11165-70; see also Tr. 12315).⁶⁵ The applicants' witnesses were cross-examined on these studies, but

⁶³ Public Service Co. was the only major New England company with coal-fired capacity during the period 1970-75 (Tr. 6503). Its largest coal-fired plant is rated at 337 MW (Tr. 6348).

⁶⁴ Moreover, the record reflects the versatility of both coal and oil and the desirability of preserving these finite resources for purposes other than as boiler fuel for the generation of electricity (Tr. 11311-13).

⁶⁵ A total of 8080 MWe nuclear capacity was included in the studies, of which Seabrook accounted for 2300 MWe (App. Exh. 5, cover letter). Because the Seabrook units are scheduled to come on-line earlier than most of the other units (*ibid.*; App. Dir. Test. No. 25, p. 6, fol. Tr. 12229), the share of cost savings attributable to Seabrook presumably would exceed the proportionate share of generating capacity represented by the Seabrook units.

none of the intervenors asked for the studies or produced any testimony undermining their validity. The most that was established was that the uranium fuel costs on which the studies were founded had since increased somewhat, but one of the witnesses testifying as to comparative costs opined that the nuclear option nonetheless was less costly (Tr. 12502). In this regard, it appears that fossil fuels have also become more expensive since the studies were performed (Tr. 12417).

Where, as here, the plant's generating capacity will undeniably be needed at some early point in its projected life (*i.e.*, by 1985-86) for reliability purposes, the costs of operation are all that need be considered for comparative purposes. The Seabrook nuclear units clearly would have lower operating costs (fuel plus operation and maintenance expenses) than an average coal plant and significantly lower costs than an oil plant (Tr. 6516-29).⁶⁶ The savings over the "least efficient" units would be even greater.

Even if capital costs of the replaced and the replacement facilities were to be considered, the applicants insist the nuclear plant would still be a preferable substitute (Tr. 12502). This insistence is supported by the study indicating a \$2 billion cost savings by 1990 for projected New England nuclear plants; that study took into account both fixed charges (depreciation) and operating expenses (including carrying charges) (Tr. 11170).

2. SAPL-Audubon claim that the applicants' use of the substitution theory is undermined by the decisions of Northeast Utilities and United Illuminating Co. to dispose of all or part of their Seabrook shares (rather than retiring fossil units); by the former utility's deferral of Unit 3 of its Millstone plant; and by the election of Central Maine Power Co. not to defer a new oil-fired plant (Wyman No. 4). This claim is not well founded. The fact that two utilities may have made a business judgment that, in their particular circumstances, either no investment or a lesser investment in Seabrook was warranted says nothing regarding the viability of the substitution theory as applied to other utilities. Stated differently, that Northeast Utilities and United Illuminating might not perceive (or have) a need to obtain a guaranteed portion of Seabrook's output to enable them to replace the generating capacity of their own fossil plants does not mean that no such need exists in the case of, for example, Public Service Co. For its part, Wyman No. 4 is not the type of base load plant which could be deferred in favor of a nuclear plant; rather, it is an "intermediate fossil" plant which has "*daily on line-off line cycling capability*" and hence "will normally be expected to operate base loaded on weekdays for several years after initial commercial operation, but must be capable of daily, on line-off line cycling" (App. Exh. 5, pp. 59, 61).

⁶⁶We note that SAPL-Audubon criticize the applicants' substitution testimony for using an unrealistic 3 mills/kWh fuel cost for nuclear plants. The applicants corrected this testimony to reflect a 6 mills/kWh fuel cost (Tr. 11102-03, 11172, 11195). See also Tr. 6517. Later, the applicants updated their testimony to reflect a nuclear fuel cost of 7.32 mills/kWh (App. Dir. Test. No. 25, p. 4, fol. Tr. 12229).

While more economical for base load service, nuclear plants are not suitable for cycling functions; and the fact that Wyman No. 4 has not been deferred has no bearing on the validity of substituting Seabrook for other fossil plants being used for base-load purposes.

3. The Coalition would have us reopen the record⁶⁷ to consider a new report of the Council on Economic Priorities⁶⁸ (CEP) which, because of an assertedly greater reliability of coal plants, recommends their use in lieu of nuclear facilities. This report is said at the very least to undercut the applicants' substitution argument.

In essence, the CEP report adopts a position similar to that espoused by Coalition witness Dr. Gordon J. MacDonald (NECNP Exh. 19). There is evidence in the record, however, which—although not exhaustive—would indicate that, as the Licensing Board pointed out, there is little reason to expect that, once nuclear plants have matured, their performance record will be substantially different from that of coal plants (3 NRC at 930; see Tr. 11203-04, 11368-75). Indeed, there is evidence that nuclear plants are likely to be as reliable as oil plants and moderately more so than coal plants (particularly if scrubbers must be used) (Tr. 11203-04). Moreover, the CEP report itself excepted one area of the country—New England—from its general conclusion that coal plants are less expensive than nuclear plants. For New England, the most the report could say is that coal is “competitive” with nuclear. CEP Report, *supra*, p. 9. There is thus clearly no warrant for reopening the record of this proceeding to consider the CEP report.

4. In sum, there is a strong factual basis for bringing Seabrook on-line in the early 1980's so it will be available to substitute for fossil (primarily oil) plants. SAPL-Audubon, however, also claim that the applicants' reliance on substitution to justify Seabrook is “legally indefensible.” They reason that a change in energy policy, represented by five Congressional enactments,⁶⁹ undercuts the legal basis for the theory by making it clear that all sources of energy will be developed and that conservation will be emphasized. SAPL-Audubon assert that the substitution theory as enunciated in *Nine Mile Point*, ALAB-264, *supra*, is inconsistent with these policies and hence that that decision should be overturned.

In our view, SAPL-Audubon fail to grasp the essential nature of the substitution theory. It is not a national policy favoring nuclear energy. It does not denigrate the importance of the other energy options with which the cited

⁶⁷ Motion dated December 3, 1976. Other aspects of that motion were considered in ALAB-366. See 5 NRC at 46.

⁶⁸ Council on Economic Priorities (Charles Komanoff), *Power Plant Performance* (1976).

⁶⁹ The Geothermal Energy Research and Development and Demonstration Act of 1974; The Solar Heating and Cooling Demonstration Act of 1974; The Energy Reorganization Act of 1974; The Solar Energy Research, Development and Demonstration Act of 1974; and The Federal Non-Nuclear Energy Research and Development Act of 1974.

statutes deal. What is involved is a case-by-case determination of the most advantageous energy option in a particular factual situation. Here, on the record, nuclear turned out to be the preferable option, but it need not necessarily be found so in all instances. The New England situation, with its heavy dependence on oil, may well be unique. Be that as it may, the substitution theory is consistent with all of the statutes in question.⁷⁰ Thus, we decline to overturn our acceptance of that theory as set forth in *Nine Mile Point* and, again, in our recent *Catawba* decision, ALAB-355, *supra*.

VIII. MISCELLANEOUS ISSUES

We have examined the other points which the various appellants have raised and conclude that none of them would warrant any change in the result reached by the Licensing Board. A few brief comments on certain of those points is in order.

A. The evidence amply supports the Licensing Board's determination that there is no single energy source alternative to Seabrook which is both feasible and superior. 3 NRC at 903-07.⁷¹ The same evidence indicates that, even taken in combination, the numerous considered alternative energy sources would not be a better choice than the nuclear facility. Those sources which are not totally unavailable (at least in New England) are either not very fruitful or more expensive than nuclear generation. This is true even with respect to coal; the portions of the record cited by the Board reflect that, as it found, the unit (kWh) cost of electricity produced by a coal-fired plant would be approximately 56 mills, as compared with 39 mills in the case of a nuclear plant commencing operation in 1984. 3 NRC at 905-06.

In light of SAPL-Audubon's heavy emphasis upon the wood-fired plant alternative, a few words on that alternative are appropriate. The record indicates that the current "state of the art" in that technology is a 4 MWe wood "pilot project" being sponsored for experimental purposes by the Green Mountain

⁷⁰Moreover, as applied in this proceeding, the theory is consistent with the thesis appearing in the President's recent energy message to Congress: that it is necessary "[t]o cut imports of foreign oil" and that to ignore the problems created by oil imports "would subject our people to an impending catastrophe." 123 Cong. Rec. H3328 (daily ed., April 20, 1977). See also fn. 72, *infra*.

⁷¹See, e.g., FES, §§9.1.1, 11.9.1.1 (oil, coal, natural gas, hydroelectric, geothermal, municipal solid wastes, solar, wind, fusion, tidal energy, ocean thermal gradients, fuel cells, magneto hydrodynamic generation, coal gasification, coal liquefaction); App. Dir. Test. No. 12, fol. Tr. 6250 (coal, nuclear, oil, hydrogenation, gas turbines, M-H-D, solar (both for electricity and heating), wind power, solid waste, biomass, ocean thermal and geothermal); Staff Dir. Test. on Alternate Energy Sources, fol. Tr. 7330 (solar, photovoltaic cells, geothermal, fuel cells, municipal solid wastes, oil shale, oil, coal); Tr. 11349-51 (solar).

Power Co. (one of the applicants here) in cooperation with the State of Vermont (Tr. 7198-99, 7201). That plant was expected to become operable by 1976 (Tr. 7199). If successful, a further project to convert a 50 MW coal plant to wood might be undertaken; now it is merely in the exploratory stage (Tr. 7204-05). Even SAPL-Audubon acknowledge that wood is not now cost-competitive with oil or coal (much less nuclear) (SAPL Exh. 8, pp. 5-6). And the various economic or environmental problems which might be created by using a number of wood-fired plants as a substitute for Seabrook have not been studied (Tr. 7234-35). In short, the Licensing Board's rather summary rejection of wood as a viable alternative on the basis that it is not cost-competitive and requires technological breakthroughs is well founded in the record.

The Licensing Board also considered the alternative of energy conservation. 3 NRC at 906-07. It described some of the methods for conserving use of electricity in residential and commercial buildings which the Coalition witnesses had suggested, including in particular the use of power (and process steam) generated by pulp and paper companies. The Board discussed why the latter source of power would not be suitable for use as firm power (for which Seabrook is to be employed) and also concluded that, although some conservation efforts are underway now, no basis exists "for predicting whether or when such conservation efforts would come into being either nationally or regionally." *Id.* at 906.

According to the intervenors, a much greater independent inquiry should have been undertaken by the NRC staff and the Board with regard to the likelihood that energy conservation measures would be implemented if Seabrook were not built. *Aeschliman v. NRC*, 547 F.2d 622 (D.C. Cir. (1976), *certiorari granted sub nom.*, *Consumers Power Co. v. Aeschliman*, 45 U.S.L.W. 3570 (February 22, 1977) is cited for the proposition that, once an alternative is identified as being "colorable," the Commission must vigorously investigate it and, if it concludes that further consideration is unwarranted, must provide an explicit statement of the reasons for that conclusion. As we recently held, however, *Aeschliman* did not work a substantive change in the scope of the Commission's investigation of alternative energy sources, particularly conservation; it merely rejected the "threshold test" which the Commission had imposed as a condition precedent for considering conservation issues. *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 2), ALAB-384, 5 NRC 612, 617 (March 22, 1977). No such "threshold test" was imposed here. Moreover, energy conservation and other "colorable" energy alternatives were in fact investigated with reasonable thoroughness. As the Commission has pointed out, the NEPA evaluation of alternatives is subject to a "rule of reason," and application of that rule "may well justify exclusion or but limited treatment" of a suggested alternative. CLI-77-8, *supra*, 5 NRC at 540 and cases there cited. See also *Illinois Power Co.* (Clinton Power Station, Unit Nos. 1 and 2), ALAB-340, 4 NRC 27, 36-37

(1976). Given these standards, applicable NEPA review requirements have here been satisfied.⁷²

B. SAPL-Audubon claim that they should have been granted a mistrial upon the replacement of Daniel M. Head as Chairman of the Licensing Board. The reason for the replacement was that Mr. Head had accepted a position with another Federal agency. SAPL-Audubon assert that "it is not proper to change Judges in midstream without declaring a mistrial and starting the proceedings *de novo*."

There is no substance to that claim. The requirement of the Administrative Procedure Act, cited by SAPL-Audubon, which provides that the official who presides at the reception of evidence must make the recommended or initial decision (5 U.S.C. 554(d)), includes an explicit exception for the circumstance in which that official becomes "unavailable to the agency." Our Rules of Practice also provide for the replacement of a board member who becomes "unavailable" (10 CFR §2.704(d)). Chairman Head became "unavailable" by virtue of his resignation from the Commission.

It is true that, at the time the change in Chairmen occurred (October 1975), the Rules of Practice did not clearly delineate the means by which a Board member might be replaced during the course of the hearing. Effective November 7, 1975, the Commission amended the rules to remove the ambiguities. See 40 Fed. Reg. 51995. In doing so, it merely made explicit what had long been implicitly authorized and routinely followed. The replacement of Chairman Head followed that practice, and we find no reason to invalidate it.

C. SAPL-Audubon take exception to the Licensing Board's denial of their February 12, 1976, "Motion to Reopen Evidentiary Hearing to Investigate Allegation of Corrupt Influence." That motion sought to have the record reopened to investigate alleged statements by New Hampshire Governor Meldrim Thom-

⁷² The Coalition's motion of June 9, 1977, to reopen the record on energy alternatives is based on the asserted conservation goals of the President's National Energy Plan (released on April 29, 1977) and the priorities which that plan allegedly would accord to conservation, solar energy and co-generation. The motion makes no attempt to show how (or whether) the energy plan would influence demand for electricity in New England or in the smaller area to be directly served by Seabrook. Nor does it endeavor to demonstrate the time frame in which the alternatives could satisfy or reduce electricity demand, although it claims that NEPOOL forecasts of demand are now lower than at the time of the hearing. In the latter regard, the NEPOOL document referred to by the Coalition does not contain a lowered projection of demand. Rather, it establishes a new method for determining the responsibility of NEPOOL participants for capacity needed to meet NEPOOL reliability standards, a method designed to reflect larger than anticipated fluctuations in forecasted demand. Moreover, the Coalition ignores one of the primary goals of the energy plan: the saving of oil, with which Seabrook construction is consistent (see pp. 96, 99 fn. 70, *supra*). In short, no basis has been presented for suggesting that a different result might be reached as a result of implementation of the energy plan; the motion to reopen must therefore be denied.

son, appearing in articles published in the *Manchester (New Hampshire) Union Leader* of February 5, 7 and 8, 1976, to the effect that he had been assured in March 1975 by a Presidential aide that the Seabrook construction permits would be issued by September 1975. The motion also referred to a statement by the applicants' project manager, appearing several months earlier in the same newspaper, that the only way the Seabrook project has been advanced "is through political pressure brought by [Governor] Thomson." Copies of these articles were attached to the motion, along with another article quoting President Ford as saying it would be "unethical and illegal" for him to pressure the Commission to approve the Seabrook plant. In aid of its proposed investigation, the motion suggested that the Licensing Board issue a subpoena requiring the Governor to testify at the reopened hearing.

In orally denying the motion (Tr. 12693-94), the Licensing Board referred to President Ford's denial of the charges and also stated that it did not "find in the motion any evidence of corrupt influence." It opined that it was not the proper forum to carry on the requested investigation and suggested that SAPL-Audubon might seek other forums.

We think the Board's approach to the matter was correct. Obviously, had it itself been subjected to an attempt to influence improperly the content or timing of its decision, the Board would have been duty-bound to call attention to that fact promptly on its own initiative. We are given no reason to believe that the Board would not have fulfilled that duty and then taken whatever other measures were thought necessary in the circumstances. Moreover, in requesting a Board investigation, SAPL-Audubon must be understood as seeking to initiate a Board inquiry into possible attempts at corrupt influence which fell short of actually reaching the Board; had those intervenors thought that the Board might itself have been approached, they assuredly would have taken a quite different tack. The question thus comes down to whether an adjudicatory tribunal which has not been subjected to attempts at improper influence must nonetheless look into allegations that such attempts were contemplated or promised. We conclude not. The investigation of such allegations can appropriately, as the Board below reasoned, be left to others.

D. We also need to consider whether the ultimate NEPA cost-benefit balance, for the Seabrook facility tips in favor of the abandonment of the facility by reason of the interim fuel cycle rule promulgated on March 14, 1977. 42 Fed. Reg. 13803. In that rule, the Commission revised the numerical values which had been assigned in Table S-3 of the previously promulgated fuel cycle rule⁷³ to the environmental impacts of the spent fuel reprocessing and waste disposal phases of the uranium fuel cycle.

By order of April 1, 1977, the Commission directed that we make a deter-

⁷³ That rule issued in April 1974 and was codified in 10 CFR §51.20(e).

mination in a number of specified proceedings, including the one at bar, with respect to the effect of the revised interim rule upon the NEPA balances earlier struck for the facilities in question. CLI-77-10, 5 NRC 717. In the implementation of that order, we issued an order of our own on April 21, in which we invited submissions by any parties who thought that the interim rule would have the effect of tipping the NEPA balance against plant construction and/or operation.⁷⁴ The Coalition accepted that invitation with regard to, *inter alia*, Seabrook. In its memorandum, it first urged that we certify to the Commission the question of the continuing validity of the interim rule in light of certain recent statements of the President with regard to the recycling of plutonium. Alternatively, it contended that the Seabrook construction permits should be revoked or suspended because of fuel cycle considerations.⁷⁵

Just last week, we denied the request for certification. ALAB-421, 6 NRC 25 (July 18, 1977). In doing so, we reserved for this decision the question whether the interim rule of itself calls for any action against the Seabrook permits.

In tackling this question, our starting point is a disagreement with the Coalition's insistence that we are confronted with a "rerun of ALAB-349," in which last September we ordered the Seabrook permits suspended on environmental fuel cycle grounds. Without belaboring the point, it is totally clear from what we said in ALAB-349 that the crucial factor was that we then had no way of determining when an interim rule would be adopted and what its substance might be. See 4 NRC at 248-49, 253, 262, 270, 271.⁷⁶ Now, of course, the interim rule is in hand. Beyond that, as the Commission pointed out in its April 1 order, "the values in the old rule and those in the interim rule are not substantially different." CLI-77-10, *supra*, 5 NRC at 718. At the time the prior rule issued in 1974, the Commission⁷⁷ had characterized the environmental effects

⁷⁴ ALAB-392, 5 NRC 759, 765.

⁷⁵ Of course, at the time of the Coalition's filing, the permits were already in a state of suspension for different reasons. See p. 39, *supra*.

⁷⁶ The Commission recognized this consideration in CLI-76-17, *supra*, in which it vacated the permit suspension ordered in ALAB-349. 4 NRC at 458-59. Although at the time of that Commission decision the interim rule had not yet been promulgated, the staff had published its revised survey on the environmental effects of the uranium fuel cycle which had not been available to us when ALAB-349 was rendered. On the strength of that survey the Commission had published a proposed interim rule, which did not differ substantially from the rule issued in 1974 (10 CFR §51.20(e)). In the Commission's view (substantially borne out by later developments), there was good reason to believe it likely that the interim rule would issue within three months and that it would closely resemble the proposed rule. In the totality of these circumstances, the Commission reasoned that it was unlikely that the cost-benefit balance for Seabrook would be tipped by the interim rule. 4 NRC at 458-63.

⁷⁷ Then the Atomic Energy Commission, the predecessor of the Nuclear Regulatory Commission.

of the fuel cycle, including reprocessing of spent fuel and waste disposal, as "relatively insignificant." See ALAB-349, *supra*, 4 NRC at 238.

We also cannot accept the Coalition's belief that, in reexamining the cost-benefit balance in light of the interim rule, we should factor in the "residual risk" that the staff judgments underlying the rule—and therefore the content of the rule—might be erroneous. As we see it, the Commission's instructions to us require that we proceed on the basis that the interim rule is valid in all respects. Adoption of the Coalition's suggestion consequently would be incompatible with what we have been directed to do.

In the final analysis, then, the question before us comes down to whether, leaving aside fuel cycle impacts, the Seabrook cost-benefit balance is so close that the addition of the quantified values in the revised Table S-3 included in the interim rule would have a decisive effect upon that balance. We conclude not. Alone of the respective parties, the staff has provided us (as part of its response to the Coalition's filing) with a detailed analysis of the impact of the revised values upon the Seabrook balance—which led it to conclude that the balance does not tip. We find it unnecessary, however, to canvass that analysis here. For it seems plain to us that, as no one seems seriously to dispute, the effects assigned by the interim rule to the uranium fuel cycle are indeed extremely small (as the Commission itself has suggested). This being so, they could not possibly serve to call for the abandonment of any particular nuclear facility unless the cost-benefit balance for that facility was otherwise in virtual equipoise. Insofar as Seabrook is concerned, that is not the case. Without attempting to establish the precise margin of difference between Seabrook benefits and costs, we are totally satisfied that it is large enough that the placing on the scales of the revised Table S-3 values would have no operative significance.

IX. SUA SPONTE REVIEW

Our review *sua sponte* of the portions of the initial decision which were not the subject of the appeals has disclosed no error warranting corrective action. There is, however, one matter which, although not raised before or addressed by the Licensing Board, requires our attention.

In another proceeding, we have been considering in depth questions relating to the integrity of the steam generator tubes in pressurized water reactors. See *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-343, 4 NRC 169 (1976). By reason of a Commission order entered subsequent to the rendition of ALAB-343,⁷⁸ our inquiry into this matter in *Prairie Island* still continues. More specifically, we are now focusing upon the so-called "denting" phenomenon which has been encountered in varying degrees

⁷⁸ CLI-76-21, 4 NRC 478 (1976).

in several pressurized water reactor facilities and which affects the integrity of the steam generator tubes of the reactor.

At this juncture, we are in the process of digesting and evaluating a wealth of documentary material pertaining to the denting phenomenon which has been furnished us by the parties in *Prairie Island*. Although the completion of this process and the issuance of a further decision appear to be at least a month away, we are able to say at this point that the most severe denting discovered to date has been in the steam generator tubes of reactors which have used sea water for condenser cooling purposes.

The Seabrook units are to be pressurized water reactors and their condensers will be cooled by sea water. In the circumstances, there is an especially large possibility that our exploration of the denting phenomenon in *Prairie Island* will produce conclusions which would have relevance to those units. For this reason, we are retaining jurisdiction in the proceeding before us on the steam generator tube integrity issue which we have raised on our own initiative. Upon the rendition of the further decision in *Prairie Island*, we will determine what, if any, additional action is required here.

This limited retention of jurisdiction has no bearing upon whether construction should be allowed to proceed in the interim. What is involved is a potential problem on the operational level. And, on the basis of the revelations pertaining to it which have been brought to our attention, we are totally satisfied that—although serious—the denting phenomenon does not call for the conclusion that there is a significant likelihood that Seabrook operation would endanger the public health and safety.

For the foregoing reasons, the Licensing Board's authorization of the issuance of construction permits for Units 1 and 2 of the Seabrook facility is *affirmed*.⁷⁹ Jurisdiction is being retained, however, with respect to the matter of steam generator tube integrity discussed in Part IX, *supra*.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

⁷⁹This affirmance is subject, of course, to our review of the Licensing Board's July 7, 1977, supplemental initial decision following receipt of all briefs on the exceptions filed to that decision. See p. 74, *supra*.

Opinion of Mr. Farrar, dissenting in part and from the result:

On most issues, the foregoing opinion reflects my views as well as those of my colleagues. But I cannot subscribe to Parts III and V of that opinion, which deal with seismicity and financial qualifications.

In view of the approach taken by the majority, my dissent on the financial issue can be narrowly focused. It is set forth in Part A below. There I explain that the quality of construction is likely to be compromised when, as all agree *will* occur here, the funds to finance that construction can be obtained, if at all, only with great difficulty and expense. This presents a serious safety question essentially ignored in my colleagues' decision. They adopt and place entire reliance upon the theory that the lead applicant's status as a large and beneficently regulated public utility provides all the evidence of its financial qualifications that is needed. The Atomic Energy Act and the Commission's regulations demand more. I therefore must conclude that the lead applicant has failed to demonstrate that it is financially qualified to construct a nuclear power plant. I dissent from the Board's decision to uphold the award of those permits.

The questions relating to seismicity are far more complex than those concerned with financial qualifications and my dissenting views commensurately broader. If, however, the applicants could pass financial scrutiny, my views on the seismic issues would not lead me to conclude that the plant should not be built. Rather, those views call for a substantial upgrading of the plant's ability to withstand earthquakes. Although this is important to safety, the necessary design changes would not be foreclosed by any construction efforts taking place in the near future. Thus, there is no cause to delay the release of today's decisions—which allow construction to proceed—while I complete the full elucidation of my response to my colleagues' seismic analysis.¹ Accordingly, I present in Part B only an outline of my conclusions on the seismic issues, without detailed supporting analysis. I will prepare a supplemental opinion later, and in it furnish the full reasoning underlying my position.

Although I am in essential agreement with the remainder of the Board's opinion, at points there is a need to make an additional observation or to emphasize what otherwise might be overlooked. My comments of this nature are brief and appear in Part C.

¹ My conclusion on the seismic matter will affect the cost of the plant and thus the comparison of it to a plant at those alternative sites located outside the same seismic area. Given the standards laid down by the Commission (see 113, *infra*), the alternative site question would not likely be affected were my views on the seismic question to be adopted.

A. Financial Qualifications

1. At bottom, the majority's holding that the lead applicant is financially qualified rests on the adoption of a singular principle. In essence, the majority is saying that a large utility company which has received the approval of its state regulatory agency to build a nuclear power plant should, on that ground alone, be conclusively presumed by this Commission to be financially qualified.

I give my colleagues credit for candor. Of course, they could scarcely place their holding on any other foundation. For the evidence establishes that, at best, the lead applicant would have a long, difficult and costly struggle competing for the outside capital necessary to finance its 50% share of this project. There is no need to rehearse here the evidence presented to the Licensing Board on this subject, for my colleagues do not claim there is a serious question about the matter.²

In this connection, however, I should mention that the lead applicant has confirmed that the picture is a gloomy one. According to the unequivocal testimony it presented recently to a state legislative committee, it believes that the Seabrook facility cannot be financed unless the State Public Utility Commission permits the inclusion in the rate base of the value of construction work in progress (p. 81, *supra*). In other words, the company now admits that its struggle will be a hopeless one unless the PUC departs radically from past practice.

Notwithstanding this concession concerning the extraordinary lengths to which the PUC will have to go in the company's behalf, there is some superficial appeal to the principle adopted by the majority. If we were not concerned with a nuclear facility, I would be willing, as are they, to assume that once a state regulatory agency has determined that the public convenience and necessity warrant the construction of a large electric power project, that same agency will

² I thought this was true when I wrote this dissent, but it is now uncertain. For at the last minute my colleagues added new material to their opinion in the form of the first sentence in footnote 52 on page 79. In effect, they there appear to recognize for the first time that the applicants must prove not just that they can obtain funds but also that they can obtain them with sufficient ease to avoid compromising safety. This comes close to conceding the invalidity of the theory upon which their finding of financial qualifications is based.

In any event, despite what was added to that footnote, they have not rejected the claims of the intervenor—which I accept—concerning the level of difficulty and expense that will be involved in raising the funds to finance this project (see pp. 75, 77, and 79, *supra*). This is in keeping with the view, still reflected in their opinion, that the “financial qualifications inquiry . . . centers upon whether the funds can be obtained and not on the price of or difficulty in obtaining them” (p. 79, *supra*).

do whatever is required to enable the utility company eventually to obtain the funds it needs to complete construction.

But this is a nuclear power plant, and that makes the difference. Consequently, I cannot agree with my colleagues that Congress and the Commission had so little in mind when they demanded that an applicant prove its "financial qualifications."

To be sure, we have been directed to, and have found, no legislative history on just what was meant by the Atomic Energy Act's requirement that an applicant be financially qualified (42 U.S.C. 2232(a)). But generally that Act's provisions stress the need to protect the public health and safety. In particular, it provides that licenses may be given only to those "who are equipped to observe . . . safety standards . . ." (42 U.S.C. 2133(b)). The Act leaves it to the Commission to decide what is appropriate for this purpose (42 U.S.C. 2133(b), 2232(a)).

The Commission's regulation on the subject proceeds on the basis that safety purposes underlie the financial qualifications requirement. For, although it too provides no specific standards for us to employ, it couches the requirement that an applicant demonstrate its financial qualifications in terms of an ability to carry out activities "*in accordance with the regulations . . .*" 10 CFR §50.33(f) (emphasis added). In the Commission's parlance, of course, the underscored language can mean only one thing, i.e., "in a safe manner."³ As we ourselves have stressed before, the financial qualifications issue arises under the Atomic Energy Act's safety provisions; if a utility company "is not financially 'equipped to observe' the Commission's safety standards, it may not be licensed to build or operate the facility." *Duke Power Co.* (Catawba, Units 1 and 2), ALAB-355, 4 NRC 397, 413-14 (1976).

In short, an applicant must prove that it is financially qualified to carry out the construction of the plant in a manner which is fully consistent with the Commission's safety goals. If this means anything,⁴ it means that there is a need to avoid a situation in which financial pressures on an applicant become so pervasive as to influence the manner in which the plant is constructed. If the struggle to obtain funds becomes too difficult, even the most safety-conscious utility company might succumb and, in its efforts to reduce costs, end up cutting corners in constructing the plant. Even where there is a promise that funds will ultimately be available in the future,⁵ financial constraints can play a

³The Commission has emphasized from the beginning that "... safety is the first, last, and a permanent consideration" in its licensing activities. *In re Power Reactor Development Co.*, 1 AEC 128, 136 (1959).

⁴Under the majority's view, the financial qualifications inquiry is virtually meaningless.

⁵I note that the record reflects that the state regulatory commission upon which the applicants base their hopes has moved slowly and reluctantly in the past.

heavy influence on day-to-day decisions. We should not close our eyes to the likelihood that letting a financially strapped company go ahead with construction will inexorably result in decisions to do less testing, to use lower quality materials, to approve borderline workmanship, and the like. In insidious fashion, each such decision, even though not consciously designed or believed to do so, increases the risk to the public from an eventual accident.

I fear that, if not reversed, the principle announced by the majority will undercut the Commission's longstanding insistence that only the highest quality standards may be employed in the construction of nuclear facilities.⁶ Our experience in reviewing other licensing cases teaches that it has not always been easy for the Commission to get this message across to those who need to hear it.⁷ Repeatedly, companies which were not in financial distress have had to be prodded to adhere to quality standards. We can expect the problem to be exacerbated when the utility involved is being forced to save money at every turn.

It is no answer to pretend that any deficiencies will be caught by the Commission's staff of inspectors and then corrected. No matter how capable and diligent they may be, the inspectors are not sufficiently numerous to oversee all work or even to review the documentation of more than a small part of it. No one expects that they will spot every instance in which safety is compromised by cost-cutting techniques.

In other words, while it may not appear to be so at first glance, a decision on an applicant's financial qualifications can have the most serious safety repercussions. Because of this, it is not enough for me to assume, with the majority, that the State PUC will see to it that the lead applicant eventually obtains the funds necessary to complete the construction of Seabrook. If we were being asked to pass on the financial qualifications of a utility to build a fossil-fueled plant, we might justifiably go no further, for deficiencies in construction brought about by financial pressures would only make it an unreliable source of electricity. But a less than carefully or adequately built nuclear plant is dangerous.

In sum, Congress and the Commission intended the test of financial qualifi-

⁶ The following statement exemplifies what the Commission has repeatedly said through the years: "... the primary assurance of safety [of nuclear power plants] is accident prevention by correctly designing, constructing and operating the reactors." See its opinion establishing the ECCS acceptance criteria, CLI-73-79, 6 AEC 1085, 1091 (1973).

⁷ See, e.g., *Duquesne Power & Light Co.* (Beaver Valley, Unit 2), ALAB-240, 8 AEC 829, 830-40 (1974); *Consumers Power Co.* (Midland, Units 1 and 2), ALAB-283, 2 NRC 11, 13-14, 21-22 (1975); see also *Duke Power Co.* (McGuire, Units 1 and 2); ALAB-143, 6 AEC 623, 625 fn. 11 (1973).

cations to be more stringent than the one employed by the majority. As I see it, an applicant must show that it will be able to obtain funds in ready enough fashion to avoid the likelihood that temporary shortages may compromise safety.⁸ The applicants have not shown this here. It invites disaster to overlook it.

2. The foregoing considerations apply principally to the lead applicant, which is firmly committed to the project. Other participants are not, and this has generated another area of disagreement between my colleagues and me. Specifically, the majority has given its approval to the refusal of the Board below to reopen the record to look into the announced desire of two utility companies, holding the second and third largest shares of the project, to sell off interests amounting to 22% of the facility.

Again my colleagues' reasoning is straightforward enough, but nonetheless faulty. They say, correctly, that those now seeking to withdraw had previously signed the Joint Partnership Agreement, which obliges them to continue their financial participation in the project unless and until substitute participants are found and approved by the Commission (see p. 80, *supra*). In this connection, they go on to say that "there has not been the slightest suggestion" (1) "that either of the utilities in question has manifested in any way an intent to breach" that obligation or (2) that "either utility is financially unqualified to continue to meet its contractual obligations in the event that it is unable to obtain a purchaser" (*ibid.*).

In my judgment, whether or not such suggestions were explicitly contained in the motion to reopen, the companies' announcement cried out for further investigation. It is not unheard of that a party able to honor its commitments decides that it is not in its interests to do so, and in any event changed circumstances can affect even a willing party's ability to fulfill its contractual obligations.⁹ Whether the companies' announcement either resulted from or fore-shadows any such developments is not known. But their shares in the project were too large, and the financial questions already too ominous; to let the

⁸ Financial qualifications have not been made a serious issue in many proceedings. In the one case referred to by the majority, the Commission's holding that the applicant was financially qualified rested on a significantly stronger footing than is involved here. See, *In re Power Reactor Development Co.*, 1 AEC 128, 150-53 (particularly fn. 68 and accompanying text) (1959).

⁹ It is worthy of passing note that the majority, which for one purpose relies so heavily on the willingness of state regulatory agencies to take steps to insure that an applicant will obtain funds to construct a needed facility, does not touch on whether the same willingness will manifest itself in favor of participants who will use the funds to support a project no longer viewed by them as necessary.

matter pass without any exploration.¹⁰ See *Northeast Nuclear Energy Co.* (Millstone, Unit 3), ALAB-234, 8 AEC 643, 644 (1974).¹¹ The Board below should have made inquiry into it, on a *sua sponte* basis if not sufficiently well prompted by one of the parties.¹² Its failure to reopen the hearing should not be upheld. This provides an independent basis for overturning the financial qualifications holding.

B. Seismic Design

The process of constructing a nuclear power plant to withstand earthquakes begins with (1) forecasting the highest intensity earthquake likely to be felt at the site during the plant's operating lifetime and (2) selecting the maximum effective acceleration likely to be associated with an earthquake of that intensity. The latter value becomes the starting point for designing the plant.

My colleagues would affirm the Licensing Board's selection of an intensity VIII earthquake and the association with it of an acceleration of .25g. I disagree. I believe the evidence in this record, viewed in the light of a proper understanding of the Commission's regulations, calls for the selection of an intensity IX earthquake as representing the site's maximum earthquake potential. It follows from this that a correlative increase in acceleration is warranted. Thus, on that ground alone .25g is inadequate. Beyond that, the reasoning employed by the majority to associate .25g with the lesser intensity level VIII earthquake will not withstand analysis.

1. In recognition of the gaps in our understanding of earthquake occurrence and mechanism, the Commission's regulations insist that in this area, more so than in others, conservatism be the watchword. My colleagues' ignore that command in two respects. First, they insist on reading a recent amendment to the regulations in unjustifiably narrow fashion, as though it circumscribed rather

¹⁰A perplexingly sharp contrast exists between the attitude taken toward this development and the amount of attention that was paid to the proposed transfer of much smaller interests. Evidence was adduced to explain the proposed transfer of a total of 1.3% of the project. See 3 NRC at 859. Moreover, the Board below mentioned that matter twice in its initial decision. See 3 NRC at 867. But that same decision never mentions the proposed transfer of 22% of the facility.

¹¹The concerns over financial health in *Millstone* had a different basis than did those which the announcement in question prompted here. In this connection, I would require that we here face up to whether the applicants are likely to find a financially qualified purchaser for the shares now available and whether, if they do not find one, the prospective sellers will remain willing and able to finance their share of the plant.

¹²The nuclear industry recently witnessed the failure of a large corporation to fulfill its contractual obligations. I am not suggesting that that situation parallels this one in any way; I mention it only to emphasize that this matter should not be taken as lightly as it has been thus far.

than emphasized the need to look beyond the records of American earthquake history in determining earthquake potential. Second, they view the evidence presented by the intervenors with an unjustifiably jaundiced eye, demanding from them what they do not expect of the staff and applicants—strict proof neither within the grasp of any practitioners of the seismological arts nor demanded by the regulations.

Evaluated under proper standards, three distinct lines of evidence converge to require the selection of an intensity IX earthquake. First, the 1755 Cape Ann earthquake may have been of such an intensity; it concededly occurred near enough to the site to require us to assume that it could recur there. To be sure, evidence of the intensity of any early American earthquake is uncertain at best and the evidence that this one was intensity IX has perhaps been discredited. But in conjunction with the other evidence, it lends support to the conclusion we should reach.

The second line of evidence concerns the so-called "Boston-Ottawa seismic trend," which extends from Canada through the New Hampshire coast and at least as far out to sea as the Kelvin Sea Mounts. An intensity IX earthquake has occurred in the northwest portion of that trend, near Montreal. Whether a similar event must therefore be assumed likely to occur at Seabrook depends on the resolution of two disputed questions: (1) whether and to what extent this trend comes within the regulatory definition of "tectonic province"¹³ and (2) whether and to what extent there are similarities between the geologic structures near Montreal and near Seabrook. These are mixed questions of law and fact; my analysis of the record and the regulations leads me to conclude that any truly conservative determination of the earthquake potential at Seabrook must take the Montreal event into account.

The third line of evidence supporting the selection of an intensity IX earthquake potential involves Dr. Chinnery's opinion that the frequency of higher intensity earthquakes near Seabrook can be fairly predicted by use of the statistical analysis which he presented. Dr. Chinnery did not "prove" that his approach was valid. But he did establish that his theory had sufficient weight to warrant its use along with the other evidence in the case. In that regard, much of the majority's criticism is not supported by the record and evidences a misunderstanding of just what his theory entails. Beyond that, the very terms of the Commission's regulations belie the majority's claim that we are forbidden to give any consideration to Dr. Chinnery's analysis; nor does that claim comport with the viewpoint of the staff, which in abandoning a similar argument long ago,

¹³ See p. 55, fn. 25, *supra*. We have seen here and in the *Indian Point* proceeding both that this definition is susceptible to widely varying interpretations and that tectonic provinces formed at different times may be superimposed upon one another.

explained in cogent fashion why the theory did not go beyond the bounds of the regulations.

In sum, Dr. Chinnery's analysis points to the same conclusion as does a conservative evaluation of the other evidence in the case. Specifically, it is necessary to design Seabrook to withstand an intensity IX earthquake.

2. Even if the majority were correct in associating an acceleration of .25g with an intensity VIII earthquake, that value would have to be increased to reflect the selection of an intensity IX as controlling. But quite apart from that, the reasons given for selecting .25g are faulty.

The data collected and analyzed by Dr. Trifunac reveal that widely varying peak accelerations are associated with any given intensity earthquake. It is necessary, however, to select a value to represent the maximum expected effective acceleration. To begin with, I agree with the majority that in this regard the applicable regulation "does not proscribe the exclusion from consideration of high frequency waves which would not have any discernible impact upon the facility" (p. 63, *supra*). But their otherwise unbuttressed conclusion that, therefore, "resort to the mean of the peak accelerations is totally reasonable" (*ibid.*), does not follow. For the exclusion of the highest peaks from consideration does not of itself establish that some other specific figure contained in or derived from the original data set is representative of the *maximum* effective acceleration to be expected; rather, it simply narrows the choice to some degree. In my judgment, the selection of a representative value requires careful consideration of how that value will ultimately be employed in the actual design of the plant and its components. This may require, *inter alia*, that attention be given to factors such as those mentioned by Dr. Newmark (see p. 64, *supra*, fn. 34).

The majority's attempt to justify its conclusions on an alternative ground (pp. 63-64, *supra*) puts to improper use the data reflected in Dr. Trifunac's tables. For that reason, the explanation given in the opinion for the approach taken is not satisfactory.

C. Other Issues

1. **Alternate Sites.** Two factors leave us no option but to hold that construction of Seabrook (assuming it employs an open-cycle cooling system) is preferable to constructing a nuclear facility at the other sites thus far considered by us. The first is that the Commission's "obvious superiority" test requires us to consider in the balance the delay and additional cost that would be entailed in moving the facility elsewhere. The second is that we are bound for now to accept EPA's conclusion that the marine environmental impacts of once-through cooling are small. Because we must accept both of these rulings, the result we reach was foreordained.

2. **Fuel Cycle.** Similarly, we are bound by the terms of the Commission's fuel cycle rule. I explained just the other day that in my judgment (with which

my colleagues agreed) the Commission has directed us in its interim rule to assume that the high level radioactive waste created by reactor operation "remains in place permanently" in the postulated Federal repository and "presents no threat at all to human safety or the environment." ALAB-421, 6 NRC 25, 32 (concurring opinion) (July 18, 1977). On that assumption, the Board is correct in saying (see p. 104, *supra*) that "the effects assigned by the interim rule to the uranium fuel cycle are indeed extremely small."

3. **Transmission Lines.** I believe the record could have been far more thoroughly developed with respect to the comparative economic costs of the so-called "northern" route and the route which the Licensing Board decreed be followed. There is room for a clearer appreciation, for example, of both (1) the expense involved in overcoming the asserted electrical stability problem, and (2) the relative costs of land requisition in the two corridors (given that the longer route could use a narrower right-of-way and that land values might differ in the two areas). Although on the present record the question is an extremely close one, I cannot say that the additional measure of environmental protection that the northern route would afford to the Cedar Swamp area (*i.e.*, avoiding it entirely rather than merely skirting it, as the dogleg would do) is worth the additional economic cost apparently associated with that route.

4. **Need for Power.** On this score, I wish merely to emphasize one fact. Our opinion recognizes that the record does not permit us to make a finding that the facility can be justified on the ground of need for *additional* generating capacity prior to 1984. Rather, our approval of it is founded essentially on the conclusionary but uncontroverted statement that, on a cost basis alone, Seabrook can be justified as a substitute for existing fossil-fuel facilities (see p. 96, *supra*, citing Tr. 11168-69).

I would reverse the Licensing Board's decision to authorize the award of the construction permits. This result follows from my determination that the applicants have not established they have the financial qualifications necessary to carry out construction safely.

Even if the majority's determination that the applicants are financially qualified were accepted, I would require that the permits be conditioned upon the plant being designed to withstand the effects of the acceleration expected to be associated with an Intensity IX earthquake.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Michael C. Farrar

In the Matter of

Docket Nos. 50-443
50-444

PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, et al.

(Seabrook Station, Units 1 and 2)

July 26, 1977

The Appeal Board grants the applicants' motion for an order reinstating the construction permits for the facility, which had been suspended by ALAB-366, 5 NRC 39, as modified in CLI-77-8, 5 NRC 503 (1977).

RULES OF PRACTICE: IMMEDIATE EFFECTIVENESS OF DECISIONS

Decisions of licensing and appeal boards which are immediately effective are presumptively valid. Unless and until stayed or overturned by appropriate authority, they are entitled to full recognition.

Messrs. John A. Ritscher, Thomas G. Dignan, Jr., and R. K. Gad, III, Boston, Massachusetts, for the applicants, Public Service Company of New Hampshire, *et al.*

Ms. Karin P. Sheldon and Mr. Anthony Z. Roisman, Washington, D. C., for the New England Coalition on Nuclear Pollution.

Ms. Ellyn R. Weiss, Assistant Attorney General of Massachusetts, Boston, Massachusetts, for the Commonwealth of Massachusetts.

Ms. Marcia E. Mulkey and Mr. Richard C. Browne for the Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

Opinion of the Board by Mr. Rosenthal and Dr. Buck:

The motion of the applicants for an order reinstating the construction permits for Units 1 and 2 of the Seabrook facility is *granted*. The suspension of those permits directed in ALAB-366, 5 NRC 39, as modified in CLI-77-8, 5 NRC 503 (1977), is accordingly being vacated and the permits reinstated. The reinstatement will become effective next Monday, August 1.

We take this action on the basis of the following recent developments:

1. In a June 17, 1977, decision, the Administrator of the Environmental Protection Agency overturned the decision last November of the Regional Administrator for EPA Region I and explicitly approved the use of a once-through cooling system at the Seabrook site. *In the Matter of Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), Case No. 76-7. As is reflected by ALAB-366, it was the Regional Administrator's decision which triggered the permit suspension.

2. In a July 7, 1977 supplemental initial decision, the Licensing Board resolved in the applicants' favor the question whether there are alternate sites in southern New England which are clearly superior to the Seabrook site. LBP-77-43, 6 NRC 134.¹

3. In a decision of our own rendered today (ALAB-422, 6 NRC 33), we have determined all of the remaining issues presented by the appeals from the initial decision of the Licensing Board which had authorized the issuance of the construction permits. LBP-76-26, 3 NRC 857 (1976). Insofar as they have a bearing upon the warrant for the restoration of the construction permits, those issues were likewise resolved in the applicants' favor.

We recognize that each of these three decisions is subject to further administrative or judicial scrutiny. A petition for review of the EPA Administrator's decision is now pending before the Court of Appeals for the First Circuit. Exceptions to the July 7 supplemental initial decision of the Licensing Board have been filed with us by both the New England Coalition on Nuclear Pollution and the Commonwealth of Massachusetts. And, given the strenuous contest among the parties over many of the issues decided therein, it is reasonable to suppose that review of ALAB-422 will be sought from the Commission,² the

¹ In ALAB-416, 5 NRC 1438 (June 29, 1977), we ruled that the permit suspension had to remain in effect at least until the Licensing Board had made its findings on the southern New England alternate site inquiry. That inquiry had been directed by the Commission in CLI-77-8, *supra*.

² As of this writing, the Commission lacks a quorum to take adjudicatory action. The President has submitted to the Senate his nominees for each of the three existing vacancies. There is no way of now ascertaining when Senate confirmation of one or more of the nominees will take place.

court of appeals or both. But the mere possibility that one or more of the decisions might be overturned at some later date does not justify the apparent suggestion of the New England Coalition on Nuclear Pollution (Coalition) that the permit suspension be left in effect until the last reviewing tribunal has had its say.³ Each decision is immediately effective and presumptively valid. Unless and until stayed or overturned by appropriate authority, each is entitled to full recognition.

Although we are not empowered to take any action with respect to the EPA decision, it is open to us, of course, to stay the effectiveness of our own decision in ALAB-422 and the Licensing Board's supplemental initial decision, LBP-77-43, *supra*. We are, however, not inclined to do so. With all due deference to the dissenting views of Mr. Farrar on some of the issues determined in ALAB-422, we are sufficiently confident of the correctness of the result reached therein to conclude that a stay of its operative effect is unwarranted. Insofar as the supplemental initial decision is concerned, we have carefully examined the strenuous assertions of both the Coalition and Massachusetts that it is a fit candidate for reversal. Without prejudging the outcome of their recently filed appeals from the decision, we can say that, *at this point*, Licensing Board error is not so apparent as to permit a finding of a *substantial* likelihood that it will not be permitted to stand. See 10 CFR §2.788(e), effective June 1, 1977, 42 Fed. Reg. 22128; *Florida Power & Light Co.* (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-415, 5 NRC 1435, 1436 (June 28, 1977).⁴ In this regard, we cannot ignore the Commission's observations in CLI-77-8, *supra*, in the course of directing the Licensing Board to inquire into whether there were any alternate sites in southern New England enjoying "obvious superiority" over the Seabrook site:

In so ruling, we do not exclude the possibility that the Licensing Board will find, on the basis of evidence already in the record and other relevant factors, that a limit on alternate site consideration to the area in or near the lead applicant's service area is appropriate in the context of this application. Careful examination of the substance of the intervenors' claims about Southern New England sites indicates that a large part of their argument deals with ways in which the applicant might satisfy its power requirements without being lead applicant for a power facility. For when the applicant indicates legal and technical barriers to its obtaining sites outside the 19 that were considered in the FES, the intervenor suggests that the plant might be built elsewhere by another utility, in which case applicant presumably may buy a share of that other plant, or purchase power from it. But this Commission sits to license, or not to license, a nuclear power plant proposed by

³ The Coalition and Massachusetts filed memoranda opposing the lifting of the stay; the NRC staff filed a memorandum supporting the applicants' motion.

⁴ Nor does it appear that a stay is called for on an application in combination of the other three factors referred to in Section 2.788(e).

a particular applicant. It is not within our power to order that a different plant be built by another utility. The fact that a possible alternative is beyond this Commission's power to implement, does not absolve us of any duty to consider it, but our duty is subject to a "rule of reason," *NRDC v. Morton*, 458 F.2d 827 (D.C. Cir. 1972); *Concerned About Trident v. Rumsfeld*, ___ F.2d ___, 9 ERC 1370, 1380 (D.C. Cir. 1976). And NEPA does not require that we reformulate a discrete licensing question in terms as broadly as intervenors suggest.

Application of the "rule of reason" here may well justify exclusion or but limited treatment of the suggested sites. We leave this decision in the first instance, to the Licensing Board, but note the several factors which bear on it.

First, alternative sites in or near the load centers to be served by the facility have obvious practical advantages for the applicant and its ratepayers. Construction at a relatively distant site—here, a southern New England site—may necessitate longer transmission lines, with consequent greater expense, aesthetic affront and loss of power. See *Northern Indiana Public Service Company* (Bailly Generating Station), ALAB-224, 8 AEC 244, 267-268 (1974). We note that the 19 sites already considered cover a broad geographic area including sites on the southern Maine coastline, and that the general area of northern Massachusetts along the Merrimack River and the Commonwealth's northeast corner had also been considered at an earlier stage in the alternate site exploration. FES 9.1.2; ASLB Tr. 2935. It is also appropriate for the Board, in applying the "rule of reason," to consider the possible institutional and legal obstacles associated with construction at an alternate site, such as the lack of franchise privileges and eminent domain powers and the need to restructure existing financial and business arrangements. The record indicates that while the Massachusetts area, where the lead applicant enjoyed neither franchise privileges nor eminent domain powers, was eliminated as offering no advantage over New Hampshire, some consideration was nevertheless given it. See FES at 9-5, 9-7. Finally, as the Appeal Board dissent noted, if Seabrook is needed primarily for power in New Hampshire and northern Massachusetts, and usefully balances NEPOOLS's transmission system, those factors, and other technical considerations such as system reliability, may also limit the "reasonableness" of considering sites in southern New England. The Licensing Board may conclude that these factors make consideration of any existing or planned unit sites "unreasonable," or it may reach particular sites and compare them with Seabrook, depending on the record made before it. Should the Licensing Board conclude that an individual comparison of Seabrook with one or

more of these sites is called for in the present circumstances, that comparison should be undertaken whether closed-cycle or once-through cooling is to be employed at Seabrook.

Id. at 539-41 (footnote omitted). Needless to say, in passing judgment on the correctness of the Board's rejection of the considered southern New England sites, we shall be obliged to give effect to these observations.

In the totality of circumstances, there is only one consideration that gives us some pause for concern. We are told by the Coalition that the EPA Administrator has been asked to stay his own decision (presumably pending the outcome of the review of that decision by the Court of Appeals for the First Circuit). We would not presume to forecast the action the Administrator will take on that request or, should it be denied, what the court of appeals would do were it then to be renewed before that tribunal. It seems quite plain, however, that the entry of a stay by either the Administrator or the court would once again place the construction permits in jeopardy—at least until such time as the Licensing Board has rendered its findings on the comparison between the Seabrook site with cooling towers and the alternate sites in New England.⁵ In short, the reinstatement of the construction permits might be short-lived.

In light of what is involved in recommencing and then halting anew construction activities—not only for the applicants but also for the workmen—another pull on the yo-yo string to which this facility has been tied for the last year would be unfortunate. Nonetheless, it does not appear to us that we can deny the sought relief on that basis. If, as we have concluded is the case, the applicants are legally entitled to the reinstatement of their permits, our duty is manifest. It must be left to the applicants themselves to weigh the risk of another permit suspension in terms of the consequences that would flow from such a suspension.⁶

⁵We have directed the Licensing Board to make these findings as soon as practicable. See ALAB-422, *supra*, 6 NRC at 73 fn. 47.

⁶The essential difference between Mr. Farrar and ourselves on the permit restoration question relates to whether the presumption of validity, which he concedes otherwise would attach to the Licensing Board's supplemental decision should be withheld simply because of the deficiencies we perceived in that Board's initial decision (as outlined in Part I of ALAB-422, *supra*). See p. 121, *infra*. It suffices to note that we are unprepared to pass even a tentative judgment on the likelihood of error in one decision on the basis of how we happened to have viewed the sufficiency of a discrete decision rendered by the same tribunal a full year earlier.

The construction permits for Units 1 and 2 of the Seabrook facility are reinstated in full, effective 12:01 a.m. (EDT) on Monday, August 1, 1977.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

Opinion of Mr. Farrar, dissenting:

I would leave the stay of construction in effect. My judgment is influenced by the inherent safety concerns discussed in my dissent on the financial qualifications aspect of the other decision (ALAB-422) we have released today. But other factors also make it premature to lift the stay now.

1. My brethren and I are not far apart in our perception of one of these factors. Specifically, the majority closes its opinion by warning the applicants that, were the First Circuit (or EPA itself) to stay the effect of the EPA decision, the permits would again be in jeopardy (p. 119, *supra*). As there explained, this follows from the fact that thus far not even the Licensing Board has purported to pass judgment on whether the Seabrook facility would remain superior to a nuclear facility at some other site if it had to employ cooling towers—the consequence of a reversal of the EPA decision.

I think that more than just a warning is in order. The applicants themselves appear to have asserted before the Licensing Board on remand that enormous financial costs and delay would attend any decision to use cooling towers at Seabrook. One of the prime advantages Seabrook now has over alternative sites is the relative rapidity with which it can be completed. Seabrook with cooling towers is a much more dubious proposition.

That being so, we ought to bear more strongly in mind the First Circuit's perplexity last winter over "momentous decisions to commit funds . . . made on the strength of preliminary decisions by several agencies which are open to reevaluation and redetermination." See ALAB-366, 5 NRC 39, 46 (1977). This consideration militates against our giving the go-ahead until the Licensing Board has decided whether Seabrook with cooling towers passes muster and we have had some opportunity to review that decision (see p. 121, *infra*). That brief delay would also give EPA (and perhaps the First Circuit) time to consider the question of a stay of the EPA decision. At that point, the hazards of "reevaluation and redetermination" will have been greatly reduced.

2. The majority and I are poles apart on the significance of another factor. My colleagues are willing to say that the Licensing Board's July 7th supplemental initial decision is presumptively valid (see p. 117, *supra*). I am not. We have in front of us what the majority describes (p. 117, *supra*) as the "strenuous assertions" of the intervenors that that decision "is a fit candidate for reversal." Those assertions must be considered in light of what has gone before. The majority seems to have forgotten already that our just-released opinion in ALAB-422 contains not only numerous references to serious errors committed by the Licensing Board but also an entire section devoted to the overall insufficiencies of that Board's first decision. The quality of that decision was such that the majority even hints (ALAB-422, p. 42) at what I would say outright: had we known when that decision first came before us what it took us several months to find out,¹ we would have vacated it (and the construction permits which it authorized) and remanded the matter to the Board for the rendition of a decision which discussed the evidence in the case.²

This background leaves me unwilling to accord the Licensing Board's latest decision the presumption of correctness which it would otherwise carry without first doing what none of us has had the opportunity to do—reviewing it with some care against the underlying record. Rather than risk repetition of last year's mistake, I would take a step which I believe is demanded by the extraordinary situation presented here and effect at least a temporary stay of the supplemental initial decision to preserve the *status quo* until we can make a preliminary review of it.³ Compare 10 CFR §2.788(g).⁴

For the foregoing reasons, I would deny the applicants' motion for reinstatement of the construction permits.

¹ See ALAB-422, p. 42, fn. 4.

² I take it that my colleagues agree with me that in the future any decision which does not come to grips with the significant questions presented will be a fit candidate for a stay and will then likely be vacated and remanded in short order. Allowing a decision which does not deal with the substantive issues and the evidence put before the Board to be the basis for construction activity makes a mockery of the Commission's "immediate effectiveness" rule and places the integrity of the administrative process in doubt. The parties are entitled to have a reasoned decision *before*, not after, construction activity begins.

³ The procedural posture of this case is unusual. The motion before us is to lift the stay previously imposed. But in opposing that request, the intervenors have presented the same arguments that would support a request by them for a stay of the supplemental initial decision. In any event, construction should not be resumed.

⁴ As added effective June 1, 1977, 42 FR 22128, 22130 (May 2, 1977). That section allows us upon request "in extraordinary cases" to grant an *ex parte* immediate stay to preserve the *status quo*. In other words, it allows us to grant a temporary stay to give us time to consider whether a long-term stay is in order. Although perhaps not literally applicable to the situation before us, that section does point us in the direction I would follow.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Michael C. Farrar

In the Matter of

Docket No. STN 50-482

KANSAS GAS AND ELECTRIC
COMPANY
KANSAS CITY POWER AND
LIGHT COMPANY

(Wolf Creek Generating Station,
Unit No. 1)

July 29, 1977

The Appeal Board rules on four motions in connection with the intervenor's appeal from the May 11, 1977, initial decision (LBP-77-32, 5 NRC 1251), authorizing the issuance of a construction permit; these are (1) the applicants' motion to strike the intervenor's exceptions (*i.e.*, to dismiss the appeal) because of its failure to file a timely brief; (2) the staff's motion to strike the intervenor's brief in support of its exceptions or, alternatively, to require clarification; (3) the intervenor's motion for a stay pending appeal; and (4) the intervenor's motion to remand the proceeding to the Licensing Board with directions to reopen the record to receive additional evidence. The Appeal Board holds that (1) intervenor's brief is only marginally late and its explanation is satisfactory; (2) in the circumstances, the intervenor's brief should not be struck because of its form; (3) the intervenor has not met the criteria for a stay pending appeal as laid down in *Virginia Petroleum Jobbers Association v. FPC* 259, F.2d 921, 925 (D.C. Cir. 1958); and (4) the intervenor's motion to reopen the record should be held in abeyance pending disposition of the merits of its appeal.

Motions denied, except that decision reserved on the intervenor's motion to reopen the record.

RULES OF PRACTICE: TIME LIMITS

The time limits provided by 10 CFR §2.762 for filing a brief in support of

exceptions run from the date on which the exceptions were actually filed and not from the date on which they were due for filing prior to being extended.

RULES OF PRACTICE: TIME LIMITS

In the event of some late arising unforeseen development, a party may tender a brief or other document belatedly. Such a belated filing should be accompanied by a motion for leave to file out-of-time which satisfactorily explains not only the reason for the lateness but also why a motion for extension of time could not have been seasonably submitted.

RULES OF PRACTICE: MOTION TO STRIKE

10 CFR §2.762 authorizes a party to file a motion to strike an exception or brief which is not in *substantial* compliance with the provisions of the section. Such a motion may be used where acceptance of a tardy submission would bring about significant prejudice to other parties.

RULES OF PRACTICE: BRIEFS

It is inappropriate to furnish record references in an appellate brief by incorporating by reference a document filed with the Licensing Board.

RULES OF PRACTICE: STAYS PENDING APPEAL

The four factors enumerated in *Virginia Petroleum Jobbers Assn. v. FPC*, 259 F.2d 921, 925 (D.C. Cir. 1958), as codified in 10 CFR §2.788(e), govern NRC disposition of a request for a stay pending appeal.

Mr. Jay E. Silberg, Washington, D. C. for the applicants,
Kansas Gas and Electric Company, *et al.*

Mr. William H. Ward, Topeka, Kansas, for the intervenor,
Mid-America Coalition for Energy Alternatives.

Messrs. Geoffrey P. Gitner and Stephen H. Lewis for the
Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

The intervenor Mid-America Coalition for Energy Alternatives (Coalition) has appealed from the May 11, 1977, initial decision authorizing the issuance of

a construction permit for Unit 1 of the Wolf Creek facility.¹ We are now confronted with four motions in connection with that appeal: (1) the motion of the applicants to strike the Coalition's exceptions (*i.e.*, to dismiss the appeal); (2) the motion of the NRC staff to strike the Coalition's brief in support of its exceptions or, alternatively, to require clarification with respect to certain portions of the brief; (3) the Coalition's motion for a stay of the effectiveness of the initial decision pending the outcome of the appeal; and (4) the Coalition's motion to remand the proceeding to the Licensing Board with directions to reopen the record to receive evidence on the feasibility of converting a portion of the Kansas Gas and Electric Company's existing gas-fired base load capacity to coal. We shall consider the motions *seriatim*.

A. Applicants' motion to strike the Coalition's exceptions.

The initial decision was served by mail on the parties on May 12 (the day after its issuance). As a consequence, exceptions to it were due for filing on May 23. 10 CFR §§ 2.762(a), 2.710.

The Coalition submitted its exceptions on May 26—three days late. In its accompanying motion for leave to file out-of-time, the Coalition offered an explanation for its tardiness and advised that counsel for the NRC staff had indicated that he had no objection to the grant of the motion on the understanding that the brief in support of the exceptions would be filed within the period prescribed by 10 CFR § 2.762(a). The Coalition expressly endorsed this understanding. By unpublished order of June 3, 1977, we granted the motion and thus accepted the late exceptions. Although mindful of the Coalition's commitment respecting the timely filing of its brief, we did not rely upon (or even mention) that consideration in our order. To us, it was enough that the Coalition was not excessively late, that the Coalition's explanation for the lateness was not patently unacceptable and that the three-day delay was not prejudicial to any of the parties.

Nonetheless, the single basis of the applicants' motion to strike the exceptions is that the Coalition failed to honor its commitment to file its brief on time. Although dated June 10, 1977, the certificate of service indicates that the brief was actually served by mail on June 12. The applicants inform us that the copy they received was postmarked the following day, June 13. In their view, under Section 2.762(a) the brief had to be filed and served no later than June 7; *i.e.*, within 15 days of the date upon which the exceptions had originally been due. Thus, we are told, the Coalition was six days late and should suffer the penalty of a dismissal of its appeal.

¹ LBP-77-32, 5 NRC 1251.

1. We think that the applicants have misread Section 2.762(a). After providing for the filing of exceptions, the section stipulates that “[a] brief in support of the exceptions shall be filed within 15 days thereafter (20 days in the case of the [NRC] staff).” The term “thereafter” clearly must be taken to refer to the date upon which the exceptions were actually filed and not to when they were originally due for filing. Otherwise, were we to extend the time for exceptions by more than 15 days, the brief would be due before the exceptions. True, in this instance no extension was sought or granted in advance of the due date. But, in granting leave on June 3 to file out-of-time, and not indicating otherwise (see 10 CFR §2.711), we obviously extended (albeit after the fact) the time for the submission of the Coalition’s exceptions to May 26.

2. In these circumstances, the Coalition’s brief was due on June 10, a Friday. As above noted, it was actually placed in the mails two days later, Sunday June 12—although not in sufficient time to reach the hands of the postal authorities until the following day. Accordingly, it was indeed late—even though not appreciably so.

The time limits prescribed in Section 2.762(a) are entitled to respect—as for that matter are the provisions of the Commission’s Rules of Practice generally. For this reason, we expect litigants to make every reasonable effort to comply with those limits and, should additional time nevertheless prove necessary, to make timely application for an extension. In the event of some eleventh hour unforeseen development, a party may tender a document belatedly. The tender must, however, be accompanied—as the Coalition’s brief here was not—by a motion for leave to file out-of-time which satisfactorily explains not only the reason for the lateness, but also why a motion for an extension of time could not have been seasonably submitted. This is so irrespective of the extent of the lateness.

The applicants’ possible belief to the contrary notwithstanding, the appeal boards are fully capable of policing these requirements on their own initiative. We experience no difficulty in ascertaining whether a particular submission is timely and, if not, whether an adequate explanation of its untimeliness has been forthcoming. It is thus not necessary for a party to bring to our attention that its adversary has not met prescribed time limits.

Nor as a general rule will any useful purpose be served by filing a motion seeking, as does the applicants’ motion to strike now before us, to have an appeal dismissed because the appellant’s brief was a few days late. It is quite true that, in *Tennessee Valley Authority* (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-409, 5 NRC 1391, 1397, fn. 8 (June 7, 1977), we referred to the fact that, in subsection (e), 10 CFR §2.762 expressly authorizes a motion to strike an exception or brief which is not in *substantial* compliance with the provisions of the section. But it hardly can be said that the mailing of a brief on a Sunday or Monday which was due for filing the prior Friday represents sub-

stantial noncompliance.² In this connection, our citation in *Hartsville* (5 NRC at 1397) of *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-270, 1 NRC 473 (1975) does not assist the applicants here. The exceptions were struck in that case not because the supporting brief was a few days late, but rather because the appellants had not filed a brief at all.

We cannot entirely exclude the possibility that, by reason of unique circumstances present in the particular case, acceptance of a tardy submission would bring about significant prejudice to other parties. In such circumstances an application for appropriate relief would of course be in order. But the applicants' motion to strike does not even hint at prejudice. And it is difficult to envisage any harm that they might have sustained because the Coalition missed the briefing deadline by one weekend. The initial decision, and thus the Wolf Creek construction permit issued pursuant thereto, have not been stayed.³ In any event, there is no possibility that the late filing of the brief will affect the timing of our decision on the appeal.

3. Although the Coalition should have accompanied its late brief with the explanation for its tardiness, we (and the other parties) now have that explanation in hand. We find it satisfactory and, accordingly, deny the applicants' motion.

B. Staff's motion to strike the Coalition's brief or, alternatively, to require clarification.

The staff claims that it cannot determine from the Coalition's brief which of the previously filed exceptions are encompassed therein. It also insists that, in contravention of 10 CFR §2.762(a), the brief does not provide "precise record references" in support of the Coalition's factual assertions. In response, the Coalition has specified the exceptions to which its brief is addressed.⁴ Insofar as the matter of citations to the record is concerned, the Coalition seeks to

² Had the brief been due on June 7 (as the applicants erroneously thought), the resultant five days lateness likewise would not have been of such substantial proportions to have warranted *per se* a striking of the exceptions and, thus, a dismissal of the appeal.

³ As shall be seen, *infra*, pp. 127-128, we are denying the Coalition's motion for a stay.

⁴ Although this would appear to dispose of that matter, we would note our doubt that the staff had a legitimate basis for complaint with regard to it. In its own brief, the staff will be called upon to respond to what the Coalition has said in its brief (and that alone). It is unclear to us why, for the purposes of this undertaking, the staff needs to know to which exception a particular argument in the Coalition's brief relates. It is true, of course, that an appellant's brief must be "confined to a consideration of the exceptions previously filed by the party." 10 CFR §2.762(a). If its analysis of the Coalition's brief had led it to conclude that certain assertions therein have no discernible relationship to any of the exceptions, the staff could have brought that fact to our attention in its brief and asked that those assertions be disregarded.

incorporate into its brief by reference a document which it filed with the Licensing Board last January. Although not expressly stated, it would seem that the Coalition considers that that document furnishes the requisite citations.

It is inappropriate to furnish record references in this fashion; the plain contemplation of 10 CFR §2.762(a) is that all such references appear in the brief itself—thus making resort to other documents unnecessary. We therefore very well might insist that the Coalition resubmit its brief with the record references inserted. We have decided, however, not to pursue that course. The brief is only five pages in length and makes very few factual assertions which are not accompanied by record references. It should not be particularly burdensome for the staff and the applicants to consult the earlier Coalition filing. Of course, those parties will be free to ask us to disregard any statement of fact in the Coalition's brief as to which a record reference is not to be found in either the brief or the earlier filing.

C. Coalition's motion for a stay of the effectiveness of the initial decision.

The Coalition's endeavor to obtain a stay of the initial decision had its genesis in a summary request for an "immediate suspension" of construction activities which was contained in the brief in support of the exceptions. In ALAB-412, 5 NRC 1415 (June 15, 1977), we called attention to the fact that the Coalition had made no endeavor to address three of the four criteria which govern the grant or denial of a stay under the teachings of *Virginia Petroleum Jobbers Association v. Federal Power Commission*, 259 F.2d 921, 925 (D.C. Cir. 1958).⁵ Specifically, we observed that:

The Coalition's brief does set forth the reasons why that party believes the decision below to be erroneous and, therefore, may be said to address the first of the four criteria. No attempt is made, however, to show that the Coalition will be irreparably injured in the absence of a stay; that the grant of a stay would not significantly harm other parties; or that the public interest dictates a stay. In these circumstances, we must deny the sought relief at this time.

5 NRC at 1416. We went on, however, to authorize the filing of an amended stay application within 10 days. *Ibid.*

⁵ As we noted, the *Virginia Petroleum Jobbers* criteria have long been applied by us in passing upon stay applications and are now codified in the Commission's Rules of Practice. 10 CFR §2.788(e), effective June 1, 1977; see 42 Fed. Reg. 22128, 22130 (May 2, 1977).

Within the prescribed period⁶ an amended application was filed. It falls short, however, of establishing that the Coalition or its members will sustain any serious—let alone irreparable—injury in the absence of a stay.⁷ Nor has the Coalition come close to making the requisite demonstration on one or more of the other criteria.⁸ This being so, the amended stay application must be denied.

D. Coalition's motion to reopen the record.

The Coalition's motion to reopen the evidentiary record and to call for a further Licensing Board hearing is grounded upon an April 21, 1977, letter authored by the Superintendent of Production—Fossil Plants of the applicant Kansas Gas and Electric Company.⁹ The Superintendent represented in that letter that his utility was "investigating the practicality" of converting a 380 MWe gas unit (identified as "Evans No. 2") to coal in the mid-1980's and that "preliminary studies" indicated that it would cost about \$500 per kilowatt to do so. The letter went on to point out that, although the company expected "to rely heavily on coal in new plants, it does not now appear that it would be practicable to convert units other than Evans No. 2 because of their relatively small size and their age."

On first impression, this letter would appear to provide an insufficient foundation for the Coalition's insistence that at this late date there should be additional evidence taken to determine "whether the conversion of [the utility's present gas-fired base load] capacity to coal and the securing of other inter-

⁶ Since the 10th day following the issuance of ALAB-412 turned out to be a Saturday (June 25), the filing deadline was automatically extended to the following Monday, June 27. 10 CFR §2.710. Although the certificate of service which accompanied the amended stay application bore the date of June 28, we were subsequently informed by the Coalition's counsel that the application was in fact mailed late on June 27. We accept this representation.

⁷ The Coalition states that it "has attempted for long to assert the interests of the environment with respect to the construction of the Wolf Creek plant," but does not indicate in what particular respects irreparable environmental damage would ensue should construction move forward. Its additional endeavor to invoke the economic interests of the applicants' customers must fail both because no showing has been made respecting how those interests would be adversely affected and because, in any event, a ratepayer's interest is not cognizable in our licensing proceedings. *Portland General Electric Co.* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610, 614 (1976); *Tennessee Valley Authority* (Watts Bar Nuclear Plant, Units 1 and 2), ALAB-413, 5 NRC 1418, 1420-21 (June 20, 1977).

⁸ Insofar as the factor of *substantial* likelihood of success on the merits of its appeal is concerned, our preliminary examination of the Coalition's brief suggests no more than there is some possibility of such success.

⁹ The letter was sent to an individual who apparently is associated with the Coalition in some fashion.

mediate load facilities may be a preferable alternative to the construction of Wolf Creek." We will, however, carry the motion to reopen with the Coalition's appeal and rule definitively upon it when we render our decision on the merits. We assume that the applicants and the staff will discuss the motion in their briefs in response to the Coalition's brief.¹⁰

All of the foregoing motions are *denied* with the exception of the Coalition's motion to reopen the record (on which decision is being *reserved*). The time provided by 10 CFR §2.762(a) for the filing of the briefs of the applicants and the staff shall commence to run on August 1, 1977.¹¹

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

Mr. Farrar participated in the consideration of these motions and concurred in the disposition made of them herein. He was not available, however, to review a draft of this opinion.

¹⁰In our unpublished order of July 1, 1977, we tolled *sua sponte* the time period for responses to the motion. So long as the motion is addressed by the applicants and the staff in their briefs, a separate response to it will not be required.

¹¹The time period for the filing of those briefs was tolled in our unpublished order of June 28, 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

Edward Luton, Chairman
Dr. Oscar H. Paris
Frederick J. Shon

In the Matter of

Docket Nos. 50-282
50-306

NORTHERN STATES POWER
COMPANY

(Spent Fuel Pool
Modification)

(Prairie Island Nuclear Generating
Plant, Units 1 and 2)

July 5, 1977

Upon licensee's motion to divide application for license amendment (which would permit expansion of spent fuel pool) into two parts and for declaration that one part is uncontested so as to permit immediate issuance of an amendment as to that part, Licensing Board rules that two contested issues exist.

Motion denied.

ORDER

Pending before us is the Applicant's June 20, 1977, "Motion For Leave To Divide Its Application Into Two Parts and For Determination That The First Part Of The Application Is Uncontested." The motion asks us to "divide" the application into parts "A" and "B." According to the Applicant, part "A" "would be installation, but not use, of the new racks in the small pool," and part "B" "would be the remainder of the authorization that has been requested, *i.e.*, to install the remainder of the spent fuel pool racks and to load fuel into the new racks." We are asked to declare that part "A" is "not contested." The motion is opposed by both the Intervenor Minnesota Pollution Control Agency (MPCA) and the Regulatory Staff. We deny the motion.

Central to the motion is its assertion that what is requested is uncontested by any party. That premise, which we find to be simply wrong, appears to rest solely upon Applicant's view of the effect to be given to certain of the testimony of Intervenor's witness Dr. John W. Ferman. The motion recites the following:

All evidence, including all evidence by MPCA, has been presented, and the hearings were concluded on June 17, 1977. MPCA's witness Dr. John W. Ferman has testified that MPCA has no technical basis to oppose installing

sufficient racks in the spent fuel storage pool at Prairie Island to accommodate fuel to be generated over the next two years. Tr. 639-40. Further, Dr. Ferman has conceded that there is no reasonable alternative to installing the proposed nonpoison racks for at least the next two years' discharge of spent fuel. Tr. 608-9. Therefore, MPCA has no technical basis for opposing the lesser activity of commencing the installation of new racks in the small pool.

From this, Applicant concludes that part "A" is "unopposed and is not contested" and, therefore, the request is "in the same posture as an uncontested license amendment request for which a hearing is not required, and for which there is no matter in controversy for the Board to resolve."

In our view, at least the following two matters would remain squarely in contest even if the application is viewed as having been "divided" so as to create the so-called part "A":

- (1) The activity involved in the part "A" work would involve occupational exposures of the workers who would be involved in that activity. That is precisely the subject matter of Intervenor's contention number 17. Intervenor's witness Dr. Ferman did not address that matter in his testimony at all; nor was the subject addressed by any other witness appearing on behalf of the MPCA. There is thus no basis for concluding that the matter is no longer in dispute insofar as the Intervenor is concerned.
- (2) Our "Order Following Prehearing Conference" dated May 6, 1977, admitted the following contention as an issue in controversy:

Approval of the proposed license amendments would be a major action by the Commission significantly affecting the quality of the human environment. The National Environmental Policy Act of 1969 requires the preparation of an environmental impact statement before the licenses can be amended.

Applicant has not claimed that this NEPA matter is not in contest. Indeed, it is difficult to see how such a claim could be seriously made. As the Intervenor points out, the activity that would be involved in the part "A" work would be the commencement of a project for which the MPCA contends a full environmental impact statement is needed. Thus, quite apart from any testimony given by Intervenor's witness Dr. Ferman (who gave *no* testimony on the NEPA issue), the NEPA matter remains to be briefed by the parties and is fully in contest in this proceeding.

We conclude, contrary to the assertion in Applicant's motion, that contested matters remain with respect to the activities requested to be authorized herein. The motion is hereby denied in its entirety.

IT IS SO ORDERED.

**THE ATOMIC SAFETY AND
LICENSING BOARD**

Edward Luton, Chairman

**Dated at Bethesda, Maryland,
this 5th day of July 1977.**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

John M. Frysiak, Chairman
Marvin M. Mann
Ernest O. Salo

In the Matter of

Docket Nos. 50-443
50-444

PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, et al.

(Seabrook Station, Units
1 and 2)

July 7, 1977

Upon remand, Licensing Board issues supplemental initial decision considering possible alternative sites to the proposed site and concluding that none of these sites are obviously superior to the proposed site, so that detailed comparison of proposed site and individual alternate sites is unnecessary.

SUPPLEMENTAL INITIAL DECISION
(Construction Permit)

Appearances

Thomas G. Dignan, Jr., Esq., R. K. Gad, III, Esq., and John A. Ritsher, Esq., for the Applicants.

Robert A. Backus, Esq., for Intervenors Seacoast Anti-Pollution League, The Audubon Society of New Hampshire, and Society for the Protection of New Hampshire Forests.

Karin P. Sheldon, Esq., for Intervenor New England Coalition on Nuclear Pollution.

Donald W. Stever, Jr., Assistant Attorney General for the State of New Hampshire.

Ellyn R. Weiss, Deputy Assistant Attorney General for the State of Massachusetts.

Richard C. Browne, Esq., and Marcia E. Mulkey, Esq., for the U.S. Nuclear Regulatory Commission.

BACKGROUND

1. The Atomic Safety and Licensing Board filed its Initial Decision in the above-entitled matter on June 29, 1976.¹ That Decision authorized the issuance of construction permits for Seabrook, Units 1 and 2, with once-through cooling as previously approved by the Environmental Protection Agency (EPA). It also rejected the proposed alternative cooling system of closed-cycle and denied authorization of the units in the contingency that EPA should reverse its approval of once-through cooling and sanction a closed-cycle cooling system.²

2. The Initial Decision was appealed before the Atomic Safety and Licensing Appeal Board. During the appeal and on November 9, 1976, the EPA Regional Administrator revoked EPA's prior approval of the once-through condenser cooling as well as the prior determinations regarding intake location.³

3. ALAB-366, filed January 21, 1977, (1) vacated the Licensing Board's Initial Decision insofar as it found the Seabrook site acceptable with once-through cooling from an environmental standpoint and unacceptable with cooling towers; (2) suspended the construction permits previously issued by the Director for Nuclear Reactor Regulation; and (3) "directed (the Licensing Board) to conduct with all due expedition the further proceedings relating to the use of the Seabrook site with cooling towers."⁴

4. On January 24, 1977, the Commission elected to review ALAB-366.⁵ On January 28, 1977, the Licensing Board issued a notice of hearing for March 22, 1977, on the remanded issue. This hearing was later postponed pending the Commission Review Order. The Commission Review Order of March 31, 1977,⁶ approved the remand ordered by the Appeal Board and further directed the Licensing Board to consider on the issue of alternate sites southern New England

¹ LBP-76-26, 3 NRC 857 (June 29, 1976).

² *Id.* p. 937.

³ Public Service Company of New Hampshire, EPA Dkt. No. NH 0020338, Regional Administrator's Initial Decision (November 9, 1976).

⁴ *Public Service Company of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-366, 5 NRC 39 (1977).

⁵ *Public Service Company of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-77-4, 5 NRC 31 (1977).

⁶ *Public Service Company of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503.

sites proposed by NECNP and in the event that the Licensing Board should "conclude that an individual comparison of Seabrook with one or more of these sites is called for in the present circumstances, that comparison should be undertaken whether closed-cycle or once-through cooling is to be employed at Seabrook."

5. The previously postponed evidentiary hearing on the matters remanded was commenced on May 23, 1977, (Tr. 12754) and was completed on May 26, 1977 (Tr. 13522). Direct evidence was presented by Applicants, Staff, NECNP, and the Seacoast Anti-Pollution League (SAPL) and the Audubon Society of New Hampshire (Audubon), acting jointly. No direct evidence was presented by the Commonwealth of Massachusetts (Commonwealth) or the Attorney General of the State of New Hampshire (AG).

6. The Applicants' direct case consisted of the testimony of a panel of nine witnesses covering a description of a preferred closed-cycle system, Applicants' views of that system's environmental impacts, and a comparison of Seabrook with natural-draft cooling towers and the various alternate sites (Applicants' Direct Testimony No. 27, as corrected Tr. 12771-72, and appearing post Tr. 12782 hereafter cited "App. Dir. 27").

7. The Staff presented two witness panels. The first addressed the question of the acceptability of the Seabrook site assuming the use of closed-cycle cooling. (NRC Staff Supplemental Testimony on Analysis of the Acceptability of the Seabrook Site Assuming Closed-Cycle Cooling as corrected Tr. 13216-19 appearing post Tr. 13220.) The second addressed the issue of alternate sites. (NRC Staff Supplemental Testimony on Comparison of Seabrook with Alternative Sites as corrected Tr. 13222, appearing post Tr. 13223 hereafter cited as "Staff No. 2.")

8. By motion dated July 5, 1977, Staff seeks to file Dr. Robert C. Geckler's affidavit correcting a portion of the Staff's direct testimony on alternate sites. That motion is granted.

9. SAPL and Audubon (hereafter SAPL) presented the testimony of Mr. Tudor Richards (SAPL Ex. 16). Mr. Richards' testimony was directed at the effect cooling towers would have upon birds.

10. SAPL also presented a total of four other witnesses. Betsy Woodward Proudfit (SAPL Ex. 17) addressed the question of the atmospheric effects of the operation of natural-draft cooling towers; Mark Kelley (SAPL Ex. 15) addressed the area of aesthetics; and Charles F. Tucker (SAPL Ex. 14) submitted testimony addressing the issue of the effect of the use of cooling towers on tourism.

11. NECNP's lone witness, Barbara Yaeman (Tr. 13480-96 and see NECNP Ex. 26) submitted color photographs with scale drawings of the cooling towers superimposed thereon.

12. By motion which is undated but received by the Licensing Board on July 1, 1977, the Commonwealth of Massachusetts requests permission to late

file findings of fact and conclusions of law originally due on June 23, 1977. That motion is granted.

13. By motion dated July 5, 1977, NECNP seeks permission to late file supplemental findings of fact and conclusions of law. That motion is granted.

14. Any proposed findings of fact or conclusions of law submitted by the parties hereto, which are not incorporated directly or inferentially into this Supplemental Initial Decision, are herewith rejected as being unsupportable in law or fact, or as being unnecessary to the rendering of the Supplemental Initial Decision.

15. On June 17, 1977, the EPA Administrator reversed the November 9, 1976, Initial Decision of the EPA Regional Administrator and reinstated the Determinations of June 24, and October 24, 1975.⁷

16. The question arises whether the recent EPA Decision has mooted the remanded issue of "cooling towers." Staff argues that it has;⁸ Applicant argues that it has not.⁹ What effect the EPA Decision has on the proceeding before us will be decided by the Appeal Board.¹⁰ In this Supplemental Initial Decision the Licensing Board consequently defers ruling on the issue of closed-cycle cooling until the Appeal Board advises it to do so.

17. This Supplemental Initial Decision solely addresses the issue of additional alternate sites in New England as directed by the Commission in its Order of March 31, 1977.¹¹

FINDINGS ON THE SOUTHERN NEW ENGLAND SITE ISSUES

18. In its Order of March 31, 1977, the Commission provided the Licensing Board with guidelines on how to conduct the additional alternate site comparison (see Commission's Order, 5 NRC at 514-15). The Commission instructs:

(1) that an application should not be denied on the basis of a comparison between the Applicants' proposed site and an alternative site unless the alternative site appears to be obviously superior to the proposed site; (2) that a cost-benefit comparison between an Applicants' proposed site and any alternative site must reflect the actual cost and time necessary to complete a facility at each of the locations in question, and (3) that any

⁷Public Service Company of New Hampshire, EPA Dkt. No. 0020338, Case No. 76-7, Decision of the Administrator (June 17, 1977).

⁸See NRC Staff Response to Applicants' Motion for an Order Reinstating Construction Permits.

⁹See Applicants' Response to the Staff Request for a Partial Vacation of Remand.

¹⁰See ALAB-416, June 29, 1977, 5 NRC at 1440.

¹¹CLI-77-8, 5 NRC 503.

consideration of additional alternative sites is subject to a "rule of reason."¹²

19. There are a total of nine additional sites in New England not previously considered. They are: the Millstone site in Waterford, Connecticut; and the Montague site in Massachusetts; the Pilgrim site in Plymouth, Massachusetts; the Charlestown site in Rhode Island; the Sears Island and Maine Yankee sites in Maine; the Vermont Yankee site in Vernon, Vermont; the Connecticut Yankee site in Haddam Neck, Connecticut; and the Yankee Atomic site in Rowe, Massachusetts (App. Dir. 27 at 44-45; Staff No. 2 at 5).

20. None of these sites are owned by Public Service Company of New Hampshire, the lead Applicant in this case. The Millstone and the Montague sites are owned by Northeast Utilities or its subsidiaries. The Pilgrim site is owned by Boston Edison Company. The Charlestown site is owned by the United States, but the New England Power Company has filed a construction permit application for it. The Sears Island, Maine Yankee, Vermont Yankee, and the Yankee Atomic site in Rowe, Massachusetts are all located outside the State of New Hampshire (App. Dir. 27 at 44-45; Staff No. 2 at 5).

21. The Millstone site now has three reactors on it and there is no evidence there exists room for two more. In addition, its population densities are higher than Seabrook's (Staff No. 2 at 8).

22. The Montague site has not yet been found to be acceptable and is, at best, a marginal site to place additional units. There is a question about availability of sufficient cooling water for additional units. A special arrangement was necessary to assure a minimum flow from an upstream dam. Furthermore, state limits on noise may be exceeded by any type of cooling tower (Staff No. 2 at 6-7).

23. Pilgrim already has reactors built on it (App. Dir. 27 at 45). There is no evidence that the site has adequate room for two additional units. Pilgrim also has a higher population density than Seabrook (Staff No. 2 at 8).

24. Charlestown, though owned by the United States, is spoken for as noted above.

25. Sears Island has been dedicated to a fossil unit by its owner, Central Maine Power Company (Staff No. 2 at 6; Tr. 13340).

26. Maine Yankee appears to have room for only one more unit (Tr. 13337).

27. Vermont Yankee does not have room for any additional units (Tr. 13334).

¹²In applying the rule of reason a Licensing Board should consider the location of the alternative site as it affects cost, reliability, and system balance. The Board should also consider possible institutional and legal barriers presented by the proposed alternative site. See CLI-77-8, 5 NRC at 540.

28. Connecticut Yankee is unsuitable for large generating units because of geological conditions (Staff No. 2 at 6).

29. There is no evidence that Yankee Rowe would be a suitable site for two units the size of Seabrook (App. Proposed Findings of Fact, p. 30).

30. The number of power plant sites, nuclear or otherwise, in New England is limited. Some southern utilities had to build base load generation outside of their service territory (e.g. Boston Edison) because of the lack of available sites in their own territory (App. Dir. 27 at 46). In view of the scarcity of available power plant sites, it appears unlikely that any of the New England companies would voluntarily part with a site it now holds for future use.

31. It had been testified earlier that the Seabrook location is ideally suited to provide new generation for those areas in New England which would otherwise be the most deficient, from the viewpoint of load and capacity (App. Dir. 24, post Tr. 10162 at 20). This testimony remains uncontroverted. None of the alternate sites surpass Seabrook in this advantage.

32. Construction of generating capacity by an Applicant at alternative sites outside his state invariably involves serious economic and scheduling disadvantages, as well as institutional and legal uncertainties about the Applicant's ability to acquire control of the necessary exclusion area, transmission rights-of-way, permits, taxes, and possible surcharges since most of the power generated would effectively leave the state (Staff No. 2 at 2).

33. A relocation of the Seabrook units to any of the sites listed above at paragraph #19 would meet with institutional and legal impediments as well as economic and scheduling disadvantages (Tr. 13331-34; Staff No. 2 at 2; App. Dir. 27 at 45-46).

34. The Board finds that none of the alternative sites listed above at paragraph #19 are viable alternative sites for the location of the base load capacity proposed at the Seabrook station. It follows that an individual comparison of Seabrook with one or more of these sites is not called for in the present circumstances (see CLI-77-8, 5 NRC at 540-41).

CONCLUSION OF LAW

35. Based upon all of the foregoing, the Licensing Board concludes that in view of the institutional and legal obstacles and the economic disadvantages associated with the nine additional alternative sites listed above as well as the uncontroverted superiority of the Seabrook location for system reliability, an individual comparison of Seabrook with one or more of these sites is unnecessary. No alternative site where nuclear units currently exist or have been planned is obviously superior to Seabrook.

36. IT IS ORDERED, in accordance with 10 CFR Sections 2.760, 2.762, 2.764, 2.785, and 2.786 of the Commission's Rules of Practice, that this Deci-

sion shall constitute the final decision of the Commission subject to the review thereof under the above-cited rules. Pursuant to Section 2.762 exceptions to this Supplemental Initial Decision must be filed within seven (7) days after service of that decision and a brief in support of the exceptions must be filed within fifteen (15) days thereafter (twenty days in the case of the Staff). Within fifteen (15) days of the filing and service of the brief of the appellant (twenty days in the case of the Staff), any other party may file a brief in support of, or in opposition to, the exceptions.

**THE ATOMIC SAFETY AND
LICENSING BOARD**

Marvin M. Mann, Member

John M. Frysiak, Chairman

(Dr. Ernest O. Salo concurs but was unavailable for signature.)

Dated at Bethesda, Maryland,
This 7th day of July 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Samuel W. Jensch, Chairman
Dr. Frank F. Hooper
Gustave A. Linenberger

In the Matter of

Docket Nos. STN 50-522
STN 50-523

PUGET SOUND POWER AND LIGHT COMPANY
PORTLAND GENERAL ELECTRIC COMPANY
PACIFIC POWER AND LIGHT COMPANY
THE WASHINGTON WATER POWER COMPANY

(Skagit Nuclear Power Project,
Units 1 and 2)

July 7, 1977

Upon Applicants' motion for authority to undertake certain road and sewer line construction, or a declaratory ruling that performance of the proposed construction would not constitute "commencement of construction" within the meaning of 10 CFR Section 50.10(c), Licensing Board rules that certain of the road work proposed cannot be accomplished with so trivial an impact that it can safely be said that no conceivable harm would be done to interests protected by NEPA, and sewer work proposed is barred by both the Commission's regulations and the Wild and Scenic Rivers Act. Motion granted in part and denied in part.

REGULATIONS: PRE-LWA ACTIVITY

10 CFR §50.10(c) permits only that pre-limited-work-authorization activity with so trivial an impact that it can be safely said that no conceivable harm would have been done to any of the interests sought to be protected by NEPA should the application for the facility ultimately be denied.

REGULATIONS: PRE-LWA ACTIVITY

For purposes of authorization of pre-limited-work-authorization activity under 10 CFR §50.10(c), the standard of "no conceivable harm" does not

encompass detectable trivial impacts from which the ecological system will recover within three to five years.

REGULATIONS: PRE-LWA ACTIVITY

Authorization of pre-limited-work-authorization activity under 10 CFR §50.10(c) may not include work on the power plant facility or its components.

WILD AND SCENIC RIVERS ACT: APPLICABILITY TO PRE-LWA ACTIVITIES

Authorization of pre-limited-work-authorization activity under 10 CFR §50.10(c) may not be given where such activity would constitute commencement of construction of a water resource project on a river designated for study under the Wild Scenic Rivers Act except as that Act may permit.

INITIAL DECISION GRANTING PRE-LWA AUTHORITY FOR ROAD CONSTRUCTION EXCEPT FOR A ZONE 150 FEET WEST OF WEISMAN CREEK, AND EXCEPT FOR THE AREAS REQUIRING TREE REMOVAL, AND DENYING PRE-LWA AUTHORITY FOR PROJECTED SEWER LINE

Appearances

F. Theodore Thomsen, Esq., Douglas S. Little, Esq., Michael A. Bauser, Esq., on behalf of Puget Sound Power and Light Company, *et al.*, Applicants

Roger M. Leed, Esq., on behalf of Skagitonians Concerned About Nuclear Power (SCANP), Intervenor

Lloyd K. Marbet (Prehearing Conference Only), Eric Stachon, on behalf of Forelaws on Board and the Coalition for Safe Power, Intervenor

Richard M. Sandvik, Esq., Assistant Attorney General, on behalf of the State of Oregon Department of Energy (Prehearing Conference Only)

Richard L. Black, Esq. (Prehearing Conference Only), Joseph R. Gray, Esq., Stuart A. Treby, Esq., on behalf of the Regulatory Staff of the U. S. Nuclear Regulatory Commission

Puget Sound Power and Light Company, *et al.* (Applicants) have filed a motion dated June 2, 1976, and supplemented on March 4, 1977, for authority to undertake certain construction, or a declaratory ruling that performance of certain proposed construction activities ("pre-LWA" work) would not constitute "commencement of construction" within the meaning of 10 CFR §50.10(c).¹ The proposed construction includes a widening, for traffic turns near the Weisman Creek, of State Highway No. 20, and some roadway construction along an extension to Hoehn Road; in addition, the improvement of a portion of an existing road (Bacus) to the site of the proposed project, and the construction of a project needed sewer line from the site 4.5 miles to the Sedro Woolley sewage disposal facilities.

Implicit, also, is that the motion as supplemented seeks a ruling that the proposed construction activities would not conflict with the prohibition within the Wild and Scenic Rivers Act, which provides, in part, that:

... no department or agency of the United States shall assist by loan, grant, license or otherwise in the construction of any water resources project ... (Emphasis added) 16 U.S. C. 1276(b).

The Skagit Nuclear Power Project, by way of brief summary, is proposed to be constructed on Bacus Hill, which rises approximately 550 feet above the Skagit River, and is located approximately a mile northerly from the river. The nearest road to the proposed site is Washington State Highway No. 20 which meanders through the Skagit Valley, through which the river flows. The valley is largely agricultural; but there is some heavy industrial activity in the town of Cement and in the town of Sedro Wooley, the latter being a few miles from the mouth of the river.

State Highway 20 (SR-20) is a two-lane road of approximately 38 feet in width, including shoulders. Below Bacus Hill, Applicants desire to widen SR-20 in order to provide a turn for traffic and then to improve by straightening the roadway up Bacus Hill, for a distance of about 500 feet toward the proposed site.

Applicants also desire to construct a 4-inch sewer line, which would be used during the construction period and ultimately tied into the proposed plant for disposal of sanitary sewage. The plant design, however, provides that no radioactive liquids would be released to this projected sewer line. It is planned to undertake analyses of liquids to confirm that no radioactive substances are in the liquids.

¹ 10 CFR §50.10(c) provides, in part, as follows: "... no person shall effect commencement of construction of a ... utilization facility ... until a construction permit has been issued ... the term 'commencement of construction' means any clearing of land, excavation or other substantial action that would adversely affect the environment of site ..."

Hearings were held in connection with the motion on May 11th through the 13th in Seattle, with Applicants, the Regulatory Staff and the Skagitonians (SCANP) being the active participating parties.² Most of the evidence adduced was in relation to allegations of damage or lack of damage to the environment from the sought to be authorized construction activities. Applicants insist that their motion was principally directed to a declaratory ruling that no damage, or only trivial damage, would be caused by the roadway and sewer line construction. The parties have left the Wild and Scenic Rivers determination to be made as a legal ruling for which no other evidence was needed.

The route of the proposed sewer line will begin on the plant site, proceed south along Bacus Road (the existing project access road), west along SR-20, in the right-of-way north of the highway, and north along Fruitdale Road in the right-of-way east of the county road until it crosses under Fruitdale Road to a discharge structure and the point of connection with the existing Sedro Wooley municipal system. Over 90 percent of the line will be located within state or county rights-of-way, with the remainder on the plant site property. The sewer line will consist of 4-inch sewer pipe, associated manholes and valves, an equalization tank on the plant site, and a discharge structure at the point of connection with the Sedro Wooley system. The sewer line will cross three creeks, eight drainage ditches and three existing roads. Except at the three creek crossings, the pipeline will be buried on the average at a depth above five feet below grade. At the three streams, the line will be suspended from the existing SR-20 bridge structures. The estimated cost of construction of the sanitary sewer line is \$420,000.

Specifically, the road construction is proposed to consist of widening 3,000 feet of SR-20, realigning Bacus Road to a new intersection with SR-20, providing an intersection with SR-20 for the proposed new access road, and installing traffic channelization lanes and signs at and in the vicinity of the two intersections. Work on Bacus Road and the new access road intersection will extend 500 feet and 75 feet, respectively, north of the SR-20 right-of-way. The widening will provide left-hand turn lanes, without adding new lanes for through-going traffic. There will be no work done on the bridge over Weisman Creek.

Most of the intersection improvement work will be within existing state and county road rights-of-way. The bulk of the excavation will occur in the bank on the north side of SR-20 where the new access road will be located and in the vicinity of the Bacus Road realignment. Both areas of excavation are more than 450 feet from the Weisman Creek bridge. The remainder of the work involves fill on both the north and south shoulders so that the roadway can be widened. The

² Intervenor Forelaws on Board had a representative at the hearings but did not interrogate any witnesses.

widening tapers into the existing shoulders at the edge of the Weisman Creek bridge.

The road work will be performed under a contract to be awarded by the State Highway Department. The estimated cost is approximately \$600,000. Completion of the work prior to commencement of site preparation work pursuant to an LWA is alleged to minimize any traffic congestion that might otherwise occur in moving heavy construction equipment from SR-20 up Bacus Road to the construction area and during construction of the new access road. In addition, the road work is believed by Applicants to improve the traffic safety at the intersections of SR-20 with both Bacus Road and Hoehn Road. Bid preparation procedures have been started and the award of a contract by the State Highway Department is not expected any sooner than early August. Under this schedule, the road work would, if authorized, probably be started in late August of this year and completed by mid-January of 1978.

The closest approach of any of the pre-LWA work is more than one mile from the Skagit River and more than 3/4 of a mile from the boundaries of the recreational river area proposed by the United States Forest Service for inclusion in the National Wild and Scenic Rivers System.

The parties have premised their analysis of environmental damage, if any, upon the rule of the Wolf Creek pre-LWA decision that the applicable standard is whether the pre-LWA work can be accomplished with "... so trivial an impact that it can be safely said that no conceivable harm would have been done to any of the interests sought to be protected by NEPA should the eventual outcome of this proceeding be a denial of the ... application." *Kansas Gas and Electric Company, et al.* (Wolf Creek Nuclear Generating Station), ALAB-331, 3 NRC 771, at 777. Affirmed by Commission, 5 NRC 1 at 12 (1977).

The Commission, (5 NRC 1, at 7 and 8) in its review and approval of both the Licensing Board's and Appeal Board's decisions in the above proceeding, discussed the offsite construction activity in some detail which is pertinent here:

... regulations proscribe environmentally significant construction activities associated with nuclear power plant construction—including activities beyond the fence—without prior Commission approval ...

The contention that we need not consider and seek to mitigate significant environmental impacts away from the immediate location of a proposed nuclear facility in meeting our NEPA obligations had been considered and rejected in the past ...

.... This Commission has assumed the necessity of considering, and where necessary, adopting license conditions with reference to the environmental

consequences of matters away from the immediate site of the reactor in question.³

In further exposition, the Commission held:

We believe . . . that if we are to discharge fully our NEPA responsibilities, a "site" for purposes of Section 50.10 must mean all the land on which the plant and its necessary accouterments, including transmission lines and access ways, are to be located. 5 NRC 1, page 9.

Under the *Wolf Creek* standard, the question to be addressed is whether the proposed activities will have "so trivial an impact that it can be safely said that no conceivable harm would have been done to any interests sought to be protected by NEPA . . ." Although the precise meaning of "trivial impact" was not elaborated upon by the Appeal Board nor by the Commission, this Board notes that the above language explicitly equates "trivial impact" with "no conceivable harm."

The Staff's position, from the testimony of one of its witnesses, is that "trivial impacts" are those which are either undetectable, or if detectable, are such that the ecological system as a whole will recover within three to five years after being disturbed (Tr. 6746-6747). In the opinion of this Board, the Staff's position regarding "detectable impact" is not the equivalent of the "no conceivable harm" language. If adopted, it would permit a potentially less conservative interpretation of "trivial impact" than the Board can find technical justification for allowing. Furthermore, the Board has no indication that the Staff intended to substitute the interpretation of one of its witnesses for that of the Commission itself.^{3a}

³These Commission determinations are important to illustrate that affirmative action is taken in the making of environmental decisions by the Commission and its adjudicatory boards respecting offsite construction activities. To this extent, and contrary to Applicant's contention here, the environmental decisions are not passive withdrawals from an exercise of jurisdiction. Rather, the decision-making process is to achieve a result, either of approval or disapproval, that affirmatively determines a course of action. This analysis is more pertinent to the determination of Wild and Scenic Rivers Act matters, *infra*, but is mentioned here in connection with the Commission's analysis of the nature of the process undertaken.

^{3a}The expansion by further definition of language of a rule or policy adopted by the Commission must be issued, of course, by the Commission and not by employees. Likewise any additions or definitions must be issued before the proceedings begin, so that all parties may know the applicable rules and their scope. "The courts may not accept *post hoc* rationalizations for agency action . . ." (*Burlington Trucklines v. U.S.*, 371 U.S. 156 (1962)). Explanations or definitions are no better than rationalizations. "We cannot find a substitute for valid agency explanation either in rationalizations of . . . counsel . . . or the *post hoc* patchwork of individual members" (*Braniff Airways v. C.A.B.*, 379 Fed 2nd 453 (1967)).

Impact of Road Construction

Witnesses for the Staff, Applicants and the Intervenor all testified that the proposed road construction will expose soil surfaces to erosion. Although the Applicants have agreed to a number of protective steps to minimize the extent and duration of this erosion, inevitably there will be some silt runoff from exposed areas even if the best restoration practices are used. Of major concern to the Board is the drainage pattern and pathways this runoff will take during heavy rains and floods, since these materials could enter one small creek in the area which is the Weisman Creek.

This creek is utilized by a variety of salmonid fish species (Coho salmon, cutthroat and steelhead trout). Fine grain sediments entering streams pose two potential threats to salmonid fishes: (1) the sediments can settle into the spawning gravels and smother eggs and fish larvae; and (2) they can temporarily eliminate food organisms by covering areas colonized by benthic invertebrates.

Salmon and trout eggs are normally deposited and fertilized in gravel areas that are exposed at certain times of the year to moderate to high rates of flow. Such areas remain clear of fine sediments when the water velocity is high but may accumulate sediments during dry periods when the velocity is low.

Weisman Creek experiences a wide range of stream discharge rates (0.9 to 40.8 cfs) and hence a wide range of water velocities. Discharge is highest from November to June and lowest from July through September. Coho may enter Weisman Creek as early as mid-October for spawning. Spawning continues until early January, and the eggs remain in the gravel several months before hatching. Young fish emerge from the gravel in late spring. Thus the spawning and egg incubation period of salmonid fishes in Weisman Creek corresponds roughly to periods when discharge is high and there is generally high current velocities at spawning sites (redds). Low velocities and low discharges occur in summer after larvae have emerged but during a period when there are many small fish residing in the stream. During the period when eggs and larvae are within the stream gravels, the stream normally carries a higher load of suspended sediments than in the summer when there are low flows. These loads are variable and fluctuate with rainfall; but normally the velocity is high and there is little deposition of silt while eggs and larvae are within the gravel.

If silt from construction activities enters the stream coincidental with a dry period when velocities are low, silt could be deposited on redds. On the other hand, if runoff from construction enters with high discharges, there likely will be little or no damage to eggs or larvae. Hence, the above yearly cycle of spawning activities and discharge fluctuation make possible sources of potential damage to salmonids by silt. These are (1) from mid-October to June when eggs and larvae may be buried and smothered and (2) from July to mid-October during low discharge periods when stream-bottom food areas may be covered by sediment.

A witness for the Intervenor emphasized the potentially damaging effect that could occur from this covering up of bottom of the stream. However, none of the parties addressed the very relevant question of how rapidly the streambottom food supply might be reestablished by the subsequent recolonization of benthic invertebrates that drift down from upstream.

The drainage pattern in the area of the proposed road work, the season of construction, and the methods employed to excavate and restore the disturbed soils will determine the amount of silt entering Weisman Creek. Testimony of both Applicants' and Intervenor's witnesses support the finding that the patterns of drainage in the area of road excavation and filling is such that runoff water carrying silt can directly enter Weisman Creek only from a limited area along the SR-20 north shoulder that extends a short distance west from the Weisman Creek Bridge.⁴ Drainage west of this point as well as all drainage from the roadway east of Weisman Creek will flow into a level area covered with vegetation and will enter the ground before entering the creek. Such runoff likely will have had all silt removed by filtration before entering the creek.

The potential effects of sediments from even this limited area can constitute conceivable harm to the ecology and the interests sought to be protected by NEPA. The volume and particle size distribution of sediments that might be eroded has not been quantified. Thus the Board is concerned whether or not the sediment load imposed on the stream by the proposed road work will be within or significantly above the range normally carried at the seasons of the proposed effort. In addition, without complete flow data, the Board recognizes that the risk from abnormal flow regimes may (1) either deposit silt on eggs or larvae or (2) cover bottom food reserves with silt. Such data are essential to making a judgment as to whether the construction impacts are in fact large or small compared with natural fluctuations, which possibly could provide a semiquantitative meaning for the word "trivial"; but the impacts on the ecology here are clearly within the scope of the Wolf Creek decision and guide that "... conceivable harm would have been done (if the siltation covers the spawning or destroys the food supply) to the interests sought to be protected by NEPA..." (i.e., the natural ecology and its inhabitants) (parentheses added).

Both the Applicant and the Staff concede that some siltation will occur. The Intervenor's contend that the damage from the siltation will be substantial.

With the admission that siltation will occur, and the recognition that the Wolf Creek decision suggests a denial of permission to undertake certain construction if it is conceivable that harm will be done to the ecology, the Board concludes that pre-LWA authority cannot be granted for the road construction

⁴Photographs and contour maps in evidence support this contention and permit the conclusion that drainage toward the creek cannot occur from the north shoulder beyond about 100 to 150 feet west of the bridge.

for a zone north and west for a distance 150 feet from Weisman Creek. This denial is for the reason that the aquatic environmental impact for this area of road construction is not trivial for there is conceivable harm to the interests sought to be protected by NEPA.

The Board in its denial of pre-LWA authority for the 150 feet zone near Weisman Creek renders its determination without prejudice to a further presentation if desired by Applicants of more complete data that will enable the Board to more thoroughly evaluate drainage patterns and the impact of sediments from this road work area upon the salmonid population of Weisman Creek.

The consideration remains however for other impacts from portions of the proposed roadway work. The terrestrial impacts of the proposed road intersection improvement program described above derive from activities involving about 8.2 acres of existing rights-of-way for SR-20 and Bacus Road, and 1.1 acres of the Applicants' property. Only about 3.3 acres of this total will be permanently altered, resulting from the loss of grass, forest edge, and forest habitats and the loss of the fauna associated with these habitats. Less than one acre involved in this permanent alteration will become additional pavement. The 1.1 acres that belong to the Applicant contain a stand of second growth timber comprising primarily alder, some Douglas fir, fewer cedars, and a few cottonwood, vine maple, and hemlock. The Board has indicated on the record that it made a site visit, and while there the Board made some observations similar to what is reflected in the photographic exhibits that a sizeable stand of trees, on the north side of SR-20, inhabits both areas (Bacus Road reroute and the new access road) where new sections of roadways are proposed. These trees—estimated to be approximately 120 in total number—would be removed and not replanted. The Intervenor SCANP has provided testimony about the special, beneficial characteristics of alder trees (including nitrogen contribution to the soil) and about the fauna that may not survive the loss of their habitat. Although such trees and the fauna for which they provide habitat are abundant in this area and are not unique, their loss cannot but to some extent diminish the natural attributes of the area, despite constituting less than one percent of the trees on the plant site. The remaining affected acreage involves land already subjected to the typical, periodic disturbances of highway right-of-way maintenance (*i.e.*, mowing of grasses; cutting, trimming, and removal of shrubs; and spraying with herbicides). Subsequent to the road work disturbance, this land will be mulched, seeded, and revegetated. It will thus be restored to what appears to the Board to be typical, periodically disturbed highway right-of-way land.

Having carefully reviewed the above and the supporting evidence, the Board finds that conceivable harm could result from the proposed removal of trees. Based upon the "trivial impact" standard discussed elsewhere in this decision, the Board finds that the removal of the trees thus constitutes an impact that is

not trivial.⁵ Hence, the request for approval to remove the trees—as a pre-LWA item of work outside of the protective umbrella of NEPA—is denied, and authority is not granted to undertake any roadway construction or modification where removal of trees is required.

During construction, there may be some temporary slowing of traffic along the affected portion of SR-20, especially during the two-day period of one-lane traffic while paving operations are occurring. The fact that SR-20 will be widened for short distances beyond the ends of the Wiseman Creek Bridge (which will not be altered) has caused the Intervenor SCANP to allege that through traffic will be bottlenecked at the bridge. Just as now, two through lanes for two-way traffic will continue to exist, although during periods when significant numbers of vehicles are entering or leaving the main road, some slow down of through traffic may be inevitable. The Board finds, however, that the Applicants' proposed changes to SR-20 do not in any significant way or extent alter the existing arterial use characteristics of the highway, nor impose any undue additional risks upon persons who would continue using it in their accustomed manner.

Impact of Sewer Line Construction

The proposed construction of a sewer line will, with an extension, be an integral part of the overall project contemplated by the Applicants. As indicated, the route for the proposed sewer line will be from the plant site, thence along Bacus Road to SR-20, and along that latter road to Sedro Wooley. The sewer will handle nonradioactive wastes since the plant design provides for separate components to handle liquid radioactive wastes.

The Commission's regulations governing construction of nuclear power facilities contain the general prohibition to the effect that no construction of the plant for the nuclear power generation will be permitted until a construction permit has been issued. That issuance depends upon a resolution of all safety and environmental considerations. The regulations do provide however for certain

⁵The definitions of "trivial" have varied among the parties. One Webster (standard) dictionary defines the word as meaning of little worth or importance; also as, insignificant, flimsy, etc. Applicants' final attempt to describe the various environmental impacts as "... most trivial, based on the triviality standard" follows the often used method that perhaps repetition of the word or derivations thereof will prove convincing.

monitoring or reconnoitering of the site for a proposed nuclear power facility in advance of the issuance of the construction permit. However, even for that preconstruction activity, the regulations have specifically circumscribed limits. In part, the pertinent regulations are as follows:

§50.10(b)⁶ No person shall begin the construction of a production or utilization facility on a site on which the facility is to be operated until a construction permit has been issued. As used in this paragraph, the term "construction" shall be deemed to include pouring the foundation for, or the *installation of, any portion of the permanent facility on the site, but does not include:*

(1) Site exploration, site excavation, preparation of the site for construction of the facility, including the driving of piles, and construction of roadways, railroad spurs, and transmission lines . . .

(c)⁷ Notwithstanding the provisions of paragraph (b) of this section, and subject to paragraphs (d) and (3) of this section, no person shall effect commencement of construction of a production or utilization facility subject to the provisions of §51.5(a) of this chapter on a site on which the facility is to be operated until a construction permit has been issued. As used in this paragraph, the term "commencement of construction" means any clearing of land, excavation or other substantial action that would adversely affect the environment of a site, but does not mean:

(1) Changes desirable for the temporary use of the land for public recreational uses, necessary borings to determine foundation conditions or other preconstruction monitoring to establish background information related to the suitability of the site or to the protection of environmental values . . . [Emphasis added.]

At the time of the adoption of Section 50.10(c) of the regulations, the Commission issued its statement of considerations which included the following:

(5) The amendment to §50.12 of 10 CFR Part 50 has been deleted as unnecessary in light of the Commission's policy of granting exemptions from §50.10(c) sparingly and only in cases of undue hardship. (6) The definition of "commencement of construction" in 10 CFR §50.10(c) has been clarified and simplified by deleting the reference to "nonnuclear facili-

⁶ & ⁷ Section 50.10(b) of 10 CFR represents the earlier than Section 50.10(c) prohibition of any construction of integral units of a nuclear facility. Section 50.10(c) is no less forceful and is directed to environmental concerns. The two sections have in combination the complete definition of the terms "construction" and "commencement of construction."

ties." *The Commission believes that onsite construction of "nonnuclear facilities" would constitute "substantial action that would adversely affect the natural environment of a site"* and that specific reference to nonnuclear facilities is unnecessary to effectuate the purposes of the prohibition. [Emphasis added.]

The Atomic Safety and Licensing Board concludes from the character of the sewer line and its intended and likely use that the Commission's regulations prohibit the construction of the proposed sewer line until a construction permit is issued. The sewer line will be a part of the nuclear power plant facility. The exceptions in the Commission's regulations to the prohibition of any commencement of construction do not extend to the power plant facility or its components, and thus no authority exists to authorize the construction.

This rejection of the Applicants' proposed sewer line is also considered in connection with the analysis of the Wild and Scenic Rivers Act, but mention should be made here that the proposed construction of a sewer line is a commencement of construction prohibited by both the regulations of the Nuclear Regulatory Commission and the terms of the Wild and Scenic Rivers Act. In view of the Commission's consideration of "commencement of construction," it is not necessary to be concerned, as the Staff appears to be, whether the counsel for the Wild and Scenic Rivers Act Administration is applying his own interpretation or definition of commencement of construction. Applying the Commission's definition and description of the scope of that term, the Wild and Scenic Rivers Act is of particular importance.

Wild and Scenic River Considerations

The Wild and Scenic Rivers Act (1968) provides for the establishment of six rivers in the United States as wild and scenic rivers, and provides for a study of a substantial number of more rivers for inclusion within the protection intended for such determined waterways. The Skagit River was designated as one for study and possible inclusion in that system. One of the bases for the Act was an early (1960) recommendation from the National Park Service which was (as reported in House Report No. 1623, 90th Cong., 2nd Session, page 3801 of Legislative History):

That certain streams be preserved in their free-flowing condition because their natural scenic, scientific, esthetic and recreational values outweigh their value for water development and control purposes

Several principles were announced as basic to the consideration of the Act: the exceptional values of free-flowing streams, state participation in the process of including additional rivers, different streams have different values requiring dif-

ferent means of protection in their natural conditions, and, the fact that the area through which the streams flow may be subject to certain controls in order to achieve the objectives for which a river is designated as a component of the National Scenic River System. An important further principle and (pertinent here) is described in the House Report as follows:

... streams which are not yet authorized for inclusion in the system but that show particular promise should be given special attention for study ... and that, during a reasonable study period and for a time thereafter, *they should be accorded substantially the same sort of protection against Federal agency action as is accorded those which are included*.... (Emphasis added.)

The Skagit River, as mentioned, is in the study group category and thus entitled to the "... same sort of protection against Federal agency action ...". The statutory direction for protection against Federal agency action is here detailed again:

... no department or agency of the United States shall assist by loan, grant, license, *or otherwise* in the construction of any water resources project (Emphasis added.)

The House Report defines what a designation as a national scenic river means, and explains further that no assistance of loan, grant, license or otherwise means no assistance in any manner, as shown by the following:

... no Federal agency should make any loans or grants for or *give any other form of assistance* to such project without assurance from the head of the Department administering the scenic river that the project will not have a direct and adverse effect on the river (Emphasis added.)⁸

In addition to the legislative history, the Regulatory Staff has received an interpretation (Tr. 7050) of the above quoted section of the Wild and Scenic Rivers Act from the United States Department of Agriculture Forest Service (USDA-FS) which administers the Act. A portion of the interpretation, after stating that the proposed pre-LWA activity involves" ... (1) construction of a sanitary sewer line, and (2) construction of certain improvements to access roads ..." continues:

The relevant questions are twofold: First, whether the proposed pre-LWA activity would constitute commencement of construction for the entire

⁸The Applicant apparently overlooked this above quoted portion of the Legislative History, though it set forth some general statements therefrom, but then asserted: "No suggestion is given that the words 'or otherwise' were intended to broaden Section 7(b) to apply to any manner of assistance by a Federal agency." The Legislative History is to the contrary.

project. Second, whether approval of such activity by the Licensing Board would be an assistance by "license, or otherwise."

In answer to the first question, it is our opinion that pre-LWA activities of the kind proposed would be commencement of construction of a water resources project involving Section 7(b) application if, in the opinion of the Licensing Board, such construction is a necessary and integral part of the overall project. With regard to the second question, if approval of the Board is a legal prerequisite to the Company's undertaking the proposed pre-LWA activities, then such approval would constitute assistance by "license, or otherwise."

While Applicants contend that the USDA-FS should not have defined commencement of construction since that is a term for NRC interpretation, the NRC Commission's statement of considerations above quoted has provided the nexus for the site and commencement of construction by defining site in (Section 50.10(c)) which specifies that "... no person shall effect commencement of construction ..." which means "... any clearing of land, excavation or other substantial action that would adversely affect the environment of a site ..." The Commission opinion states that "site" means "... all the land on which the plant and its necessary accouterments, including transmission lines and access ways, are to be located." Thus, Applicants' objection to the USDA phraseology is not substantial.

It is clear further from the Commission's statement of considerations that approval of the requested pre-LWA activities here is necessary before Applicants might proceed, and as interpreted by USDA-FS such approval would constitute a conflict and be in violation of Section 7(b) of the Wild and Scenic Rivers Act. It is not necessary to again cite the support for the familiar rule that an agency's interpretation of the Federal act that the agency is delegated to administer is entitled to substantial and primary weight. For a nostalgic reference, however, see *Power Reactor Development Corporation v. International Union, etc.* (re: Fermi reactor) (367 U.S. 396 (1961)).

Thus, on both NEPA environmental grounds and the application of the Wild and Scenic Rivers Act, the authority requested for the proposed sewer line construction is denied since the sewer facility will be an integral part of the overall project. The proposed roadway construction is defined by NRC regulations to not constitute a commencement of construction and is not precluded by the Wild and Scenic Rivers Act. However, those portions of roadway, *i.e.*, 150 feet west of Weisman Creek, and the areas requiring tree removal for roadway, are not authorized for construction in view of the NEPA considerations as heretofore determined.

Rejection of Certain Proposed Findings

The Atomic Safety and Licensing Board accepts all proposed findings of all of the parties except to the extent shown by the following specific rulings which reject either the entirety or a part of the identified findings:

The following Applicants' proposed findings are rejected as not supported by reliable, probative and substantial evidence and in the portions and for additional reasons as stated:

13 is rejected as shown by contrary determinations made by the Board in this initial decision.

15 in its entirety

16 is rejected in part as to effect of aquifer.

18 is rejected as contrary to determinations made by the Board.

19 in its entirety

20 is rejected in reference to drainage pattern and underground percolation of water.

21 is rejected in reference to water drainage patterns both surface and subsurface.

23 is rejected in reference to drainage patterns, erosion control measures and the conclusions in reference hereto.

24 is rejected as argumentative and also rejected in reference to siltation.

25 is rejected in reference to traffic patterns.

The following Regulatory Staff's proposed findings are rejected as not supported by reliable, probative and substantial evidence and in the portions and for additional reasons as stated:

27 in its entirety

30 is rejected in part, in reference to permanent effects.

31 is rejected in part in reference to its conclusion of temporary character and undetectability.

33 is rejected in part as to traffic patterns.

34 is rejected as contrary to law.

41 is rejected in reference to siltation.

43 is rejected in reference to aquifer presence or effects.

44 is rejected in reference to drainage.

46 is rejected in reference to the aquifer discharge and effects.

48 is rejected in reference to siltation.

51 is rejected in reference to water runoff directions, filtration, and siltation.

55 is rejected in reference to siltation.

56 is rejected in reference to effects of siltation.

Also rejected are the conditions proposed by the Staff in its proposed form of Order for the reason that adequate assurance is not provided by such proposed conditions for a pre-LWA decision so that adverse environmental impacts will be avoided. In addition, while recognition is given by such proposed conditions that conceivable environmental damage will occur by the proposed construction advanced by the Applicants, it is clear to the Board that such damage is not trivial. The Applicants have proposed a construction that in their opinion requires no conditions in order to avoid environmental damage, and while Applicants will accept the Staff's proposed conditions, the net result is that conceivable and substantial damage will occur, especially without a time specified within which to undertake the proposed corrective or preventive activities that the Staff believes necessary to avoid the environmental damage impacts.

The following Intervenor Skagitonians (SCANP) proposed findings are rejected for lack of reliable, probative and substantial evidence and as further shown for the portions and reasons identified:

2 is rejected in part due to its error in quoted portions of regulations.

3 is rejected in part due to error in summary of the identified zoning agreement.

4 is rejected in part in that the roadway is not an integral part of the proposed plant facility.

12 is rejected in part in its references to Staff investigations.

13 is rejected in part in reference to the identified witness's knowledge of the environmental conditions.

14 is rejected as to uniqueness.

15 is rejected in reference to permanent character of some environmental damage.

16 is rejected in reference to aquifer and siltation effects.

17 is rejected in reference to aquatic insects.

18 is rejected in reference to conclusions respecting qualifications and foundation evidence from the identified witnesses.

19 is rejected in reference to erosion effects of both roadway projects.

20 is rejected in reference to 20-year environmental impact on Weisman Creek and the siltation and sedimentary deposits.

22 is rejected in reference to permanent effects of environmental damage.

23 is rejected in reference to corrective traffic arrangement.

24 is rejected as argumentative and not factual.

The following Intervenor Forelaws on Board/CFSP proposed findings are rejected as not supported by reliable, probative and substantial evidence and for further reasons and for the portions identified:

5 is rejected as contrary to the record and for lack of any disagreement at the time of the proposed cross-examination with the arrangement Intervenor Skagitonian's counsel would undertake the cross-examination for all intervenors, such arrangement having been made since Forelaws on Board/CFSP representative was not a lawyer and had not submitted a statement showing special qualification to interrogate witnesses. In addition, Applicants' objections appeared to convince Forelaws on Board/CFSP representative that their intervention was not related to the subjects of the evidence being presented.

12 is rejected in reference to the qualifications of the identified witness to express conclusions.

13 is rejected in reference to Staff investigations.

14 is rejected in reference to permanent effects of environmental damage.

16 is rejected in reference to aquifer effects.

17 is rejected in reference to endangering of the trees.

18 is rejected in reference to qualifications of witnesses.

19 is rejected in reference to erosion and siltation effects and patterns of occurrence.

20 is rejected in reference to the undefined permanent effects.

22 is rejected as argumentative in general and also in reference to older trees
". . . miles away."

23 is rejected as argumentative and not wholly factual.

WHEREFORE IT IS ORDERED, in accordance with the Atomic Energy Act, as amended, the Rules of Practice of the Nuclear Regulatory Commission, the National Environmental Policy Act, the Wild and Scenic Rivers Act, and for the reasons given and the determinations made in the foregoing Initial Decision, all of which are incorporated herein, that the Applicants' request is denied for a declaratory ruling that the construction of a sewer line and highway intersection improvements conforms to the requirements of 10 CFR Section 50.10(c) and the decisions rendered by the Licensing and Appeal Boards and the Commission. The Board determines:

1. that the proposed construction, to the extent specified in this Initial Decision, will not be so trivial an impact that it can safely be said that no conceivable harm will be caused to those interests sought to be protected by the National Environmental Policy Act;
2. that the proposed sewer line is sought as an integral part of the proposed nuclear plant facility and for reasons given in the Initial Decision is prohibited from construction by the virtue of the Wild and Scenic Rivers Act;
3. that to the extent not prohibited by the Initial Decision and Order Applicants may proceed with the balance of the proposed construction at their own risk (with no determination made here whether at the stockholders' or ratepayers' expense), and necessity of returning the environment to its natural condition so far as possible if eventually its application to construct a nuclear power plant facility is denied.

ATOMIC SAFETY AND
LICENSING BOARD

Frank F. Hooper

Gustave A. Linenberger

Samuel W. Jensch, Chairman

Issued: July 7, 1977
Bethesda, Maryland

[Attachment A has been omitted from this publication but is available in the NRC Public Document Room, 1717 H Street, N.W., Washington, D.C.]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Marshall E. Miller, Chairman
Elizabeth S. Bowers
Edward Luton

In the Matter of

Docket No. 50-564A

PACIFIC GAS & ELECTRIC COMPANY

(Stanislaus Nuclear Project,
Unit No. 1)

July 8, 1977

Upon applicant's motion for summary disposition of intervenors' antitrust allegations, Licensing Board rules that the motion itself and responses to it reveal genuine issues of material fact which must be resolved at hearing.

Motion denied.

RULES OF PRACTICE: SUMMARY DISPOSITION

When a motion for summary disposition pursuant to 10 CFR §2.749 is supported by an affidavit, the affiant must affirmatively show that he is competent to testify as to the facts stated. Mere familiarity with the negotiation of contracts does not constitute such a showing with respect to those contracts.

RULES OF PRACTICE: SUMMARY DISPOSITION

A motion for summary disposition pursuant to 10 CFR §2.749 must be supported by a statement of material facts as to which there is no genuine issue.

RULES OF PRACTICE: SUMMARY DISPOSITION

Motions for summary disposition pursuant to 10 CFR §2.749 are analogous to motions for summary judgment under Rule 56, F.R. Civ. P., and the same standards generally apply.

RULES OF PRACTICE: SUMMARY DISPOSITION

In a complex antitrust proceeding, motions for summary disposition pursuant to 10 CFR §2.749 are not favored.

RULES OF PRACTICE: SUMMARY DISPOSITION

Motions for summary disposition pursuant to 10 CFR §2.749 should not be granted unless the entire record shows a right to summary disposition with such clarity as to leave no room for controversy and establishes affirmatively that the adverse party cannot prevail under any circumstances.

ATOMIC ENERGY ACT: ANTITRUST JURISDICTION

Under Section 105c of the Atomic Energy Act, the Commission must hold a hearing on antitrust issues if the Attorney General so recommends or, in the absence of such a recommendation, if antitrust issues are raised by a person in the manner required by the Commission's rules or regulations.

ORDER DENYING MOTION OF PACIFIC GAS AND ELECTRIC COMPANY (APPLICANT) FOR SUMMARY DISPOSITION

Petitions for leave to intervene and for a preclearing antitrust review under Section 105c of the Atomic Energy Act of 1954, as amended (42 U.S.C. §2135(c)) were filed on October 15, 1976. The Petitioners are the Northern California Power Agency (NCPA), the State of California Department of Water Resources (DWR), and the Cities of Anaheim and Riverside, California (Cities). On December 13, 1976, the Pacific Gas and Electric Company (Applicant) filed an answer to all three petitions together with a motion for summary disposition.

By Memorandum and Order dated April 15, 1977, the Atomic Safety and Licensing Board designated to rule on intervention petitions granted all three petitions and ordered that an antitrust hearing be held. The Board further ruled that it did not have jurisdiction to hear the motion for summary disposition. It concluded that such a motion was not ripe for adjudication until intervention had been granted and a hearing ordered. The Appeal Board on May 20, 1977, sustained the decision of the Licensing Board for intervention petitions (ALAB-400), holding that the Board below correctly held that it lacked jurisdiction to pass upon the motion for summary disposition. It further held that the second or "hearing" board, which may or may not have the same composition as the "intervention" board which preceded it, would consider Applicant's motion. The Appeal Board at page 1178 of 5 NRC 1175 also stated:

All that need be added is that, notwithstanding the applicant's dark forebodings respecting "delay" in an "era of increasing energy shortages," there is every reason to assume that the summary disposition motion will be considered with appropriate dispatch. A special prehearing conference is now scheduled for July 8, 1977. The motion is on the agenda and the other parties must respond to it prior to that date.

The other parties have seasonably responded to Applicant's motion, the Cities on June 22, NCPA and DWR on June 23, and the Staff on June 29, 1977. This Licensing Board as reconstituted¹ has carefully considered Applicant's motion for summary disposition, all exhibits thereto, and all of the answers filed by the other parties, as well as the arguments of counsel on July 8, 1977. The Board has concluded that Applicant's motion for summary disposition should be denied because its motion and answers to the three petitions to intervene, as well as the petitions themselves and the answers to Applicant's motion, show the existence of numerous genuine issues of material fact which are in dispute, and Applicant is not entitled to judgment as a matter of law.

Motions for summary disposition on the pleadings are governed by Section 2.749 of the Commission's Rules of Practice (10 CFR Section 2.749). This section reads in pertinent part as follows:

(a) Any party to an initial licensing proceeding may, at least ten (10) days before the time fixed for the hearing, move, with or without supporting affidavits, for a decision by the presiding officer in that party's favor as to all or any part of the matters involved in the proceeding. There shall be annexed to the motion a separate short and concise statement of the material facts as to which the moving party contends that there is no genuine issue to be heard. . . .

(b) Affidavits shall set forth such facts as would be admissible in evidence and shall show affirmatively that the affiant is competent to testify to the matters stated therein. The presiding officer may permit affidavits to be supplemented or opposed by depositions, answers to interrogatories or further affidavits. When a motion for summary decision is made and supported as provided in this section, a party opposing the motion may not rest upon the mere allegations or denials of his answer; his answer by affidavits or as otherwise provided in this section must set forth specific facts showing that there is a genuine issue of fact. If no such answer is filed, the decision sought, if appropriate, shall be rendered. . . .

¹ By Notice of Reconstitution of Board, dated May 24, 1977, Marshall E. Miller was designated Chairman to succeed Daniel M. Head, who was unavailable for further service on the Board.

(d) The presiding officer shall render the decision sought if the filings in the proceeding, depositions, answers to interrogatories and admissions on file, together with the statements of the parties and the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a decision as a matter of law

Clearly, Applicant is not entitled to summary disposition on the pleadings alone as a matter of law. The Intervention Board considered the totality of the circumstances pleaded in the intervention petitions, which it summarized as allegations that PG&E has established and maintained monopoly control over the generation, transmission and wholesale sale of power in its service area, and that it has exercised control over access to alternate sources of bulk power supply in its service area and throughout California, in a manner inconsistent with Sections 1 and 2 of the Sherman Act and Section 5 of the FTC Act. The Board further identified 11 respects in which NCPA alleged that the conduct of PG&E established and maintained a situation inconsistent with those antitrust laws (Order, 5 NRC at 1026-1028). Similar and additional allegations of predatory conduct were made by DWR, and the Board identified 8 particularizations of conduct inconsistent with antitrust laws (Order, 5 NRC at 1029-1031). The Cities also alleged anticompetitive conduct by PG&E in connection with the California Power Pool and the Seven Party Agreement. The Intervention Board found that these allegations were sufficient to warrant intervention under 10 CFR §2.714, and the Appeal Board summarily affirmed the grant of intervention "on the basis of the opinion of the Licensing Board, with which we find ourselves in essential agreement" (ALAB-400, 5 NRC 1176). The Appeal Board further observed that an "examination of the specific averments of the several petitions convinces us that the Board below correctly concluded that the pleading requirements in antitrust matters which were laid down by us in *Wolf Creek* have been fully satisfied here" (5 NRC at 1176). Thus, it is clear that the pleadings are sufficient to allege anticompetitive conduct on the part of PG&E, and cannot be attacked as such as a matter of law. Although PG&E is entitled to file a motion for summary disposition on the pleadings "with or without supporting affidavits" under Section 2.749(a), it is not "entitled to a decision as a matter of law" on the pleadings under subparagraph (d) of that section.

There is also a serious question whether PG&E has complied with the affidavit requirements of Section 2.749(b). That section states that affidavits "shall set forth such facts as would be admissible in evidence and shall show affirmatively that the affiant is competent to testify to the matters stated therein." William B. Kuder in his verification stated that he is presently serving as a consultant to PG&E, and that he "represented the Company as counsel in connection with the negotiation of *many* of the contracts discussed in the foregoing Answer," and that all statements of fact set forth therein are true and correct,

“to the best of his knowledge, information and belief” (emphasis supplied). This falls somewhat short of showing affirmatively that Mr. Kuder is competent to testify in the form of admissible evidence to all of the facts contained in a discursive and argumentative motion. Familiarity with the negotiation of many contracts is far from such an affirmative showing. However, in the interest of an expeditious preclearing antitrust review, the Board will consider the motion on the merits.

Neither is PG&E entitled to a summary decision on the basis of its motion being supported by affidavits under Section 2.749(b). Subsection (a) clearly requires that “There shall be annexed to the motion a separate, short and concise statement of the material facts as to which the moving party contends that there is no genuine issue to be heard.” PG&E has failed to file this required statement of material facts. Such a requirement is not merely a procedural technicality, but it is of substantive significance. This statement is necessary in order to impose upon other parties a duty to file a statement of material facts as to which it is contended there exists a genuine issue to be heard, under penalty of having uncontroverted material facts deemed to be admitted. It is necessary for the Board to have this of having uncontroverted material facts deemed to be admitted. It is necessary for the Board to have this information in a readily available form in order to evaluate the merits of a motion for summary disposition. PG&E’s lengthy (77 pages plus numerous exhibits) and argumentative motion for summary disposition wholly fails to comply with the requirement of a concise statement of material facts as to which there is no genuine issue.

Motions for summary disposition under Section 2.749 are analogous to motions for summary judgment under Rule 56 of the Federal Rules of Civil Procedure, and the same standards are generally applied in considering the appropriateness of terminating a proceeding without an evidentiary hearing.² Accordingly, summary disposition is only authorized where the moving party is entitled to judgment as a matter of law, where it is quite clear what the facts are, and, where no genuine issue remains for trial.³ In determining such a motion, the record will be viewed in the light most favorable to the party opposing the motion. The opposing party need not show that he would prevail on the factual issues, but only that there are such issues to be tried.⁴ It is also well settled that summary judgments are not favored in complex antitrust litigation. As the Supreme Court has observed:

² *Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), ALAB-182, 7 AEC 210, 217 (1974); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), LBP-74-36, 7 AEC 877, 878-879 (1974).

³ *Sartor v. Arkansas Natural Gas Co.*, 321 U.S. 620, 627 (1944).

⁴ *Poller v. C.B.S., Inc.*, 368 U.S. 464, 473 (1962); *American Manufacturers Mut., Inc. Co. v. American Broadcasting-Paramount Theaters, Inc.*, 388 F.2d 272, 280 (2nd Cir. 1967).

...[S]ummary procedures should be used sparingly in complex antitrust litigation where motive and intent play leading roles, the proof is largely in the hands of the alleged conspirators, and hostile witnesses thicken the plot. It is only where the witnesses are present and subject to cross-examination that their credibility and the weight to be given their testimony can be appraised. Trial by affidavit is no substitute for trial by jury which so long has been the hallmark of "even handed justice."⁵

It has also been held that a motion for summary judgment "should not be entertained before discovery has been completed in antitrust cases in which the relevant facts are disputed and intent to injure is an issue."⁶

As the Staff correctly notes, the motion for summary disposition by PG&E, standing alone, demonstrates that there are genuine issues of material fact to be resolved. This motion contains numerous denials of facts pleaded in the various petitions, coupled with attempts to persuade the Board to adopt its version of factual controversies. The following examples sufficiently indicate that no judgment can be rendered on the merits without an evidentiary hearing:

1. Paragraph 7 (a) is an outright falsehood This allegation is an example of NCPA's "big lie" technique. (Motion of PG&E, pp. 51-52.)

2. Both allegations made by NCPA are simply incorrect insofar as they refer to existing SMUD contracts. (*Id.*, p. 64.)

3. DWR claims that PG&E has consistently refused to permit DWR to use the California segment of the Pacific Northwest Intertie for any interstate transmission, "a refusal based solely on PG&E's desire to exploit fully its monopoly on transmission facilities" Both the basic charge and the assertion as to PG&E's motions are unfounded. (*Id.*, pp. 94-95.)

4. DWR alleges that this [SMUD] contract . . . the first point is a distortion of the relevant contract provision . . . The second point is simply untrue. (*Id.*, pp. 95-96.)

5. With regard to priority in purchasing surplus energy given to the California companies by the Seven Party Agreement, PG&E states that "a fair consideration of circumstances leading to the signing of the Agreement, its

⁵*Poller v. Columbia Broadcasting System, Inc.*, 368 U.S. 464, 473 (1962). See also *United States v. Diebold, Inc.*, 369 U.S. 654 (1962); *Fortner Enterprises, Inc. v. United States*, 394 U.S. 495 (1969).

⁶*George C. Frey Ready-Mixed Concrete, Inc. v. Pine Hill Concrete Mix Corp.*, No. 75-7698 (2d Cir., May 6, 1977), Antitrust & Trade Reg. Rep. (BNA) No. 814, pp. A-6, 7.

purpose, and the relationship of the parties to it will demonstrate. . . . (*Id.*, p. 82.)

When the answers to the motion filed by the Intervenors are considered, it is manifest that there are many disputed issues of fact requiring resolution. For example, NCPA cites many facts to rebut the assertion of PG&E that it has not acted to prevent the development of "public power" (Answer of NCPA to motion of PG&E, pp. 18-30). There are disputes concerning alleged refusals to wheel power (*Id.*, p. 34), as well as unreasonable restraints on the San Luis facility (*Id.*, p. 37), and on the effect of various contracts (*Id.*, pp. 38-40). Many controversies exist regarding the nature and effect of the California Power Pool and the Seven Party Agreements (*Id.*, pp. 41-48). DWR asserts that it was excluded from "secret negotiations" between PG&E and the Department of Justice, which resulted in commitments which failed to preclude anticompetitive conduct (Response of DWR, pp. 19-21).

In short, the answers of the other parties to the PG&E motion for summary disposition are replete with disputed issues involving material facts. The applicable principles have been judicially described as follows:

It is well settled that summary judgment should not be granted unless the entire record shows a right to judgment with such clarity as to leave no room for controversy and establishes affirmatively that the adverse party cannot prevail under any circumstances. Neither should summary judgment be granted if the evidence is such that conflicting inferences may be drawn therefrom, or if reasonable men might reach different conclusions. (*Phoenix Savings and Loan, Inc. v. Aetna Cas. & Surety Co.*, 381 F.2d 245, 249 (4th Cir. 1967).)

Finally, PG&E contends that the issues raised by the Intervenors are mooted by the Commitments accompanying the Attorney General's advice letter. We do not agree, and regard this issue as settled by the Decision of the Appeal Board in *Wolf Creek*, which stated:

In the case at bar, the Attorney General recommended that no hearing would be necessary provided the Commission inserted specified conditions in the Wolf Creek license. The suggested conditions were ones which the Attorney General believed adequate to assure smaller utilities in the applicants' service area access to power produced by that nuclear facility. See pp. 562-563 above. The applicants have agreed to those conditions; consequently, no hearing is needed insofar as the Attorney General is concerned if they are included among the terms of the license.

The second situation which may necessitate a formal antitrust proceeding—and the one with which we are concerned here—is described in the Joint

Committee Report which accompanied the enactment of Section 105c in 1970. [See n. 10, *supra*.] In the case where the Attorney General does not recommend a hearing "but antitrust issues are raised by another in a manner according with the Commission's rules or regulations, the Commission would [then] be obliged to give such consideration thereto as may be required by the Administrative Procedure Act and the Commission's rules or regulations." [Joint Committee Report, p. 30.] (*Kansas Gas & Electric Co. et al.* (Wolf Creek Generating Station, Unit No. 1), ALAB-379, 1 NRC 559, 565-566) (1975).)

We have here given consideration to the antitrust issues properly "raised by another," the Intervenor, and have concluded that such issues should be resolved in an evidentiary hearing.

For the foregoing reasons, the motion for summary disposition filed by Applicant, Pacific Gas and Electric Company, is denied. Inasmuch as the disposition of this motion could have an impact upon the framing of issues and the establishment of a discovery schedule, and since its resolution is based upon the sufficiency of the motion and its supporting affidavit and exhibits which have been filed previously, this order is entered at the conclusion of the arguments on summary disposition and prior to the hearing of other matters in the special prehearing conference of July 8, 1977.

IT IS SO ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Elizabeth S. Bowers, Member

Edward Luton, Member

Marshall E. Miller, Chairman

Dated at Bethesda, Maryland,
this 8th day of July 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Sheldon J. Wolfe, Chairman
Dr. Paul W. Purdom
Frederick J. Shon

In the Matter of

Docket Nos. STN 50-556
STN 50-557

PUBLIC SERVICE COMPANY OF OKLAHOMA
ASSOCIATED ELECTRIC COOPERATIVE, INC.
WESTERN FARMERS ELECTRIC COOPERATIVE,
INC.

(Black Fox Station, Units 1 and 2)

July 20, 1977

Upon motions filed by applicant and staff for summary disposition of certain environmental contentions of two intervenors, Licensing Board analyzes affidavits and statements submitted by the parties to determine whether or not genuine issues of material fact exist.

Motions granted in part and denied in part.

NEPA: COST-BENEFIT ANALYSIS

In striking a cost-benefit balance pursuant to NEPA, Licensing Board must consider intervenor's contention that the somatic and genetic effects of low level gaseous and liquid radioactive discharges, which are as low as reasonably achievable, have not been adequately assessed.

ORDER RULING ON MOTIONS
FOR SUMMARY DISPOSITION
AND LISTING BOARD QUESTIONS

On April 1, 1977, Applicant and Staff respectively filed motions for summary disposition regarding certain environmental contentions of two Intervenor. The two Intervenor are Citizens Action For Safe Energy (CASE) and Mrs. Ilene Younghein. On April 15, 1977, said Intervenor responded to the Staff's

motion and on May 13, 1977, responded to Applicant's motion. On April 19 and on April 20, 1977, the Staff and Applicant respectively responded to each other's motion. Thereafter, during the course of the Section 2.752 prehearing conference on June 27, 1977, oral arguments were heard on certain of the contentions subject to summary disposition. As hereinafter discussed under heading I, we grant in part and deny in part the motions for summary disposition. As reflected in our Order of July 1, 1977, written direct testimonies relating to contentions which are not dismissed herein shall be filed within fourteen days after the instant Order is issued. Further, under heading II, the Board has set forth various questions, and it is requested that the parties submit written direct testimonies in response thereto within fourteen days after the instant Order is issued.

I. RULINGS ON MOTIONS FOR SUMMARY DISPOSITION

Contention 4

Intervenors contend that the Applicant has not adequately demonstrated compliance with 10 CFR Part 50, Appendix A, Criterion 2, and Part 100, Appendix A, with respect to the Black Fox, 1 and 2 site, in that the G-value selected for the Safe Shutdown Earthquake is too low.

It is unnecessary to summarize the arguments of the parties. While the Staff agrees with Applicant's conclusion that an intensity of VII (Modified Mercalli) is conservative for the Black Fox Plant and that an acceleration of .12g is an adequate acceleration for seismic design of the plant, it notes that one of its members feels that taking into account the record of historical seismicity, its limited nature and lack of definite correlation with structure, the more conservative assumption of MM VII-VIII should be used as a basis for determining the safe shutdown earthquake. An individual dissent in and of itself does not create a controverted issue of material fact; however, said dissent has evoked our interest. Accordingly, Applicant's motion for summary disposition is denied and we will hear the evidence on this contention.

Contentions 11 and 36

Contention 11

Intervenors contend that the Applicant has not demonstrated that the radioactive liquid and gaseous releases during normal operation of Black Fox, 1 and 2, will meet the requirements of 10 CFR Part 50, Appendix I.

Applicant moves for summary disposition, and is supported by the Staff. Applicant asserts as facts as to which there is no genuine issue to be heard:

- A. Applicant has demonstrated that Black Fox, Units 1 and 2, will meet the requirements of 10 CFR Part 50, Appendix I, by conservative calculations of expected releases, pathways, and exposure doses.
- B. Applicant's calculations have been based upon an analysis of the design of Black Fox, Units 1 and 2, and the Black Fox site and have been verified by calculations in accordance with draft regulatory guides.

Applicant relies upon the affidavit of Dr. Robinson to the effect that conservative calculations, performed according to the methods outlined by appropriate Regulatory Guides and drafts of such Guides, indicate that the requirements of 10 CFR Part 50, Appendix I, will be met.

Intervenors allege that "Dr. Bertell's deposition and Dr. Huver's testimony (Intervenors Supplemental Answers to Staff Interrogatories) create questions of fact for trial," but they do not see fit to tell us what these questions are. In fact, as Applicant points out, Dr. Bertell's deposition suggests that she disagrees not with whether the design meets the regulation but with the validity of the regulation itself which would not be a matter properly before this tribunal. *Southern California Edison Company, et. al.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-268, 1 NRC 383, 400 (1975).

The Board concludes that there is no triable issue of fact. Accordingly, the motion is granted.

Contention 36

Intervenors contend that the Applicant and the Regulatory Staff have not adequately assessed the somatic and genetic effects of the low level gaseous and liquid radioactive discharges which will result from the normal operation of Black Fox, 1 and 2, on humans, including but not limited to, persons engaged in shipping operations on the McClellan-Kerr Navigation Channel, as well as the plants, fish, waterfowl and wildlife.

Applicant moves for summary disposition, as supported by Dr. Robinson's affidavit, and asserts that the following facts are uncontroverted:

- C. Applicant's calculations take into account persons engaged in shipping operations on the McClellan-Kerr Navigation Channel.
- D. Radiation doses which are low as reasonably achievable for humans in accordance with 10 CFR Part 50, Appendix I, are acceptably low for other animals and plants.

Staff opposes summary disposition on the ground that the design's compliance with 10 CFR Part 50 does not preclude the Board from assessing the biological effects of releases within regulatory limits and including such effects in the general examination of impact which is mandated by NEPA. Intervenor simply assert that these effects must be considered.

The Board heard oral argument on this matter at the prehearing conference on June 27, 1977. We understand Applicant's position to be that the very presence of Appendix I to 10 CFR Part 50 in the Commission's regulations implies that, as a part of the rulemaking proceeding which produced the regulations, the Commission itself gave adequate consideration to the environmental impact of the limited releases and adequately assessed the cost-benefit balance arising therefrom. Staff's position, on the other hand, is that, although the Commission has fixed the radiological impact of plant releases by regulation, a Board may, and indeed should, consider this impact in the cost-benefit analysis for a given case.

In the time since the prehearing conference, we have received a letter dated July 7, 1977, from Applicant in which its counsel cited the case of *Tennessee Valley Authority* (Hartsville Nuclear Plant), ALAB-380, 5 NRC 572, 579 (1977), wherein the Appeal Board noted that "... environmental issues may be decided in rulemaking proceedings as well as in adjudicatory proceedings" We agree with the principle, but we disagree that the Commission, in RM 50-2, generically assessed the impact of the releases from Black Fox Station (BFS) and balanced such impact against the benefits from this particular power plant. Further, it is important to note that Appendix I is a part of the Commission's safety regulations. Said appendix defines the manner in which one must proceed to evaluate whether the Commission's safety standard, viz. that emissions must be "as low as reasonably achievable," has been satisfied. It does not speak to the question of how these low emissions and any resulting biological effects weigh in the cost-benefit balance for a particular nuclear plant.

We conclude that we are required to determine the impacts of these releases and include them in the cost-benefit balance. Accordingly the motion is denied.

Contention 14

Intervenor contend that the Applicant has not adequately analyzed potential consequences on the Black Fox, 1 and 2 facility, resulting from a possible explosion of a barge carrying explosives on the Verdigris River.

In an affidavit a Staff employee (Mr. Kantor) deposed that no explosives are presently being shipped past the site of the BFS and none are expected to be in the future. The Intervenor do not controvert this material fact. Said deponent proceeded to postulate TNT and fuel vapor explosions at the closest point on

the Verdigris River to the plants' safety related structures and computed the probability for a barge explosive accident. However, the deponent limited his analysis to these two types of explosions. Applicant supported the Staff's motion for summary disposition. The motion is granted and the contention, as worded, is dismissed. However, as pointed out by the Intervenor, potentially explosive fertilizers were not considered by the Staff. Accordingly, the parties will present evidence with regard to the contention as reworded:

Intervenor contend that the Applicant has not adequately analyzed potential consequences on the Black Fox, 1 and 2 facility, resulting from a possible explosion of a barge carrying potentially explosive fertilizers on the Verdigris River.

Contention 17

Intervenor contend that the site selected for Black Fox, 1 and 2, will not comply with the requirements set forth in 10 CFR Section 100.11 since the site is within 23 miles of Tulsa and the population within a 50-mile radius is 700,000.

In separate affidavits attached to the motions for summary disposition, an employee of the Applicant (Dr. Robinson) and a Staff employee (Mr. Kantor) depose that the BFS will comply with 10 CFR Part 100 requirements in that the low population zone is 2.5 miles and that the nearest population center (25,000 residents or more) is Tulsa at a distance of 13 miles from the site (about 5 times the minimum population center distance specified by Part 100). Tables attached to the affidavits project population densities which indicate that the site is and will be acceptable from a population distribution standpoint. Neither via affidavit nor argument have the Intervenor raised triable issues of fact. As a matter of law we conclude that Section 100.11(a) requirements have been met in that the population center distance is at least one and one-third times the distance from the reactor to the outer boundary of the low population zone, and there is no further Part 100 requirement with respect to the population within a 50-mile radius. Accordingly, the contention is dismissed.

However, the Board requests that evidence be presented regarding the two following questions:

1. What consideration has been given to the requirements in Section 100.11(b)?
2. If the SER reflects that the radiological consequences of a postulated hypothetical fission product release from the site will be less than the dosage guideline limits given in 10 CFR Section 100.11, how was this dosage evaluation determined?

Contentions 20 and 21

Contention 20

Intervenors contend that the Applicant and the Regulatory Staff have not adequately considered the topography of the site so that an adequate assessment of soil erosion can be made.

Contention 21

Intervenors contend that, since a great percentage of the soil at Black Fox, 1 and 2 site, is of the type and composition which is most susceptible to high run-off and has the lowest infiltration capacity, the Applicant and Regulatory Staff has underestimated the environmental impact and the cost of preventing soil erosion.

With respect to Contention 20, the Intervenors have failed to raise a controverted issue of material fact. In answering Applicant's interrogatories, in responding to Applicant's motion for summary disposition, and during oral argument, the Intervenors did not specify wherein the Applicant and Staff had inadequately considered the site's topography so that an adequate assessment of soil erosion could be made. Applicant's motion, as supported by the Staff, is granted and the contention is dismissed.

Applicant's motion for summary disposition is granted and Contention 21 is dismissed. In answering Applicant's interrogatories, the Intervenors stated that the ER generally recognizes the types of impacts resulting from soil erosion and stated they had no information concerning the total cost of preventing erosion which they considered to be appropriate. Further, in their response to Applicant's motion, the Intervenors do not controvert material facts A through F.¹

¹ Applicant lists the following material facts as to which it asserts there is no genuine issue to be heard:

A. The soil types present at the Black Fox site, as they affect soil erosion, were considered by Applicant during the site selection process.

B. Following the site selection process, Applicant collected detailed data on the types and distribution of soils within the Black Fox site for purposes of planning for construction and erosion control.

C. Particularly erodable soil types cover less than 7% of the area of the Black Fox site.

D. Applicant has altered its original plans for the location of the waste water drainage channel in order to decrease the potential for erosion of the highly erodable soil types.

E. Applicant's erosion control measures are designed to prevent gullyng, loss of fertile topsoil and the transport of excessive amounts of soil to the Verdigris River for all soil types present on the site.

F. All soil types present on the Black Fox site were considered in estimating the environmental impact from soil erosion and the cost of preventing soil erosion.

While the Intervenor's do assert that the soils should be analyzed using several classification schemes in order to understand the potential for erosion and in order to understand erosion control measures, they do not explain why the Applicant's alleged failure to use these classifications presents a genuine issue of material fact. In their response to the Staff's motion, the Intervenor's take a different tack—i.e., they argue that Applicant and Staff have emphasized mitigation of soil erosion rather than its prevention and have not determined costs thereof. The Guyot affidavit and its tables of costs attached to Applicant's motion show that this argument is erroneous insofar as Applicant is concerned. While it is true that the Staff did not address preventative action and determine costs thereof, and instead concentrated on a monitoring program and the costs thereof, the Applicant's motion carries the day and the contention is dismissed.

Contention 22

Intervenor's contend that the Applicant and Regulatory Staff have not adequately analyzed noise impacts on adjacent land uses in both the construction and operation phases of Black Fox, 1 and 2, in that:

a. Instantaneous values rather than periodic values have been utilized and instantaneous values fail to consider effects on health and the environment from exposure to noise over time;

b. The analysis fails to establish the ambient noise level by sampling over time and area;

c. Assumptions are made as to impact based upon hypothetical rather than actual conditions (see 5.6-4);

d. No actual basis is provided for the Applicant's "expectation" that attenuation of noise will be significant. Applicant admits (page 5.6-4) that the model chosen does not consider all factors; and

e. Applicant is not complying with state and local noise control standards and regulations.

Contrary to the Intervenor's assertion in their response to Applicant's motion for summary disposition, the Board finds that the Intervenor's have not showed in answers to Staff's and Applicant's interrogatories wherein the noise analysis is inadequate. Further, while the Intervenor's argue that the rural area proximate to the site may in the future become both urbanized and industrialized, and while they urge that Applicant's affidavit admits there are some unknown factors or effects that cannot be evaluated, we conclude that no genuine issue of material fact has been raised. As reflected in Mr. Steppich's affidavit attached to Applicant's motion, Applicant reasonably recognized that site construction noise will vary with the particular phase of construction, the mix of equipment used for each phase and the duty cycle of each source, and thus the

total acoustical emission from the construction site at any given instant could not be predicted. Using a worst case analysis suggested by the EPA, Applicant's deponent developed noise level figures for various construction phases at the site and for the operation of BFS which were within the EPA guidelines. Moreover, we note that the Intervenor agree with the Staff, which, in supporting Applicant's motion, points out that there are no state, county, and township guidelines and/or regulations on noise control applicable to the BFS site. Accordingly, the Board concludes that there is no material issue of fact to be tried and grants Applicant's motion for summary disposition.

Contention 23

Intervenor contend that the Applicant and the Regulatory Staff have not adequately analyzed the impact of the proposed Eastern Transmission Lines on the Flint Creek/Illinois River area which has been declared a scenic river by the state and which is currently being considered for inclusion as a wild and scenic river under Federal law.

In an affidavit, a deponent (Dr. La France) for the Staff attests that the proposed power transmission system does not cross either the Illinois River or Flint Creek, and that, at five locations at or near the mouth of a tributary with a line of sight up a tributary valley, the proposed transmission line would be at least one mile from an individual standing on the Flint Creek or Illinois River valley floor and the tallest proposed tower would appear to be no larger than a half inch tall wooden match stick held at arm's length. The Intervenor do not controvert these facts. They merely urge that legislation pending before the Oklahoma legislature shows that proximity of a transmission system to a stream is no longer a basis for analysis. Although Intervenor furnished us with a copy of the proposed legislation, they do not cite specific provisions thereof in support of their argument. The Staff's analysis is more than adequate to show that the proposed transmission lines would not substantially interfere with the public's use and enjoyment of the area. Further, the Intervenor do not advise us how long the Wild and Scenic River Study has been underway with respect to the area concerned. The Intervenor have failed to indicate that a triable issue of material fact exists, and, accordingly, we grant the Staff's motion (supported by the Applicant) and dismiss the contention.

Contention 24

Intervenor contend that the Applicant and Regulatory Staff have not demonstrated that Black Fox, 1 and 2, will comply with all applicable Federal, state and local clean air requirements.

The Board denies the Staff's motion for summary disposition, as supported by the Applicant. During the 10 CFR §2.752 prehearing conference on June 27, 1977 (Tr. 368-369), the Board indicated its concern about all air pollutants that might be generated during construction of and during the decommissioning of the nuclear plant, and, of course, we are concerned about possible air pollution during the operational span. This is a complex subject which has not been fully analyzed in the Staff's affidavit (Dr. Vaslow) and, for example, is not subject to summary disposition upon the belief of counsel that equipment operated at the site must comply with EPA regulations (Tr. 369).

Contention 26

Intervenors contend that the Applicant's program to monitor fish impingement on the intake plate will not be able to detect fish concentrations in the vicinity of the intake structure so as to minimize fish loss (see 6.2.6.3 and page 5.1-6).

Applicant asserts that there are no genuine issues to be heard as to the following facts:

A. Applicant's fish sampling in the Verdigris River demonstrates that the fish population is very low in the main channel where it is proposed to locate the water intake structure. Only approximately 5% of the sampled fish were sport or pan fish.

B. The design of the water intake structure, which minimizes its intake velocity, and its location in an area of very low fish population will minimize fish impingement.

C. No effective and reliable method exists to detect the low concentration of fish in the vicinity of the intake structure so as to enable further reductions in fish losses due to impingement.

Applicant's motion for summary disposition, supported by Staff, is denied. Applicant's supporting affidavit by Mr. Aronson describes the fish sampling, its results and the intake design and concludes that monitoring of fish populations in the vicinity of the proposed BFS river intake would not be practical or necessary, in order to minimize impingement losses. Although the Staff supports Applicant's motion for summary disposition, the FES (February 1977), NUREG-0176, 6.2.1, pps. 6-12 states "in addition to the plans set forth by the Applicant, the Staff will require a fish impingement monitoring program." These statements are conflicting and we want to hear testimony on this contention.

Contentions 27 and 28

Contention 27

Intervenors contend that the construction of Black Fox, 1 and 2, would cause silting on the eggs of the fish inhabiting the Verdigris River, which would result in false spawning and false migratory cycles.

Contention 28

Intervenors contend that the discharge of heated effluent from Black Fox, 1 and 2, would cause false spawning and false migratory cycles of fish which inhabit the Verdigris River.

Via affidavits of Messrs. Aronson, Guyot and Vinikour attached to the Applicant's and Staff's motions for summary disposition, deponents attest that, for several stated reasons, siltation could not result in false spawning or false migratory cycles and that the amount of heat that will be discharged into the Verdigris River from BFS will not affect fish eggs, fish spawning or migratory cycles. The Board notes that in answering the Applicant's interrogatories, the Intervenors stated that they had no independent information in support of these two contentions, and that, in responding to Applicant's and Staff's motions for summary disposition, the Intervenors neither meet the thrust of the motions nor directly contradict the issues of material fact which are supported by the reasoning of the deponents. There being no triable issues of material fact, we grant the motions and dismiss Contentions 27 and 28.

Contention 29(b)

Intervenors contend that the Applicant and Regulatory Staff did not adequately analyze the proposed sites for Black Fox, 1 and 2, because the following items were not adequately considered:

- (a)
- (b) Feasibility of implementing an evacuation plan, and
- (c)

Applicant's motion for summary disposition, as supported by the Staff, is granted. Applicant's assertions of material facts,² supported by Dr. Robinson's

² Material facts as to which there is no genuine issue to be heard:

A. The feasibility of implementing an evacuation plan at a particular site is dependent upon the population density around the site and the available road network.

Continued on next page

affidavit, are not controverted by the Intervenor. Intervenor merely assert and we parenthetically conclude as follows:

a. Applicant assumes a static population. (This is incorrect. See Exhibit 5 of the Robinson affidavit wherein LPZ populations are projected to the year 2020).

b. Applicant assumes the road network is adequate. (Exhibit 6 referenced in the Robinson affidavit shows three roads which could be used for evacuation purposes. The Intervenor do not factually support their assertions that the road network is inadequate and that said network is inaccessible to evacuees.)

c. The EPA manual appended to Robinson's affidavit has incomplete sections. (As indicated at page 5 of the affidavit, Dr. Robinson only used two tables in the EPA manual to extract suggested guideline values for whole body and thyroid doses, and neither the tables nor the section in which they are found indicate incompleteness.)

d. The plan has not been rehearsed. (There is no such requirement and the Intervenor fail to specify one.)

e. The plan does not consider all possible accidents. (There is no such requirement.)

f. The planning is not complete. (There is no requirement for complete plans covering all contingencies at this stage.)

g. The costs of the plan have not been evaluated. (The thrust of the contention is feasibility and not cost.)

In the Board's view the motion is adequately supported and the Intervenor's opposition thereto is not. There is no triable issue of material fact, and thus the motion is granted.

Contentions 30 and 31

Contention 30

Intervenor contend that the Applicant and Regulatory Staff have

Continued from previous page

B. The Black Fox site is in a region of relatively low population density. The resident population in the low population zone is small and the transient population is mobile.

C. The area surrounding the Black Fox site is adequately traversed by roads.

D. Even in the event of an accident involving source terms for fission product releases as high as those specified in Regulatory Guide 1.3 there would be an ample period to initiate evacuation before doses at the site boundary would reach the values established in USEPA guidelines for such action.

inadequately considered the effect of the plume of the Black Fox, 1 and 2, cooling towers in the following areas:

- a. Fogging and icing;
- b. Increased humidity;
- c. Acceleration of temperature inversions, thus increasing the effects of Tulsa's pollution;
- d. Increased precipitation;
- e. Spawning tornadoes; and
- f. Emissions of asbestos which is used in the cement filler board.

Contention 31

Intervenors contend that the Applicant has not adequately addressed the remedial measures to be utilized if the plume of the cooling tower for Black Fox, 1 and 2, causes drift damage to the vegetation in the area (see 5.3-1).

The Applicant asserts these as material facts as to which there is no genuine issue to be heard:

A. Applicant has analyzed the effects of the plume from the Black Fox cooling towers in detail employing analytical models which are the most advanced available and appropriate input data.

B. Applicant's estimate of visible plumes, ground fog, drift deposition and icing overstate the effects which can actually be expected.

C. Field experience and analyses demonstrate that the cooling tower plume will not have measurable effects upon humidity in the area or precipitation and will not promote inversions or tornadoes.

D. The maximum asbestos concentrations downwind resulting from erosion of the cooling tower filler board would be several orders of magnitude below permissible exposure levels.

E. Applicant's overall analysis demonstrates that the effects of the cooling tower plume will be insignificant.

F. The levels of salts deposited in the drift from Black Fox Station will be less than those occurring naturally and below the threshold for damage to vegetation.

G. No drift damage has been reported from existing cooling towers so that remedial measures are unnecessary.

Applicant's and Staff's motions for summary disposition of Contention 31 are granted and Applicant's motion regarding items a. through e. of Contention 30 is granted, but summary disposition of item f. of Contention 30 is denied.

In response to Contentions 30 and 31, the Applicant's supporting affidavit by Mr. McVehil cites the mathematical models used to analyze visible plumes, ground fog, icing and drift deposition. The Staff in the FES (pgs. 5-9-5-14, Sections 5.3.3.2-5.3.3.4) states the approach is conservative. The Intervenor merely generally allege that these analyses are inadequate, but do not specify the inadequacies.

The McVehil discussion of tornado formation hypothesizes that under some circumstances a large accumulation of energy dissipation systems could conceivably increase the possibility of tornado formation; however, the size source required is on the order of one covering several hundred football fields whereas the cooling towers proposed herein would cover an area of one football field - i.e., cover a minor fraction of the area which might conceivably increase the possibility of tornado formation. In addition, Mr. McVehil cites field experience as demonstrating that cooling towers have not been a cause of tornadoes. The Intervenor has not considered the statements in the affidavit in their total context and have offered no additional information. With respect to the acceleration of inversions and increases in precipitation, the Intervenor offered no factual basis for contesting the Applicant's statements and supporting material. Contrary to the Intervenor's assertion regarding his lack of qualifications, Mr. McVehil only stated that he was not qualified to discuss remedial measures for drift damage—he proceeded to state that he had done many analyses of drift deposition rates and had carefully reviewed the literature on drift damage to vegetation.

The emissions of asbestos however represent a "new" concern. The McVehil affidavit concedes that the erosion rate is poorly defined but suggests that it is extremely small. Under assumptions and calculations used, Mr. McVehil estimates that with normal dispersion the general population exposure is a minor fraction of the permissible OSHA occupational exposure and concludes the effects are negligible. We would like to have these issues examined in more detail and precision as to erosion rates and emissions, size of particles as related to respirability, ambient concentrations during inversions, downwash or other meteorological conditions that would tend to confine emissions, and threshold concentrations (if there is a threshold level) for effects on the general population (as contrasted with OSHA standards for the working population).

Accordingly, we dismiss Contention 30 a. through e. and Contention 31, but deny the motion for summary disposition regarding Contention 30 f.

Contention 32

Intervenor contend that the Applicant and the Regulatory Staff have not adequately demonstrated that the waste water holding pond is of a sufficient size and capacity to retain the blowdown effluent for a minimum

of 24 hours (see 10.3-1) and for longer periods when the Verdigris is in a period of low flow (see 9.3-4).

Applicant's motion for summary disposition, as supported by the Staff is granted and Contention 32 is dismissed. Applicant asserts that material facts A-D, supported by the affidavit of its Project Department Engineer (Mr. Guyot) present no genuine issues to be heard.³ We grant the motion because, in the first place, the Intervenor's question erosion control measures during the construction (see page 19 of Guyot affidavit), which is not an issue in the instant contention although adverted to by the Applicant in material fact A as to which it asserts there is no triable issue of fact. Second, Intervenor's apparently contend that Applicant has not taken into consideration discharges of thermal waters and of other effluents from sources other than that of the operating nuclear facility. Once again such an argument is not relevant to the subject matter of the contention which questions whether the waste water holding pond is of sufficient size and capacity to retain the blowdown effluent for a minimum of 24 hours and for longer periods when the Verdigris is in a period of low flow.

Contention 33

Intervenor's contend that the Applicant and the Regulatory Staff have overstated the benefits of the waste water holding ponds providing a habitat for aquatic life since the chemicals and biocides contained therein are detrimental to such life.

In their respective motions for summary disposition, supported by the affidavits of Messrs. Day and Vinikour, Applicant and Staff assert there is no controverted issue of material fact in that both have determined and

³ Applicant lists the following material facts as to which it asserts there is no genuine issue to be heard:

A. The waste water holding pond will be designed for a total storage capacity of 207 acre-feet of water, of which approximately 24 acre-feet may be lost due to siltation during construction and operation of the Black Fox Station.

B. The calculated maximum discharge to the waste water holding pond during 100% load factor for both units, worst case station water use and low river flow is 18.1 acre-feet per day.

C. The effective hold up time within the waste water holding pond can be controlled by varying the pond water elevation and the rate of discharges from the pond.

D. The large margin in pond storage capacity and the ability to vary pond water elevations and the rate of discharges from the pond assures that an effective 24 hours or longer holdup can be maintained in the waste water holding pond under all anticipated operating and environmental conditions.

acknowledged that the waste water holding ponds for the BFS would be an undesirable aquatic habitat and accordingly that neither claimed as a credit in the cost-benefit analysis that said ponds provided a beneficial habitat for aquatic life. This being so, it does not make sense for the Intervenor to argue that benefits are overstated, and thus we dismiss this contention.

Contention 34(a)

Intervenor contends that the Applicant and Regulatory Staff have not adequately analyzed the environmental impacts at Black Fox, 1 and 2, of the following construction activities:

- (a) the clearing, excavation, dredging and dewatering will result in long-term ecological damage.

Applicant moves for summary disposition, and is supported by the Staff. We deny the motion in that the Intervenor raises issues of material fact—*e.g.*, that the Environmental Report reflects that ground and subsurface investigations remain to be performed, that the statements in the ER are not factually supported, and that the ER will be revised. Accordingly, we will hear evidence on Contention 34(a).

Contentions 34(b) and (c)

Intervenor contends that the Applicant and Regulatory Staff have not adequately analyzed the environmental impacts at Black Fox, 1 and 2, of the following construction activities:

- (b) the acreage from which vegetation will be removed is underestimated; and
- (c) the acreage disturbed is underestimated because it does not include land necessary for the waste water canal, railroad spur and access roads.

We deny Applicant's and the Staff's motion for summary disposition. As the Intervenor points out, there is a controverted issue of material fact because the Applicant initially estimated in the ER that 434 acres of vegetation would be removed during construction but now estimates the acreage to be 596.9, which differs from the Staff's estimate of 591 acres.

Contention 35

Intervenor contends that in order to minimize environmental damage the Applicant and Regulatory Staff should have used a "100-year flood"

rather than a 50-year "standard project flood" in determining where to place the spoils which will result from construction of Black Fox, 1 and 2.

Both Applicant and Staff move for summary disposition. Applicant asserts that mention of a 50-year flood in the ER was "unfortunate" and was not meant to imply that such a flood was the maximum for which account was taken in selecting the spoils placement area. Applicant's assertions are supported by the affidavit of Mr. Guyot. That affidavit indicates that the terrain upstream of the spoils area is such that the spoils will be naturally protected and kept from involvement in any flood, including both 50 and 100-year recurrence floods, provided only that the spoils are deposited below the 550 ft. MSL elevation.

Staff reaches the conclusions, supported by the affidavit of Dr. La France, that the 100-year return flood is only 0.14 ft. higher than the 50-year flood; that neither exceeds 536.94 ft. MSL; and that the spoils stored as they are, would, be out of the flood plain for both floods.

Intervenors question use of the terms "50-year flood" and "50-year standard project flood," but, since their contention asserts that a 100-year flood should be used, we are at a loss to see the relevance of this distinction. Intervenors further suggest that some "other development" might change the situation. This suggestion is so speculative as to preclude serious consideration.

While the Applicant and the Staff seem to have reached their conclusions by rather divergent routes, it is nonetheless apparent that both believe the spoils will not affect or be affected by floods up to and including the 100-year flood. Thus the issue addressed by the contention, *viz.*, whether a 50 or 100-year flood is appropriate, seems not to be in serious dispute. Under these circumstances the Board would normally grant summary disposition; however, in the course of our review of the material submitted, we have noted several seeming discrepancies among certain documents. We will therefore require that these discrepancies be resolved during the forthcoming hearing. The points we wish to have addressed are the following:

1. The Guyot affidavit repeatedly states that the spoils will present no problem if stored "*at or below 550 ft. MSL.*" The La France affidavit assures us that the site is proper because the spoils are stationed *above* the calculated level for the flood. Is the limit properly a minimum level or a maximum level? Are both analyses directed at protection against the same contingency and, if so, exactly what is the contingency?

2. The La France affidavit states that the 50-year return period flood elevation is 536.8 ft. MSL and that the 100-year return period flood elevation is 0.14 ft. higher. The FES, however, at p. 3-9, in a note in Fig. 3.5 lists a 50-year flood at 554 ft. and a 100-year flood at 556 ft. at the intake structure. Since the intake structure is located quite near the spoils area, it seems unlikely that the predicted floods would differ so greatly. Are these the same floods? Would the

possibility of a flood reaching 556 ft. MSL alter Dr. La France's conclusion that "the 100-year return period flood is . . . still . . . below the proposed spoils disposal area?" How would such a flood level alter the environmental impact of the stored spoils?

The motions for summary disposition are granted in part and denied in part and we will hear evidence on this contention to the extent necessary to answer the questions set forth above.

Contention 37

Intervenors contend that the Applicant's preoperational and operational radiation monitoring program is insufficient in that:

- (a) The preoperational monitoring program will not provide an adequate baseline of background radiation because the data utilized is from areas too remote from the site; and
- (b) The operating monitoring program will not adequately measure the concentration and magnification of radiation in the food chain.

Applicant moves for summary disposition and the Staff supports the motion. Applicant asserts that the proposed monitoring program meets or exceeds NRC guidelines and submits the affidavit of Dr. Robinson to indicate the extent of the program. Intervenors assert, without affidavits, that the program should include additional monitoring to comply with Oklahoma State Health Department requirements (said requirements being unstated); that program quality control is not properly specified; that human beings should be monitored; that there are "differences" between the preoperational program and operational programs; that pre-1968 data should be included; and that the equipment is not necessarily suitable to proper detection of certain isotopes. While the Intervenors' assertions leave the Board unconvinced that the Intervenors can show flaws in the program, the Board is nevertheless mindful that guidelines are not regulations, and that such a complex matter as a radiological monitoring program may have facets which might best be tested in an adjudicatory hearing. Accordingly, the motion is denied.

Contention 41

Intervenors contend that the Applicant and Regulatory Staff have not adequately assessed the impact on the aquatic community of the growth retardant which will be utilized for post construction maintenance at the Black Fox, 1 and 2.

The Staff moved for summary disposition but apparently misunderstood the contention. It equated chlorine (a biocide) to a growth retardant and its

deponent, Mr. Vinikour, attested that the total residual chlorine levels would be undetectable when discharged into the Verdigris River and thus would have no deleterious impacts upon the biota. In supporting the Staff's motion, Mr. Morphis, Applicant's Assistant Vice President-Nuclear attested that there will be no use whatsoever of growth-retardent herbicides for postconstruction maintenance. In light of this attestation by Applicant, there is no triable issue of material fact, and the contention is dismissed.

Contentions 43 and 63

Contention 43

Intervenors contend that the Applicant and Regulatory Staff have not adequately analyzed the total energy requirements for the construction, operation and decommissioning of Black Fox, 1 and 2, in that there is not adequate justification for extrapolating the energy requirements for a project the size of Black Fox, 1 and 2, from the model developed by Rombaugh [sic] and Koen.

Contention 63

Intervenors contend that the Applicant and Regulatory Staff have not complied with the National Environmental Policy Act and 10 CFR Part 51 in that by using the model of Rombough and Koen to produce the estimate of overall energy requirements noted in the Environmental Report at p. 5.7-3, they have applied the model inappropriately and have neglected alternative models which could have led to reduced overall energy requirements.

With respect to Contention 43, the Applicant moves for summary disposition and is supported by the Staff. Applicant argues that the model used is the best available; that energy to decommission is small and not readily estimated; and that the model's conservatism and estimated error more than account for any neglected energy requirements.

Intervenors counter that no allowance has been made for energy needed to bring water from an alternate source should present negotiations with the City of Tulsa fail, and that the model also omits energy requirements for regulatory oversight, treatment of irradiated persons, waste disposal, or repairs. Intervenors also note that no allowance is made for variation in plant lifetime or load factor, and that credit has been taken for fuel reprocessing. While the Intervenors have not submitted affidavits or other evidence in support of these assertions, the allegations raise questions which the Board feels should be resolved during the hearing. The motion for summary disposition is denied.

With respect to Contention 63, both the Applicant and Staff move for summary disposition. Applicant raises the same arguments for summary disposition of this contention as for Contention 43. In addition, it notes that use of a model which showed reduced energy requirements would simply tip the balance further in favor of licensing the plant. Staff alleges that there is no regulatory or statutory requirement for analysis of overall energy requirements needed to build a plant, and that it is the Staff's analysis, not the Applicant's which the Board must consider. Thus, the Applicant's model is irrelevant. Staff further notes, citing the affidavit of Mr. Wolsky, that the selection of a model does not affect the actual energy used to construct the plant.

Intervenors assert that the NEPA cost-benefit balance implies a requirement for energy-cost analysis. Further, Intervenors coincidentally clarify the meaning of their contention by saying that a proper analysis would not only show the energy requirements but would point out useful ways to reduce such requirements in practice.

The Board agrees with Applicant that, read as it appears at first sight, the contention would present no real issue, since reduced requirements would favor the plant. But read as the Intervenors intended it, the contention seems to raise a triable issue, *viz.*, whether some model other than that used could not only assess energy requirements but also point the way to reduction of such requirements. The Board does not feel that this point has been adequately addressed in the material submitted. Accordingly, the motion is denied to the extent that we will hear evidence as to whether some alternative model for energy requirements could, by its application, point the way to energy savings in building the plant.

Contentions 44(a) and 44(b)

Contention 44(a)

Intervenors contend that the Regulatory Staff and Applicant have underestimated the operational and maintenance expense in the cost-benefit analysis for Black Fox, 1 and 2, by understating the cost of:

- (a) Purchase power due to down time of Black Fox, 1 and 2;
- (b) Alternative means of producing electricity within Applicant's system due to down time of Black Fox, 1 and 2.

Applicant, supported by the Staff, moves for summary disposition. Applicant alleged that the following is a fact as to which there is no genuine issue to be heard:

- A. The cost of obtaining power from other sources when the Black Fox units are not operating is not an operational or maintenance expense.

Further, in discussing the matter Applicant asserts:

The cost of obtaining power from other sources when the Black Fox units are not operating is not an operational and maintenance expense and is not a cost attributable to Black Fox in the cost-benefit analysis since those costs would be even larger if the units were not built.

Intervenors state that this analysis assumes an unproven relationship between the cost of power from BFS and the cost of power from alternate sources. We agree that no such relationship has been established, and that such an assumption appears to underlie the Applicant's assertions. We will therefore hear evidence on the differential costs incurred when BFS is not operating and on the accounting technique appropriate for including such costs in the cost-benefit balance.

The motion is accordingly denied.

Contention 44(c)

Intervenors contend that the Regulatory Staff and Applicant have underestimated the operational and maintenance expense in the cost-benefit analysis for Black Fox, 1 and 2, by understating the cost of:

(c) Back-fitting (as defined in 10 CFR §50.109) by Regulatory Bodies;

The Intervenors argue that back-fitting is a predictable event, that reasonable, conservative projections could be made based on the back-fitting history, and that Applicant and Staff have underestimated such expenses in the cost-benefit analysis. We grant Applicant's motion for summary disposition, as supported by the Staff. Pursuant to 10 CFR §50.109, back-fitting may be required by the Commission but only after a construction permit has been issued, and thus any estimate of such projected costs would be pure speculation at this time. There being no triable issue of material fact, this portion of this contention is dismissed.

Contention 44(e)

Intervenors contend that the Regulatory Staff and Applicant have underestimated the operational and maintenance expense in the cost benefit analysis for Black Fox, 1 and 2, by understating the cost of:

(e) Maintenance Dredging

Applicant, supported by the Staff, moves for summary disposition. In an affidavit setting forth the bases for his conclusions, Mr. Guyot, Applicant's Project Department Engineer, deposes that (1) neither the river outfall nor the

barge slip will require operational maintenance dredging, (2) the proposed location and design for the river intake minimizes the potential for operational maintenance dredging, and (3) that the estimated cost of such unanticipated maintenance dredging would be a few thousand dollars. The Intervenor do not controvert these facts but insist that the estimated cost for the operational dredging of the river intake be made a matter of record. While the *de minimis* concept is no stranger to regulatory schemes (*Southern California Edison Company, et. al.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-308, 3 NRC 20, 28 n. 9 (1976)), we desire to know the amount of this estimated cost. Accordingly, the motion is granted in part and denied in part, with Applicant only being requested to submit evidence regarding the estimated cost for operational maintenance dredging at the river intake.

Contentions 50(a) and (c)

Intervenor contend that the Regulatory Staff and Applicant have not demonstrated a sufficient need for power to justify construction of Black Fox, 1 and 2, in that:

- a. The projected demand includes sales of firm power to be produced by Black Fox, 1 and 2, to utilities, other than Applicant, outside of Oklahoma; and
- c. The projected demand could be reduced by using cryogenic transmission or storage.

With respect to part a. of this contention, the Staff moves for summary disposition and is supported by the Applicant. There is no triable issue of material fact, and we agree with the Staff that, as a matter of law, there is no basis to the contention that more power is not needed because Applicant's projected demand includes sales of firm power outside Oklahoma. Neither NEPA, nor the Commission's regulations, nor case law require that all energy produced by a proposed nuclear plant be consumed within the state where that plant is located.

With respect to part c. of this contention, the Staff moves for summary disposition and is supported by Applicant. In an affidavit, a Staff witness (Dr. Wolsky) deposes that neither cryogenic transmission nor storage is at present commercially feasible or likely to become so because cryogenic transmission requires the refrigeration of transmission lines, and cryogenic storage requires areas the size of one or two football fields and a magnet or magnets to fill that area. In their submission of April 15, 1977, the Intervenor did not contend that there exists a genuine issue to be heard, and, in fact, did not respond to the Staff's motion.

We grant Staff's motion for summary disposition and dismiss Contentions 50(a) and (c).

Contention 51

Intervenors contend that the Applicant has not demonstrated a sufficient need for power to justify the construction of Black Fox, 1 and 2; *e.g.*, a report published by the United States Corps of Engineers has indicated that there was not a load demand for electricity sufficient to warrant generators being placed in the dam at the Kaw and Oologah Reservoirs.

The Staff moves for summary disposition and is supported by the Applicant. In an affidavit, a Staff witness (Dr. Wolsky) attested that the December 1975 report of the Corps of Engineers, Tulsa District, reflected that the benefit-cost ratio of installing 25 MWe of hydroelectric capacity at Kaw Lake was 2.5:1, and that he concluded that this small capacity hydrogeneration is typically used for peaking or load following and thus that this type of generation selected to meet peaking and load following needs was irrelevant to a choice of a type of generation such as a large nuclear plant like the BFS which would supply the base load. Further, the Staff cited Section 79 of the Water Resources Development Act of 1974 (Pub. L. No. 93-251) which authorized the Chief of Engineers to reassign the storage provided in the Oologah Reservoir for hydroelectric power production to municipal and industrial water supply. The Staff argues that, since the Kaw Reservoir had only a small generating capacity and since Congress had precluded the use of the Oologah Reservoir for hydrogeneration, the existence or nonexistence of hydroelectric power at these two reservoirs was irrelevant to the question of need for power in the instant case.

The Intervenors fail to respond to Staff's arguments and merely state that the question of need is much broader. Since the Intervenors fail to join issue, we grant the motion and dismiss the contention.

II. BOARD QUESTIONS

1. What are the details in the water supply contract between Applicant and the City of Tulsa? (A copy of said contract should be offered into evidence.) How does the effectuation of the contract affect Tulsa's future water supply?

2. In light of the U.S. Corps of Engineers' letter appearing at page A-110 of the FES, which raises questions about the low flow of water in the Verdigris River, what is the probability that the BFS will have to be shut down because of lack of water flow during an extended drought?

3. What features have been incorporated into the waste water holding pond design to prevent the pond from stratifying and thus reducing the residence time for the blowdown?

4. Figure 3.5 at page 3-9 of the FES does not seem to agree either with the

description of the intake system presented at page 3-8 or with the figure from which it is allegedly drawn (ER Fig. 3.4.3). Is this figure out of date?

5. What is the predetermined level adverted to in the last sentence of Section 3.5.2 of the FES?

6. What is the value which should appear in footnote a. of Table 3.5 of the FES (page 3-17) for the nuclide C-14?

7. Referring to Section 3.6.1.1 of the FES, what would be the impact on the environment if the colloidal material does not settle out as expected?

8. Have the Applicant and the Staff agreed upon measures to control erosion in transmission rights-of-way (see Section 4.1.3 of the FES)?

9. Has the Applicant agreed to have the proposed transmission routing inspected by a qualified biologist as indicated in Section 4.1.3 of the FES?

10. Have the Applicant and Staff resolved the bank and spoils deposit area erosion questions indicated in Section 4.3.2.2 of the FES?

11. What is the position of the State of Oklahoma with regard to the ability of BFS to meet the state's thermal water quality standards under the anomalous conditions stated at the bottom of page 5-6 of the FES?

12. What is the position of the State of Oklahoma regarding the ability of BFS to meet the State's chemical discharge standards and/or guidelines re: sulfates and trace elements (see Section 5.5.1.1 of the FES)?

13. Can the Staff give some justification for the assumed similarity between chemical and thermal plumes mentioned at page 5-35 of the FES? (It seems to the Board that there could be cases when no thermal plume existed (discharge at river temperatures) but an extensive chemical plume would nonetheless be present). Is your assumption always conservative?

14. Have the values in Table 5.16 at page 5-39 been changed since the issuance of the FES?

15. Does Applicant plan to follow the alternative route in the western study area as recommended by the Staff in Section 9.2.4 of the FES?

16. Has the Staff formalized its methods of implementing EPA's Drinking Water Regulations for Radionuclides, and, if so, what are they (see Section 11.1.5.22 of the FES)?

17. Has Staff resolved whether certain materials added for corrosion inhibition (including zinc, chromium and phosphorus) will be discharged at levels in excess of EPA's new source standards (see pages A-99, A-101 and A-103 of the FES)?

18. What remedial actions would serve to limit the doses in the case of a Class 3.3 accident listed in Table 7.2 for people downstream from BFS through the liquid pathway? What range of doses would be expected through this liquid pathway for such accidents if no remedial actions were taken (see page A-103 of the FES)?

Dr. Purdom concurs but was not available to sign the instant Order.

IT IS SO ORDERED.

**THE ATOMIC SAFETY AND
LICENSING BOARD**

Frederick J. Shon, Member

**Sheldon J. Wolfe, Esquire
Chairman**

**Dated at Bethesda, Maryland,
this 20th day of July 1977.**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Frederic J. Coufal, Chairman
Dr. Walter H. Jordan
Dr. Donald P. deSylva

In the Matter of

Docket Nos. STN 50-491

50-492

DUKE POWER COMPANY

50-493

(Cherokee Nuclear Station,
Units 1, 2 and 3)

July 26, 1977

Upon request by applicant for a limited work authorization pursuant to 10 CFR §50.10(e)(3)(i) (LWA-2), Licensing Board convened evidentiary hearing to consider the LWA-2 request, reconsider the need for certain monitoring stations previously required, and consider the health effects of alternative fuels and the effect of revised Table S-3 on the cost-benefit balance previously struck.

LWA-2 request granted in part and denied in part; condition requiring certain monitoring stations deleted; health effects of alternative fuels and revised Table S-3 found not to tip the cost-benefit balance.

LWA: SCOPE

10 CFR §50.10(e)(3)(i), which permits the Director of Nuclear Reactor Regulation to authorize applicants to undertake certain work subject to the provisions of 10 CFR Part 50, Appendix B, once a Licensing Board has made the required findings, permits only work done below grade.

SUPPLEMENTAL PARTIAL INITIAL DECISION

Appearances

J. Michael McGarry, Esq., Debevoise and Liberman, 700 Shoreham Building, 806 Fifteenth Street, N.W., Washington, DC 20005, and William L. Porter, Esq., Associate General Counsel, Duke Power Company, 422 South Church

Street, Charlotte, NC 28242, for the Applicant, Duke Power Company

M. Richbourg Roberson, Attorney General's Office, P. O. Box 11549, Columbia, SC 29211, for the State of South Carolina

Charles A. Barth, Esq., Office of the Executive Legal Director, Washington, DC 20555, for the Staff, U. S. Nuclear Regulatory Commission

I. INTRODUCTION AND BACKGROUND

1. The Duke Power Company (the Applicant) is the holder of a Limited Work Authorization (LWA-1) dated May 28, 1976, relating to a construction site located on a 1560-acre site adjacent to the Broad River in the eastern portion of Cherokee County, South Carolina.

2. Under 10 CFR §50.10(e)(3)(i), the Director of Nuclear Reactor Regulation may authorize, in addition to those activities allowed under an LWA-1, the installation of structural foundations, including any necessary subsurface preparation, for structures, systems, and components which are subject to the provisions of Appendix B to Part 50. Such authorization may be granted only after the Board, in addition to making the findings and determinations required by 10 CFR §50.10(e)(2), has also determined that there are no unresolved safety issues relating to the proposed activities that would constitute good cause for withholding authorization. Such an authorization is known as an LWA-2.

3. By letter dated November 12, 1976, the Applicant sought authority for certain activities under an LWA-2.¹ The requested activities involve:

- a. Final foundation preparation and inspection and fill placement, compaction, and testing for the Nuclear Service Water (NSW) Pond Dam. This work includes all activities required to prepare and map geologically the foundation and to place all materials required to complete the dam.
- b. All work required to construct the NSW Pond Spillway and discharge channel. These activities include all necessary earth and rock excavation, final foundation preparation and inspection, installation of drain

¹ This letter is contained in the hearing transcript as Attachment A to the prepared testimony of L. C. Dail (following Tr. p. 645; hereafter known as "Dail Testimony").

systems, construction of the concrete structure, and the placement and testing of backfill materials.

- c. Work required to install the NSW pipe in the yard. These activities include the necessary excavation, installation of pipe, and backfilling around all installed pipe for the buried portion of the NSW system.
- d. Work required to construct the NSW intake structure. These activities include the necessary earth excavation, final foundation preparation and inspection, and construction of the concrete structures.

A list of appropriate PSAR references associated with such work has been provided by Applicant (Dail Testimony, Attachment B).

4. Some work activity associated with the above items is subject to the Quality Assurance provisions of Appendix B to 10 CFR Part 50 and is subject to the provisions of Section 50.10(e)(3).

5. On April 26 and 27, 1977, public hearings were held in Gaffney, South Carolina, to consider the Applicant's LWA-2 request. In addition to testimony on the LWA-2, evidence was presented with respect to the need for retaining aquatic monitoring Stations 19 and 20, Table S-3 of 10 CFR Part 51, the health effects associated with nuclear and coal-fired generation, and flow of water through Ninety-Nine Islands Dam.

II. LWA-2

6. The Staff, at the time of the hearing, posed no opposition to two of the items requested by Applicant set out on page 192, *supra*. These were the intake structure to be located at the bottom of the Nuclear Service Water Pond (NSW) and the excavation and lining of the NSW spillway and discharge channel. Two items were opposed: the NSW pipe and that part of the NSW dam which is designed to be above-grade. Following the hearing, Staff's opposition to the NSW pipe was withdrawn (Staff motion dated May 27, 1977, and attached affidavit). We perceive no reason of safety or environmental significance to question the Staff's position on the three uncontested items. We must, however, resolve the difference between Applicant and Staff relative to the above-grade portion of the NSW dam.

7. Applicant believes that the above-grade portions of the dam should be authorized for two principal reasons: (1) since the dam is to be constructed of material excavated for the foundations of other structures, it is more efficient to move the material immediately from the excavation to the dam location; and (2) it is more difficult to obtain a good bond of the dam material if part is built and allowed to weather before the balance is added. Staff does not disagree with this

engineering view but contends that the regulations applicable to the authorization of an LWA-2 do not permit above-grade construction.

8. The regulation provides in part that an LWA-2 may authorize "installation of structural foundations, including any necessary subsurface preparation, for structures, systems and components . . ." which are safety-related (10 CFR §50.10(e)(3)(i)). The statement of considerations issued by the Commission at the time of the adoption of the regulation (39 FR 14506) advised that the then new provision was an authorization for the "excavation for safety-related structures . . ." but not their installation.

9. Applicant argues that the regulation relates only to "power block" structures and that the regulation is ambiguous enough to permit the interpretation it urges.

10. We must agree with Staff. The regulation, which seems clear enough on its face, and the explanation of it made on its adoption preclude an interpretation that would permit any but subsurface work on safety-related structures. That work above the surface is permitted under an LWA-1 does not support the Applicant's interpretation. The Commission distinguished between nonsafety-related construction and safety-related construction and chose to limit the latter to work done below-grade. We are not free to ignore that distinction.

11. At the time the hearing began, the parties had not resolved all the safety issues (Tr. 719). Before the conclusion of the hearing, however, the Applicant had made commitments to meet the demands of the Staff related to safety issues and so announced (Tr. 749). Thus, there are now no unresolved safety issues.

III. MONITORING STATIONS 19 AND 20

12. In the May 21, 1976, PID, the Board imposed a condition that Applicant continue preoperational sampling at its Stations 19 and 20 (p. 30). Both Staff and Applicant have asked this Board to reconsider this condition.

13. In an Order dated June 23, 1976, the Board agreed to reconsider the matter and requested that the record should be expanded to contain the information on which the parties concluded that the stations were no longer needed.

14. On July 7, 1976, Staff submitted Exhibit 13, Affidavit of Benjamin R. Parkhurst, which concluded that Stations 19 and 20 were at such distances from the plant (20 and 35 miles, respectively) that any impact on these stations would be undetectable because of the dampening effects of distance, changes in river habitat, and inflows of tributaries, plus a downstream hydroelectric dam. (See June 8, 1976, Affidavit of Benjamin R. Parkhurst, p. 3.)

15. On July 9, 1976, Applicant submitted evidence which explained that Stations 19 and 20 were originally chosen because of their accessibility to nearby highway crossings. There are very few access points to the Broad River below Cherokee and sampling in the river is difficult. (See July 8, 1976, Af-

fidavit of L. C. Dail, pp. 5-6.) After nine months of sampling, Stations 19 and 20 were terminated in favor of establishing other stations in the immediate vicinity of the Cherokee site. (See July 8, 1976, Affidavit of L. C. Dail, pp. 5-6.)

16. On December 14, 1976, the Board issued an Order seeking further evidence on the matter.

17. On January 13, 1977, further hearings were held and exhaustive evidence was presented with regard to thermal and chemical effects downstream in the vicinity of monitoring Stations 19 and 20 (Tr. 487-588). However, as the Board stated in its March 17, 1977, Amendment of the Partial Initial Decision, Applicant's testimony reflected a change in the number of cycles of cooling tower operation prior to blowdown, thereby affecting the concentrations of total residual chlorine to be emitted to the Broad River. In addition, the data showed that the flow of water through the Ninety-Nine Islands Dam, immediately upstream of the Cherokee discharge, would be a minimum of 60 cfs rather than 40 cfs as assumed in previous calculations (p. 5). On the basis of this new information, the Board stated that it would proceed no further until the Staff had completed its evaluation of these new data (p. 6).

18. On March 17, 1977, Applicant submitted information to the effect that the new data did not affect prior commitments made to the Staff² nor did they serve as a basis for continued monitoring at Stations 19 and 20. (See Affidavit of L. C. Dail following Tr. 619.)

19. The Staff presented testimony at the April 1977 hearing which concurred with Applicant's presentation that monitoring Stations 19 and 20 were not necessary, taking into consideration the revised flow figures of Applicant. (See Testimony of B. R. Parkhurst following Tr. 612.) The Staff also testified that the levels of chlorine and heat to be introduced into the Broad River by virtue of Applicant's revised data were not a significant departure from previous conditions and accordingly did not affect the Staff's position (Tr. 621-622).

20. On the basis of this information and the responses the Board received to its questions at the January and April 1977 hearings, the Board finds that there is no need to continue monitoring at Stations 19 and 20 because the art of ecological monitoring at its current state is not capable of detecting relatively

²Applicant had previously agreed to hold its chlorinated blowdown until the total residual chlorine ("TRC") concentration at the end of the discharge pipe into the Broad River had decayed to 0.2 mg/l (Tr. 231). The NRC Staff indicated their acceptance of this commitment based upon their opinion that a TRC concentration of 0.04 mg/l after mixing would be adequate for environmental protection (Tr. 231, 557). Applicant's March 17, 1977, submission describes the measures to be taken to assure that TRC concentration in the river will be no greater than 0.04 mg/l. This assurance contemplates downstream water releases, as necessary. The Board finds these measures to be acceptable.

small changes in community or population structure or function. (See Testimony of B. R. Parkhurst following Tr. 612, p. 2.)

21. The Board does find, however, that because of the occasional low flow of water below Ninety-Nine Islands Dam, which is the only water available to carry away the blowdown discharge, a condition should be added to any license or permit relative to maintenance of a concentration of total residual chlorine in the river after mixing (Tr. 616 *et seq.*). This condition is set out in paragraph 32 hereof.

IV. HEALTH EFFECTS

22. The Appeal Board in its Hartsville decision (ALAB-367, 5 NRC 92 (January 25, 1977)) stated that the health effects from alternative fuel cycles must be considered in striking a balance. In conformance with the Appeal Board's decision, both Applicant and Staff presented testimony regarding the health effects associated with nuclear and coal-fired generation. (Lionel Lewis following Tr. 738 and R. L. Gotchy following Tr. 739.)

23. In conformance with 10 CFR §51.20(e), Applicant limited its consideration to the health effects of operating the Cherokee Nuclear Station as compared to a coal-fired station of the same power.

24. Staff's witness Gotchy addressed the health effects of the uranium cycle as required by the Appeal Board and compared them to the health effects of an equivalent coal cycle. In attempting to stay within the constraints of 10 CFR §51.20(e), some effects were relegated to footnotes (*i.e.*, radon from mining), while other effects (*i.e.*, fuel processing) were said to be not adequately known but believed to be small. Although Staff's witness was faced with large uncertainties in both cycles, he concluded that the health effects from the uranium fuel cycle would be much less than from an equivalent coal cycle.

25. The Board has no reason to disagree with Dr. Gotchy's testimony and concludes that the additional evidence, over and above that presented in the FES, does not change the cost-benefit balance.

V. TABLE S-3

26. At the time of the preparation of the FES and during the hearing leading to the PID authorizing the LWA-1, the environmental costs ascribed to the uranium fuel cycle were as defined in Table S-3, following 10 CFR §51.20. The Board in that PID concluded that the costs of the project were outweighed by its benefits and authorized an LWA-1 (PID, p. 62 *et seq.*). Since that time the Commission has adopted another Table S-3, described as an interim rule (42 Fed. Reg. 13803, March 14, 1977), which changes in some respects the costs of the uranium fuel cycle. The effects of this new rule were assessed by Staff

(Gilbert Affidavit p. 6, following Tr. 743) and from that assessment we find that the effects of the "new" over the "old" Table S-3 are so small that there is no significant change in the environmental costs of the uranium fuel cycle, and that the effects of the "new" table do not tip the cost-benefit balance previously assessed.

VI. CONCLUSIONS

27. There are no unresolved safety issues relating to any of the limited work activities requested by the Applicant which are subject to Appendix B to 10 CFR Part 50 which would constitute good cause for withholding authorization of such activity.

28. The Board finds that 10 CFR §50.10(e)(3)(i) allows only the placing of structural foundations and that we cannot find that the entire NSW dam can be considered a structural foundation. Accordingly, we conclude that under an LWA-2 the Applicant may place foundations for the dam to the ground level but not above.

29. The Board has determined that, based upon the difficulty and expense of maintaining Stations 19 and 20 and the fact that more ideally situated monitoring stations exist, there is no need to maintain monitoring Stations 19 and 20.

30. The Board, after considering the health effects associated with coal generation, has concluded that the cost-benefit balance previously struck is not tilted in favor of the coal alternative.

31. The Board has determined that the impacts associated with the revised Table S-3 to 10 CFR §51.20 are so insignificant as not to tip the cost-benefit balance previously struck.

32. Any license or permit issued by the Commission to the Applicant shall be subject to the following condition: Applicant shall maintain a flow of water through the Ninety-Nine Island Dam immediately upstream of the Cherokee Nuclear blowdown discharge so that the total residual chlorine concentration in the river after mixing will never be greater than 0.04 mg/l. This condition is in addition to the condition stated in paragraph 115 (iii) set out on page 651 of the Partial Initial Decision dated May 21, 1976 (LBP-76-18, 3 NRC 627 at 651).

33. The Board concludes that the action to be taken at this time is the issuance of this Supplemental Partial Initial Decision, which incorporates by reference the Partial Initial Decision and the Amendment thereto, so as to address all environmental issues and certain specified health and safety issues, recognizing that such action will permit the Director of Nuclear Reactor Regulation to issue a Limited Work Authorization authorizing in total items 2, 3, and 4. The Applicant should be authorized to construct only that part of the dam below and at the original ground level.

VII. ORDER

Based upon the Board's Findings and Conclusions, IT IS ORDERED THAT: The Affidavit of Calvin W. Moon sworn May 25, 1977, is marked as Staff Ex. 15 and is received;

This Supplemental Partial Initial Decision shall constitute a portion of the Initial Decision to be issued upon completion of the radiological health and safety phase of this proceeding; and

In accordance with Sections 2.754, 2.760, 2.762 and 2.764(a) of the Commission's Rules of Practice, 10 CFR Part 2, this Supplemental Partial Initial Decision shall be effective immediately and shall constitute the final action of the Commission thirty (30) days after the date of issuance hereof, subject to any review pursuant to the Rules of Practice. Exceptions to this Supplemental Partial Initial Decision may be filed by any party within seven (7) days after service of this Supplemental Partial Initial Decision. A brief in support of the exceptions shall be filed within fifteen (15) days thereafter, twenty (20) days in the case of the Regulatory Staff. Within fifteen (15) days after service of the brief of appellant (twenty (20) days in the case of the Regulatory Staff), any other party may file a brief in support of, or in opposition to, the exception.

IT IS SO ORDERED.

THE ATOMIC SAFETY AND LICENSING BOARD

Dr. Walter H. Jordan, Member

Dr. Donald P. deSylva, Member

Frederic J. Coufal, Chairman

Dated at Bethesda, Maryland,
this 26th day of July 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Jerome E. Sharfman, Chairman
Richard S. Salzman
Dr. W. Reed Johnson

In the Matter of

Docket No. 50-564

EXXON NUCLEAR COMPANY, INC.

(Nuclear Fuel Recovery and
Recycling Center)

August 3, 1977

Upon consideration of a certified question from the Licensing Board, the Appeal Board concludes that the Commission's Mixed Oxide Fuel Order of May 3, 1977, (42 FR 22964) does not require that proceedings on the application for a permit to construct the Nuclear Fuel Recovery and Recycling Center remain in suspension pending the Commission's assessment of the impact of the President's April 7, 1977, "Statement on Nuclear Power Policy" upon the Commission's "Policy Statement on Mixed Oxide Fuel" of November 11, 1975 (40 FR 53056, as modified at 40 FR 59497).

Certified question answered in the negative. Licensing Board instructed to resume regular proceedings on application, up to but not including authorizing issuance of a construction permit.

RULES OF PRACTICE: AUTHORITY OF APPEAL BOARD

Pending formulation by Congress and the Executive Branch of a new national policy on reprocessing and alternative fuel cycles, the Appeal Board acts solely as the Commission's delegate and must look to the Commission for policy guidance.

CONSTRUCTION PERMIT HEARINGS: CONTINUATION PENDING POSSIBLE POLICY CHANGE

Resumption of proceedings presently in the discovery stage will not preclude adaptation to possible reformulated policy and criteria for reprocessing

and fuel storage facilities, particularly as applicant's proposed facility could have many uses.

CONSTRUCTION PERMIT HEARINGS: CONTINUATION PENDING POSSIBLE POLICY CHANGE

The Commission could properly choose to continue "recycle-related license applications" when it suspended the Generic Environmental Statement—Mixed Oxide Fuel (GESMO) hearings; the Court of Appeals held in *Natural Resources Defense Council v. NRC*, 539 F.2d 824 (2d Cir. 1976), that hearings could continue although licensing must be held in abeyance. Since the Commission knew about pending adjudicatory proceedings when it suspended the GESMO hearings but failed to suspend such proceedings, it can be inferred that it wanted them to continue.

Mr. Edward L. Cohen, Washington, D.C., for the applicant,
Exxon Nuclear Company, Inc.

Messrs. David S. Fleischaker and Anthony Z. Roisman,
Washington, D.C., for the Friends of the Earth.

Mr. Myron Karman for the Nuclear Regulatory Commission
staff.

MEMORANDUM AND ORDER

We have before us a certified question which, in essence, asks whether the Licensing Board's suspension of proceedings on the application of Exxon Nuclear Company ("Exxon") for a permit to construct the Nuclear Fuel Recovery and Recycling Center ("NFRRC") should remain in effect pending decision by the Commission on what direction to take in its rulemaking proceeding on the use of mixed oxide fuel. For the reasons which follow, we answer the question in the negative.

I

1. On February 10, 1977, the Commission noticed a hearing before a Licensing Board on the application in question.¹ That Board held a special prehearing conference on April 28, 1977. At that conference, the Board deferred action on pending petitions to intervene of two parties, one of which was

¹ 42 Fed. Reg. 8439.

Friends of the Earth ("FOE"). Instead, the Board granted FOE's request for leave to file an amended motion seeking suspension of the proceedings. Such a motion was indeed filed and its grant is the genesis of the certified question at bar.

"The NFRRC is designed to receive, store and process irradiated fuels discharged from light-water nuclear power reactors, recovering uranium and plutonium in chemical forms compatible with reuse in nuclear fuels."² It includes a fuel storage facility capable of holding 3500 metric tons of spent fuel, which is expandable to accommodate 7000 metric tons.³ The storage portion is scheduled for completion and startup in the 1980-82 period.⁴ The fuel reprocessing portion is scheduled to be ready for operation some time between 1984 and 1986.⁵

2. On November 11, 1975, the Commission issued a statement setting out the course it would follow in a major rulemaking proceeding to decide whether it should permit widescale use of mixed oxide fuel in power reactors, along with the necessary recycling of spent fuel (the "GESMO" proceeding).⁶ The Commission's statement indicated that all aspects of the final environmental statement (a monumental work) would be completed in mid-1976 and that its completion would be followed by quasi-legislative hearings at which the public would be able to participate. The statement also announced the Commission's determination that, while these lengthy rulemaking procedures were taking place, the Commission would allow consideration, on a case-by-case basis, of the licensing of "fuel recycle related activities (other than reactor construction and operation), such as commercial nuclear fuel reprocessing and mixed oxide fuel fabrication . . ."⁷ Whether or not a license would issue would be decided in each case "on the basis of consideration and balancing" of these factors:

(1) Whether the activity can be justified, from a NEPA cost-benefit standpoint, without placing primary reliance on an anticipated favorable Commission decision on wide-scale use of mixed oxide fuel;

(2) Whether the activity would give rise to an irreversible and irretrievable commitment of resources that would unjustifiably foreclose for the activity substantial safeguards alternatives that may result from the decision on wide-scale use; and

(3) The effect of delay in the conduct of the activity on overall public interest.⁸

² Applicant's Environmental Report, p. 1.1-1.

³ *Id.* at p. 1.3-3.

⁴ *Id.* at p. 1.1-1.

⁵ *Ibid.*

⁶ 40 Fed. Reg. 53056 (November 14, 1975), modified at 40 Fed. Reg. 59497 (December 24, 1975). GESMO is an acronym for Generic Environmental Statement-Mixed Oxide Fuel.

⁷ *Id.* at 53062.

⁸ *Ibid.*

The licensing proceeding at bar was being conducted pursuant to the November 11, 1975, statement.

3. In 1976, in a suit challenging the November 11, 1975, statement, a Court of Appeals held, based on its construction of the National Environmental Policy Act, that "the Commission may not grant or deny applications for commercial licenses to construct or operate plutonium-related separation or reprocessing facilities . . . until the GESMO and the GESMO supplement have been issued in final form and until the Commission has made its final decision on wide-scale use of mixed oxide fuel." *Natural Resources Defense Council v. NRC*, 539 F.2d 824, 845-46 (2d Cir.). However, the Court also said (*id.* at 845):

We do not conclude that the Commission must refrain from all action until the final decision on GESMO; rather, the Commission can process license applications, rule on the scope of hearings and applications for intervention, and even proceed to hold individual hearings to gather relevant data on individual site factors. All this may be undertaken before the final decision on wide-scale use

The Supreme Court has granted *certiorari* to review *NRDC v. NRC*,⁹ but its decision is still some time in the offing.

4. In August 1976, the Commission issued a final environmental statement ("FES") in GESMO dealing with the health, safety and environmental impacts of wide-scale use of mixed oxide fuel. (A supplement dealing with problems connected with safeguards and also with the overall cost-benefit balance is to follow.) Meanwhile, a hearing board was appointed for the purpose of eliciting public comments on the FES and conducting public hearings on the GESMO FES.¹⁰ On April 7, 1977, while that process was still in its relatively early stages, the President issued a statement on nuclear power policy. Most importantly for our purposes, he said:

[W]e will defer indefinitely the commercial reprocessing and recycling of the plutonium produced in the U.S. nuclear power programs. From our own experience we have concluded that a viable and economic nuclear power program can be sustained without such reprocessing and recycling.

He also announced a slowdown and restructuring of the breeder reactor program to give priority to alternative designs, along with accelerated "research into alternative nuclear fuel cycles"

On April 12, 1977, the GESMO hearing board, without explanation, postponed both a prehearing conference and the commencement of hearings until further notice. On May 3, 1977, the Commission issued an order in the GESMO

⁹ 51 L. Ed. 2d 791 (March 28, 1977).

¹⁰ 41 Fed. Reg. 31621 (July 29, 1976).

proceeding announcing that it "intends to assess the impact of the President's statement on the entire November 11, 1975, policy statement" and that the "further notice" promised by the hearing board would be issued by the Commission itself after the assessment is made.¹¹ The order stated that "the future course and scope of GESMO, the review of recycle-related license applications, and the matter of interim licensing will all be among the topics subject to Commission scrutiny."¹² It also invited the Executive Branch of the Government to submit its views in a public filing. That filing has not as yet been made. It is too early to predict when the Commission will complete that assessment.

5. FOE moved to suspend the proceeding on Exxon's application one day before the Commission issued the May 3rd order alluded to above. The motion sought that suspension in light of the President's April 7th statement and the GESMO hearing board's April 12th suspension order. On May 27, 1977, the Licensing Board granted the motion and suspended the proceedings pending determination of the following certified question:

In light of the Commission's Mixed Oxide Fuel Order of May 3, 1977, should the instant proceedings remain in suspension pending the Commission's assessment of the impact of the President's "Statement on Nuclear Power Policy" issued on April 7, 1977, upon the Commission's "Policy Statement on Mixed Oxide Fuel" of November 11, 1975 (40 Fed. Reg. 53056)?

At our request,¹³ the Board below supplemented its certification order by summarizing the posture of the litigation, outlining the respective parties' positions and stating its own views about disposition of the certified question.¹⁴ We then accepted the certification and invited the parties to brief us on the question.¹⁵ Exxon (the applicant) urged that we answer the certified question in the negative and allow the proceeding to continue. FOE and the staff took the opposite view; they would have us delay the proceeding pending some further instruction from the Commission.

II

The Board below suspended proceedings not because it thought it impermissible to continue, but out of an abundance of caution stemming from a desire to

¹¹ 42 Fed. Reg. 22964 (May 5, 1977).

¹² *Ibid.*

¹³ Authority to decide questions certified to the Commission by a licensing board pursuant to 10 CFR § 2.718(i) has been delegated to us. 10 CFR § 2.785(b)(1).

¹⁴ LBP-77-38, 5 NRC 1447 (June 17, 1977).

¹⁵ Order of June 23, 1977 (unpublished). We also declined to accede to applicant's suggestion that the question be further certified to the Commission without an intervening expression of our own views on the matter. Order of July 6, 1977 (unpublished).

avoid conflict with Commission policy. On the merits, however, the Board made clear its own judgment that (5 NRC at 1451):

[b]ecause of our statutory obligations, because we are in place to proceed expeditiously, and because it would be in the public interest to have a timely rendered initial decision in the event the Commission's assessment does not substantially affect our review of the application, we believe that the suspension should be lifted and that this Board should be directed to proceed up to the point of licensing if we ultimately decide that the construction permit should be issued.

We agree with that assessment of the situation.

It is true that national policy on reprocessing and alternative fuel cycles is under reconsideration in Congress and in the Executive Branch. But no new policy has yet been formulated. In the interim, we must look to the Commission for guidance, for we act here solely as its delegate. The Commission itself is, as noted, also reassessing its policies in this area and is well aware of the similar activities elsewhere in the government.

The Commission's reassessment of its course in GESMO could, to be sure, result in a decision to suspend proceedings on all applications to license reprocessing and fuel storage facilities. But the opposite result is equally possible. It is to be recalled that a facility of the type Exxon seeks permission to build has many uses, some of which would further the national interest whatever the outcome of that reassessment. To give but one such example, the facility could serve as a spent fuel repository, of which there is a present shortage. Thus, if the licensing proceeding is allowed to continue, important options may be available earlier than if it is halted pending the formulation of new policy. Moreover, the proceeding is still in its incipient stages and discovery is the main activity at hand. Its resumption, therefore, would not foreclose its later adaptation to consideration of new criteria or its looking in any new directions that the Commission may prescribe.

Perhaps even more important, the Commission was aware that "recycle-related license applications" were pending when it issued its May 3rd order.¹⁶ Nevertheless, it deliberately chose not to interrupt proceedings on such applications when it suspended the GESMO hearings. That judgment was one the Commission could quite properly make, the Court of Appeals in *NRDC v. NRC* having expressly stated that hearings could continue and only licensing need be held in abeyance.¹⁷ The Commission's judgment in this regard must be respected.

¹⁶ We know that because it mentions them in that order, saying that the assessment will deal with their future course and scope.

¹⁷ See p. 202, *supra*.

For all the foregoing reasons we answer “no” to the certified question and, accordingly, instruct the Licensing Board to resume regular proceedings on Exxon’s application forthwith but not to the point of authorizing issuance of a construction permit. That action remains foreclosed under *NRDC v. NRC, supra*.¹⁸

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

¹⁸ FOE also complains that it will suffer unnecessary litigation expense if the suspension is lifted and the Commission eventually terminates the proceeding. Regrettably, this is a risk a litigant often runs and is part of the price of protecting one’s interest. On balance, we think the public interest is moving the proceeding forward outweighs FOE’s private interest in delay.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARDS*

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Dr. Lawrence R. Quarles
Michael C. Farrar
Richard S. Salzman
Dr. W. Reed Johnson
Jerome E. Sharfman

In the Matter of

PUBLIC SERVICE ELECTRIC & GAS COMPANY (Salem Nuclear Generating Station, Units 1 and 2)	Docket Nos. 50-272 50-311
PHILADELPHIA ELECTRIC COMPANY (Peach Bottom Atomic Power Station, Units 2 and 3)	Docket Nos. 50-277 50-278
METROPOLITAN EDISON COMPANY, et al. (Three Mile Island Nuclear Station, Units 1 and 2)	Docket Nos. 50-289 50-320
DUQUESNE LIGHT COMPANY, et al. (Beaver Valley Power Station, Units 1 and 2)	Docket Nos. 50-334 50-412
PHILADELPHIA ELECTRIC COMPANY (Limerick Generating Station, Units 1 and 2)	Docket Nos. 50-352 50-353

*Every Appeal Panel Member is on one or more of the Boards hearing the captioned proceedings; their collective designation is simply a convenience in issuing this joint order.

PUBLIC SERVICE ELECTRIC AND GAS COMPANY	Docket Nos. 50-354 50-355
ATLANTIC CITY ELECTRIC COMPANY (Hope Creek Generating Station, Units 1 and 2)	
PENNSYLVANIA POWER AND LIGHT COMPANY (Susquehanna Steam Electric Station, Units 1 and 2)	Docket Nos. 50-387 50-388
DUKE POWER COMPANY (Catawba Nuclear Station, Units 1 and 2)	Docket Nos. 50-413 50-414
GEORGIA POWER COMPANY (Alvin W. Vogtle Nuclear Plant, Units 1 and 2)	Docket Nos. 50-424 50-425
UNION ELECTRIC COMPANY (Callaway Plant, Units 1 and 2)	Docket Nos. STN 50-483 STN 50-486
TENNESSEE VALLEY AUTHORITY (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B)	Docket Nos. 50-518 50-519 50-520 50-521

August 8, 1977

Upon consideration of the impact of the Commission's newly promulgated interim fuel cycle rule (42 FR 13803) on the environmental cost-benefit balances previously struck for 11 facilities for which uranium fuel cycle questions were pending, the respective Appeal Boards conclude that none of the balances is sufficiently affected by the addition of the quantified values set forth in Table S-3 of the interim rule so as to warrant abandonment of the project in question.

NEPA: COST-BENEFIT BALANCE

With reference to facilities "either fully constructed and operational or well along the road to completion," the numerical values assigned in revised Table S-3 for the spent fuel reprocessing and waste disposal phases of the fuel cycle are not

weighty enough to have any operative significance on the established environmental cost-benefit balances.

NEPA: COST-BENEFIT BALANCE

The addition of the quantified values contained in Table S-3 of the interim fuel cycle rule could not have a decisive impact on facilities still in the incipient stage of construction where the environmental cost-benefit balance for those facilities is not sufficiently close to "virtual equipoise." *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33 (July 26, 1977).

TECHNICAL ISSUE DISCUSSED: Interim fuel cycle rule (numerical values for spent fuel reprocessing and waste disposal phases).

MEMORANDUM AND ORDER

By its order of April 1, 1977,¹ the Commission directed us to determine the impact of its just promulgated interim uranium fuel cycle rule² on the environmental cost-benefit balances which had been struck for each of ten nuclear facilities specified in that order. As the first step in the carrying out of that direction, we entered our own order three weeks later³ in which, *inter alia*, we announced that we would entertain further submissions by a party or parties with respect to any of those ten facilities or three other facilities which still had uranium fuel cycle questions pending before us. The submissions were to "be confined in scope to an assignment of reasons why, in light of the interim rule, the cost-benefit balance for the facility or unit in question tips, or might tip, in favor of abandonment of the facility." 5 NRC at 765.

In response to this invitation, an intervenor in two of the thirteen proceedings filed a memorandum in which it urged, *inter alia*, that the application of the interim rule would tip the cost-benefit balance against both of the facilities there involved.⁴ This memorandum and the responsive memoranda of other parties were considered by the appeal boards assigned to those two proceedings. Each board rejected the intervenor's assertion. *Vermont Yankee Nuclear Power Corp.*

¹ CLI-77-10, 5 NRC 717.

² The interim rule issued on March 14, 1977. 42 Fed. Reg. 13803.

³ ALAB-392, 5 NRC 759 (April 21, 1977).

⁴ An intervenor in a third proceeding also filed a memorandum in response to ALAB-392. We discuss it later in this opinion, *infra*, fn. 8.

In addition, the staff and licensees filed papers setting forth their views on certain questions relating to the application of the interim rule which had been posed in ALAB-392 on behalf of some Appeal Panel members.

(Vermont Yankee Nuclear Power Station), ALAB-421, 6 NRC 25, 28-30 (July 18, 1977); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33, 102-104, 113-114 (July 26, 1977).⁵

What still remains for consideration is the effect of the interim rule (and, more particularly, the numerical values assigned in revised Table S-3 for the spent fuel reprocessing and waste disposal phases of the fuel cycle) upon the cost-benefit balances for the other eleven facilities. On the basis of the analysis of the interim rule contained in *Seabrook*, ALAB-422, *supra*—an analysis which is accepted by all members of the Appeal Panel—we conclude that the balance for none of those facilities is tipped by the placement of fuel cycle environmental impacts on the scale.⁶

We need not rehearse the entire discussion on the point contained in ALAB-422. It suffices for present purposes to repeat the conclusion there reached: “the effects assigned by the interim rule to the uranium fuel cycle are . . . extremely small . . . This being so, they could not possibly serve to call for the abandonment of any particular nuclear facility unless the cost-benefit balance for that facility was otherwise in virtual equipoise.” 6 NRC at 104.

In the application of this conclusion, the *Seabrook* Appeal Board found it unnecessary “to establish the precise margin of difference between Seabrook benefits and costs”; that Board was “totally satisfied” that, in any event, it was “large enough that the placing on the scales of the revised Table S-3 values would have no operative significance.” *Id.* at 104. The same can now be said respecting each of the eleven facilities now under consideration. As noted in ALAB-392, several are either fully constructed and operational or well along the road to completion. 5 NRC at 764. As to them, there would not be room for any serious suggestion that the revised Table S-3 values might be weighty enough to dictate abandonment of the project. What is left, then, are those units which—in common with the Seabrook units—are still in an incipient stage of construction.⁷ *Ibid.* A review of the adjudicatory record pertaining to each of them leaves us in no doubt that, as in *Seabrook*, the cost-benefit balance (fuel cycle impacts aside) is not so close to “virtual equipoise” that the addition of

⁵ In a concurring opinion in ALAB-421, Mr. Farrar addressed the questions raised in ALAB-392 (see fn. 4, *supra*). All members of the Appeal Panel are in substantial agreement with the views expressed by Mr. Farrar in that opinion.

⁶ This conclusion does not extend to Unit 2 of the Three Mile Island facility, as to which we have left it to the Licensing Board to decide the matter in the first instance. See ALAB-407, 5 NRC 1381 (June 1, 1977). Nor, for similar reasons, does it extend to the Midland facility. See ALAB-396, 5 NRC 1141 (May 4, 1977).

⁷ Beaver Valley 2, Hope Creek 1 and 2, Callaway 1 and 2, Hartsville 1A, 2A, 1B and 2B, and Vogtle 1 and 2.

the quantified values set forth in Table S-3 of the interim rule could be of decisive significance.⁸

This order brings to fruition the discharge of the responsibilities placed upon us by the Commission's April 1 order, CLI-77-10, *supra*. In addition, it terminates the reservation of jurisdiction over fuel cycle questions contained in several of our decisions over the course of the last year. See *Union Electric Co.* (Callaway Plant, Units 1 and 2), ALAB-347, 4 NRC 216, 219-20 (September 16, 1976);⁹ *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-355,

⁸In the *Hope Creek* proceeding, one of the intervenors, David A. Caccia, filed a brief memorandum in response to ALAB-392, in which he opined that the "cost of Hope Creek will be greater than the benefits when the entire environmental costs of the fuel cycle are included." It appears, however, that he is not contending that the differences between the 1974 fuel cycle rule and the interim revised rule are such as to invalidate the Licensing Board's determination in late 1974 that, taking into account the environmental effects of the uranium fuel cycle, the cost-benefit balance favored the plant. See LBP-74-79, 8 AEC 745, 759, 768, *affirmed on this point*, ALAB-251, 8 AEC 993 (1974). Rather, Mr. Caccia seemingly wishes to relitigate, without regard to the extent of difference between the original rule and the interim revised rule, the question of resort to alternate energy sources. Specifically, he would have us direct a further exploration into (1) the unit cost of the electric power to be generated by Hope Creek; (2) the cost of conserving an amount of electricity equivalent to the total Hope Creek generation; and (3) the cost of generating "a like amount of electricity by another method." Manifestly, such an inquiry would be well beyond the ambit of the Commission's April 1 order—which, as applied to the *Hope Creek* proceeding at least, calls upon us to determine only "the incremental effect, if any, that the use of the values in the interim rule would have" on the cost-benefit balance for the facility. 5 NRC at 717b.

⁹There, the *Callaway* Appeal Board deferred until completion of the Commission's new fuel cycle study (and any new regulations which might flow from it) various fuel cycle contentions. Among these was the propriety of the Licensing Board's exclusion of intervenors' contention that the radiological hazards of criminal acts and sabotage during the transportation of plutonium from the reprocessing plant had not been adequately considered in the environmental impact analyses of the staff and applicant. These hazards were not among those evaluated in preparing the former Table S-3.

Be that as it may, it is certain that the new Table S-3, promulgated as part of the Commission's new interim fuel cycle regulation (42 Fed. Reg. 13806-07 (March 14, 1977)), does encompass the subject. The new survey was completed in October 1976 (NUREG-0116). Public comments on that survey and the staff's responses to those comments were published in March 1977 (NUREG-0216). These "provide detailed narrative explanation of the new values in Table S-3 and give greater illumination to the background and context of the revised values," according to the Commission's Statement of Considerations accompanying the adoption of the interim regulation. 42 Fed. Reg. 13803, 13804 (March 14, 1977). The new survey considers two fuel cycle options: no recycle and uranium-only recycle; the uranium-plutonium recycle option is not considered because it is treated in the Commission's Generic Environmental Statement for Mixed Oxide Fuel ("GESMO"). NUREG-0116, pp. 3-1 to 3-5. Under the uranium-only recycle option, plu-

Continued on next page.

4 NRC 397, 417-18 (October 29, 1976); *Tennessee Valley Authority* (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-367, 5 NRC 92, 105-07 (January 25, 1977); *Georgia Power Co.* (Alvin W. Vogtle Nuclear Plant, Units 1 and 2), ALAB-375, 5 NRC 423, 424 (February 16, 1977). Unless otherwise indicated in those opinions, the Licensing Board decisions under review therein now stand *affirmed* in their totality.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARDS

Margaret E. Du Flo
Secretary to the Appeal Boards

Dr. Quarles participated in the consideration of the matters decided in this opinion and concurs in the result insofar as it pertains to the proceedings to which he is specifically assigned. He was unavailable, however, to review the final version of the opinion.

Continued from previous page.

onium is handled, treated and disposed of as a waste. *Id.* at 4-100. The survey considers the transportation of high-level wastes (including plutonium) from the reprocessing plant to the interim storage facility. *Id.* at 4-28. It also considers the environmental effects of that transportation. *Id.* at 4-28 and 4-144 to 4-152. The survey also evaluates the environmental effects of sabotage, including sabotage aimed at transportation. *Id.* at 4-153 to 4-163. NUREG-0216 (at p. 3-96), in response to the California Energy Resource Conservation and Development Commission's inquiry whether sabotage impacts have been included in the revised Table S-3, answers: "The risks of sabotage are judged to be negligible and therefore no entry is given" Intervenors' contention is thus without merit because the environmental impacts it seeks to have considered have already been weighed in the formulation of the new Table S-3.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Dr. W. Reed Johnson

In the Matter of

Docket Nos. 50-282
50-306

NORTHERN STATES POWER
COMPANY

(Prairie Island Nuclear Generating
Plant, Units 1 and 2)

August 15, 1977

Upon remand by the Commission (CLI-76-21, 4 NRC 478) to consider the "denting" phenomenon with relation to the Prairie Island facility, the Appeal Board issues a memorandum supplementary to ALAB-343 and concludes that the proceeding need not be reopened. It finds that, although questions still exist concerning the safety significance of the overall denting phenomenon, technical factors militate against a substantial denting problem arising at either Prairie Island unit; further, that the generic denting safety issue is receiving appropriate staff and industry attention.

TECHNICAL ISSUE DISCUSSED: Steam generator tube integrity.

Mr. Jay E. Silberg, Washington, D. C. for the applicant,
Northern States Power Company.

Messrs. Joseph Scinto and O. Gregory Lewis for the Nuclear
Regulatory Commission staff.

MEMORANDUM

More than three years ago, the Licensing Board rendered an initial decision authorizing the issuance of operating licenses for Units 1 and 2 of the Prairie Island Nuclear Generating Plant. LBP-74-17, 7 AEC 487 (1974). Later the same year, we upheld those portions of that decision which were challenged on the appeals taken by the two intervenors. ALAB-244, 8 AEC 857. But that did not

bring to an end our involvement in the proceeding. For a review *sua sponte* of the balance of the decision led us to conclude that there had not been a satisfactory resolution of an important safety question which had been raised below but not pressed on the appeals. That question pertained to the integrity of the tubes in the Westinghouse steam generators associated with these pressurized water reactors.

Following extended supplementary proceedings—which included additional evidentiary hearings conducted by not only the Licensing Board but ourselves as well—we handed down a lengthy decision last September on the steam generator tube integrity issue. Based upon our analysis of the record developed at those hearings, we determined that there was the requisite “present reasonable assurance that the public health and safety will not be endangered as the consequence of tube failure during operation of the Prairie Island facility.” ALAB-343, 4 NRC 169, 202 (1976). This determination rested upon several subsidiary findings and conclusions which need not be rehearsed here. Suffice it to say that we found of particular significance the evidence indicating a likelihood that, at least in the case of a facility (such as Prairie Island) which uses an all-ferrous secondary system, the all-volatile (AVT) method for chemically treating the water in that system will obviate the onset of serious corrosive conditions. Unit 2 has consistently employed the AVT method since it commenced operation; although Unit 1 initially utilized a different treatment method (involving the addition of phosphates to the secondary water), it converted to AVT approximately ten months later.

ALAB-343 made several passing references to a then-recently identified phenomenon in the region of the tube support plates which had been referred to by witnesses at our hearing in terms of “tube-diameter-reduction” but is now characterized as “denting.” Pointing out that as of that time “this phenomenon has been observed exclusively in plants with more extensive previous experience with phosphate secondary water chemistry than that of Prairie Island Unit 1,” we expressed the view it would not likely be encountered at this facility. 4 NRC at 195. Nonetheless, it seemed to us to be worthy of “continuing investigation.” *Id.* at 201.

On October 29, 1976, before the time for Commission review of ALAB-343 (as extended) had expired, the NRC staff sent a letter to the Secretary of the Commission in which it called attention to a “rapid” generator tube failure (evidenced by an 80 gpm primary-to-secondary leak) which had occurred at Unit 2 of the Surry pressurized water reactor facility six weeks earlier. This failure was attributed to intergranular, stress-assisted corrosion cracking at the apex of the tube in question. The letter went on to suggest that the same condition which had brought about the increase in stress at the tube apex—namely, the growth of corrosion products in the tube support plate-to-tube crevices—was also responsible for “denting” of the tube in the region of those crevices. In the view

of the staff, however, the Surry developments presented "no pressing safety issue relevant to Prairie Island" for the reason that tube denting at that facility had not been observed. Accordingly, the staff concluded, this proceeding need not be reopened.

On November 11, 1976, the Commission entered an order remanding the proceeding to this Board so that we might "have the opportunity to consider the denting questions raised by the staff letter . . ." CLI-76-21, 4 NRC 478. It was left to us to decide "how and to what extent" the matter would be examined. *Ibid.*

In the execution of the remand order, we issued unpublished orders of our own (on November 17, 1976, and January 26, 1977) which (1) solicited the information in the possession of the applicant and staff respecting the denting phenomenon; (2) posed a number of specific questions based upon the initial submissions in response to that solicitation; and (3) invited the views of the parties regarding the significance of the phenomenon insofar as the safe operation of the Prairie Island facility is concerned. We have now examined with care the wealth of documentary material that these orders produced.¹

In sum total, what has been placed before us reflects that both the staff and the industry have the denting phenomenon under intensive investigation.² Although definitive conclusions may not as yet have been reached on each phase of the investigation, what has been ascertained to date gives us reasonable cause to adhere to the belief expressed in ALAB-343 that Prairie Island is not likely to experience denting. This is not to say, of course, that there is no necessity for continued vigilance with respect to the condition of the steam generator tubes in all pressurized water reactors (Prairie Island included)—so long as the possibility of denting cannot be entirely ruled out the public interest demands that much.

It would serve little useful purpose to embark in this opinion upon an exhaustive recitation of the content of the numerous recent submissions. But, in determining whether to pass its own judgment upon the steam generator tube integrity issue in the context of this facility, the Commission might find it helpful to have at hand a brief treatment of the revelations which appear to us to be of particular importance to an assessment of the safety implications of the denting phenomenon insofar as the Prairie Island units are concerned. To this end, we shall discuss, in order, (1) what the denting phenomenon is; (2) its

¹ All of the material was provided by either the applicant or the staff. Although the Minnesota Pollution Control Agency also is a party to the proceeding, it apparently (and understandably) does not possess any original information relevant to the denting phenomenon.

² The investigation has included the scrutiny of observed denting at a number of PWR facilities, including both Surry units and Turkey Point, Units 3 and 4 (the facilities which have experienced the most severe denting).

apparent cause; (3) the detection of the onset and consequences of denting; and (4) potential safety consequences.

1. The tubes in a Westinghouse steam generator are in the shape of an inverted U and pass through and receive lateral support from a number of horizontally mounted tube support plates. These plates are made of carbon steel, are 3/4 inches thick and are located at vertical intervals of about 3 feet along the length of the tube bundle. Each plate contains drilled holes through which the tubes pass. Typically, the diameter of these holes is 0.903 inches and the outside diameter of the tubes is 0.875 inches. As a consequence, there are crevices, 0.014 inches in width, between the tubes and the plates (Applicant's Exhibit, *Steam Generator Update*, July 1976, pp. 4, 19, 73).³

Tube denting occurs when porous magnetite (Fe_3O_4)—created by corrosion of the carbon steel tube support plates—first fills these crevices and then, by reason of further growth, compresses the tube. In addition, the tube plates themselves may become distorted (Staff Exhibit 10, pp. 1-2, 8-9). The most dramatic, and to this point most significant, example of such distortion has been the partial closure ("hour-glassing") of the rectangular flow slots (each 16 inches in length) which lie in a dramatic line across the plates.⁴ Originally, the flow slots in the Surry 1 steam generators were uniformly 2.75 inches wide. But as a result of pressure exerted on the plates by the Fe_3O_4 growth in the crevices, the width of the slots became reduced to as little as 1.38 inches at their center (Staff Exhibit 1, Figure 7).

The large tube leak which developed last fall in one of the Surry 2 steam generators (see p. 213, *supra*) is thought by the staff, based upon an analysis of available information, to have been caused by the sudden opening of a stress corrosion crack at the top of a U-tube in the innermost (and tightest radius bend) row of tubes. The prevailing thesis is that the stress corrosion producing the crack originated on the inner (or primary) side of the tube as a result of stresses in the U-bend generated by flow slot closures (Staff Exhibit 95, p. 1). In an endeavor to prevent similar failures, all tubes in the first row (and some in the second row) have been plugged in both Surry units and in certain other facilities as well (Staff Exhibit 92, p. 10).

2. As we have just seen, denting has been attributed to the rapid corrosion of the tube support plates, giving rise to the formation and growth of Fe_3O_4 which eventually occasions stresses in both the tubes and the plates. It is thus

³ This document consists of a number of Vu-graphs. It was transmitted to this Board by the applicant, together with several other items, in response to our order of November 17, 1976. The Vu-graphs were not numbered, hence the page references given above assume sequential numbering beginning with the title page.

⁴ The two legs of each U-tube pass through the plates on either side of the flow slot line, thus forming a "bridge" over the flow slots themselves.

important to ascertain what causes the corrosion. It should be noted that the rapid Fe_3O_4 growth appears to be confined to the crevices between the tubes and the plates—*i.e.*, there is nothing before us to suggest that it has been encountered on the surface of the plates. To date, the most severe denting has been observed at facilities (such as Surry, Turkey Point and Indian Point 2) which (1) converted, after extensive use of phosphate secondary water treatment, to all-volatile treatment; (2) utilize salty or brackish waters for condenser cooling; and (3) have experienced condenser tube leakage to the secondary system (Staff Exhibit 92, p. 9).

We have been offered an explanation for the rapid rate of corrosion within the crevices which is consistent with this set of factual circumstances.⁵ This explanation would have it that metallic phosphates are deposited in the crevice region during phosphate chemistry operations. Upon conversion to AVT chemistry, the pH of the solution in the crevice region changes from slightly caustic (the result of the buffering action of sodium phosphate) to acidic as the phosphates are consumed or diffused away. This acidic condition produces corrosion of the support plates, thus providing a source of additional iron ions (Fe^{++}). It may also bring about some corrosion of the inconel tubes,⁶ a source of nickel ions (Ni^{++}) (Staff Exhibit 10, pp. 11-12). Laboratory experiments have indicated that, if chlorine ions (Cl^-) are introduced into such an environment, the level of acidity will be further increased and the outcome will be "runaway" Fe_3O_4 formation in the crevices (*i.e.*, where the metallic phosphates are concentrated) (*id.* at pp. 12-13).

Although, under this theory, the acidic condition necessary to the corrosive attack on the plate has its origin in prior operation with phosphate chemistry, it now appears that other types of porous deposit in the crevice—*e.g.*, boiler scale or sludge—might lead to a like acidic condition if sufficient Cl^- is present, and hence to rapid Fe_3O_4 growth (Staff Exhibit 95, pp. 2-3). In laboratory studies, such growth has been encountered in circumstances where Cl^- was present but phosphates were not (Staff Response, pp. 2-4). More significantly, recent operating reactor experience seems to have confirmed these experimental results.

Specifically, since the beginning of the year denting has been discovered in the steam generator tubes of the Maine Yankee and Millstone 2 reactors (located, respectively, on the Maine and Connecticut seacoasts). On the basis of the

⁵ See NRC Staff Response to Atomic Safety and Licensing Appeal Board Order Dated January 26, 1977—*Integrity of Steam Generator Tubes in the Prairie Island Reactors* (hereafter "Staff Response"), pp. 4-6; Staff Exhibit 10, pp. 10-12.

⁶ The steam generators of most pressurized water reactors employ inconel tubing.

information supplied by the staff and the operators of these two facilities,⁷ it appears that:

- a. Both reactors use steam generators manufactured by Combustion Engineering, Inc. The Combustion Engineering generator design is different from that of Westinghouse generators. One major difference relates to the carbon steel tube support plates. In a Westinghouse steam generator, at all elevations the plates are of the drilled-hole type, with the consequence that tube support plate-to-tube crevices exist at each tube penetration through every one of the plates. On the other hand, in a Combustion Engineering generator only at the upper elevations are there plates of the drilled-hole type (two in number) and, because they are only partial plates, not all of the tubes pass through them. At lower elevations, there are support structures of the so-called "egg crate" design. They hold the tubes in place at a few localized points of contact (by means of such devices as spring clips or dimples rather than by a drilled-hole arrangement).
- b. The condenser tube material in both reactors is primarily aluminum-brass, although some of the Maine Yankee tubes are composed of copper-nickel.
- c. Both reactors use seawater for condenser cooling. The chlorine concentration of that water is in the range of 14,000-16,000 ppm. There has evidently been a history of condenser leakage at each facility, with resultant occasional introduction of high levels of chlorine into the steam generators. Deposits of sludge to depths of between 3" and 6" have been found in the steam generators of the two units.
- d. Both reactors have employed AVT since the commencement of operations.
- e. In the case of each reactor, denting has been observed only at the locations at which the steam generator tubes pass through the drilled support plates; *i.e.*, no denting has been detected at the lower, "egg crate" type tube supports. The extent of the discerned denting was approximately 4 mils (.004") in the Maine Yankee tubes and up to 15 mils (.015") in the Millstone tubes.

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⁷By letter of May 24, 1977, the staff brought to our attention the discovery of denting at Maine Yankee. Upon receipt of that letter, we requested the staff to provide us with certain specific factual information pertaining to that development. By letter of June 2, 1977, the staff responded to that request and also apprised us of the occurrence of denting at Millstone 2. On June 28, 1977, we received a further communication from the staff in which it provided with respect to Millstone 2 the same kind of information previously given us in connection with Maine Yankee. It appears that the source of much of the content of the staff's several submissions was the respective licensees of the two facilities.

- f. The denting was first observed with a dual coil differential type eddy current (EC) probe using a frequency of 400 kHz.⁸

In summary, then, although they have used AVT from the start, these two seacoast facilities have experienced some condenser leakage with resultant sludge formation and periods of high chlorine presence in their steam generators. In addition, the steam generator-condenser system of each contains a wide mixture of chemical elements such as iron, copper, zinc, aluminum and nickel.

With this review of the history of the occurrence of denting in mind, we now turn to the Prairie Island facility and an assessment of the likelihood of the phenomenon being encountered at that facility. In the first place, the facility's all-ferrous system will permit its operation with secondary water maintained at a relatively high pH level. This will reduce the potential for sludge or scale formation resulting from corrosion of the secondary system materials—particularly those materials in the condenser tubes. ALAB-343, *supra*, 4 NRC at 185. This consideration, combined with the fact that the Prairie Island units have had either little or no phosphate exposure (*id.* at 179-80), means that there is only a small potential for the development of an environment in the tube support plate crevices that might lead to acidic conditions. Secondly, condenser leakage has been minimized in both units by mechanical modifications which essentially eliminated condenser tube vibrations *id.* at 185. As has been noted, such leakage can be a major source not only of solid contaminants which might be deposited in the crevices but, as well, of chlorine. In the latter regard, potential for the introduction of chlorine into the secondary system is also lessened by reason of the comparatively low chlorine content of the Mississippi River (from which Prairie Island draws its cooling water). More specifically, that content is approximately 5 ppm; in contrast, the chlorine content of the source of the Surry cooling water (the James River) is in the neighborhood of 1000 ppm (Staff Response—Appendix D, p. 57).⁹ Thirdly, mechanical modifications have been made in Unit 2 of Prairie Island (and by now perhaps in Unit 1 as well) which are designed to reduce sludge accumulation on the tube sheets.¹⁰ ALAB-343, 4 NRC at 185. This, too, should minimize the sludge content in the secondary system. Fourth, and finally, if necessary the demineralizers, which should be operational very shortly (*id.* at 183), also can be invoked for the purpose of limiting the accumulation of impurities. As is thus seen, there are several features

⁸ These eddy current measurements appear to exhibit a higher degree of resolution for the determination of dent depth than those reported to us earlier in this proceeding (see ALAB-343, 4 NRC at 190-92). This suggests an encouraging improvement in the EC methodology.

⁹ Where seawater is involved, the chlorine content is much greater. See p. 217, *supra*.

¹⁰ The tube sheet is the bottom plate through which the open ends of the steam generator tubes penetrate. The tubes are welded to this plate.

of the Prairie Island facility which negate the likely development in serious measure of those conditions which appear to underlie the denting phenomenon.

3. Although there may be a low probability of extensive denting at Prairie Island as a result of the now postulated mechanisms, it is nonetheless important that means be devised for the detection of the onset of the phenomenon should it occur—as well as for the ascertainment of the condition of the tubes in the tube support plate region.

To this point at least, no method exists to detect the buildup of deposits of porous Fe_3O_4 in the tube support plate crevice region (Applicant's Response to Question 2a, pp. 1-2). The monitoring of the condensate and steam generator blowdown for chemistry conditions associated with Fe_3O_4 creation might, however, yield a warning of the onset of denting (Staff Response, pp. 23-24).

Beyond that, the recent experience at Maine Yankee and Millstone teaches that eddy current testing may provide a means whereby denting can be detected relatively early; *i.e.*, before serious distortion or cracking occurs in the tube support plates. Since such early detection will reduce the possibility of steam generator tube cracking due to additional stresses, we think it essential that the EC equipment and techniques used at Prairie Island attain at least the level of performance of that used at those two New England facilities.

4. One of the major safety concerns associated with degraded steam generator tubes is that of a concurrent failure of a number of such tubes in the event of a loss of coolant accident or secondary system pipe break. See ALAB-343, *supra*, 4 NRC at 170-71. But even the failure of a few tubes during normal operation has significance in terms of plant reliability and the exposure to radiation on the part of the plant personnel responsible for taking necessary corrective action. *Id.* at 171.

In ALAB-343, our focus was upon an impairment of the tubes as a result of a corrosive attack upon their secondary side made possible by an accumulation of sludge on the tube sheets. As we have seen, the impact of the denting phenomenon is upon other areas of the tube—*i.e.*, the apex and the portion located in the crevice region. In this connection, the highest tube stresses in a postulated LOCA occur where the large radius U-tubes pass through, and are constrained by, the top tube support plate (Staff Exhibit 1, Attachment V, pp. V-3 to V-4). The analyses made thus far reflect that, in the case of a tube which is tightly fixed at the point of intersection with the plate but has experienced no compression because of denting, the stresses generated by the LOCA will not exceed the allowable limits for Inconel-600 (the tubing material used) (*id.* at p. V-4). Insofar as we are aware, however, a similar analysis has not been made with respect to the effect of LOCA-induced stresses upon a tube which, prior to the LOCA, had already been stressed because of compression due to severe denting.

Additionally, the tube support plates in the Surry steam generators (as well

as in the generators of other facilities encountering serious denting) were found to be cracked to such an extent that they were being held together only by reason of the compressive forces exerted by the Fe_3O_4 accumulations and the tubes themselves (Staff Exhibit 5, Attachment No. 1, pp. 1-3). Although the implications of tube support plate failure (such as fragmentation and buckling) upon the integrity of the tubes is under study, apparently no conclusive answers have yet been reached (*id.* at p. 2).

In sum, the precise safety significance of the overall denting phenomenon remains in some doubt. There is every reason to believe, however, that this aspect of the problem is now receiving appropriate attention on the part of both the staff and the industry. And because, in light of the factors earlier discussed, it is quite improbable that either Prairie Island unit will experience substantial denting, the still existing uncertainties are not a cause for concern here.

In view of the foregoing, no further order or action on our part appears warranted in the carrying out of the Commission's November 11, 1976, order. This memorandum stands simply as a supplementation of ALAB-343 and the findings and conclusions contained therein and is so submitted to the Commission in aid of its consideration of that decision. More specifically, as earlier stated we explicitly adhere to the result reached in ALAB-343 on the steam generator tube issue.

We reiterate that, although much of what has been said here and in ALAB-343 may have a generic flavor, it is solely the Prairie Island units and their particular circumstances which are before us in this adjudicatory proceeding and, therefore, the operative effect of our determinations regarding the lack of a serious safety concern necessarily is confined to those units. In this connection, it is worthy of passing note that the Advisory Committee on Reactor Safeguards has been pursuing for some time its own inquiry into the steam generator tube integrity matter. That inquiry, unlike ours, is not being conducted in an adjudicatory context; nor is its scope limited to any single facility. Accordingly, we presume that it will eventually produce ACRS conclusions and recommendations of broader application.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Romayne M. Skrutski
Secretary to the Appeal Board

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Richard S. Salzman
Jerome E. Sharfman

In the Matter of

FLORIDA POWER AND LIGHT
COMPANY
(St. Lucie Plant, Unit No. 1)

Docket No. 50-335A

FLORIDA POWER AND LIGHT
COMPANY
(Turkey Point Plant, Units No. 3 and 4)

Docket Nos. 50-250A
50-251A

August 23, 1977

The Appeal Board affirms a Licensing Board order (LBP-77-23, 5 NRC 789) denying a joint petition for leave to intervene out of time and for an antitrust hearing concerning three fully licensed plants. It further issues a declaratory order that the Director of Nuclear Reactor Regulation has no authority to initiate an antitrust review on the basis of the instant petition.

ATOMIC ENERGY ACT: ANTITRUST REVIEW

The antitrust responsibilities of both the Licensing Board and the Director of Nuclear Reactor Regulation end (with certain limited exceptions) with the termination of operating license proceedings.

ATOMIC ENERGY ACT: ANTITRUST REVIEW

Congress elected to exclude from Section 105c antitrust review (with limited exceptions) reactors authorized prior to the 1970 antitrust amendments to be built (pursuant to Section 104b) as research and development projects, although such reactors might be determined to have commercial value when operating licenses were later sought.

ATOMIC ENERGY ACT: ANTITRUST REVIEW

Section 186a does not require plants licensed as research and development facilities under Section 104b subsequently to be treated as commercial generating facilities subject to Section 103 requirements.

ATOMIC ENERGY ACT: ANTITRUST REVIEW

The general provisions of Section 186 are "subordinate to the specific, limited regime [of Section 105] adopted by Congress as recently as the 1970 amendments to the Act" with respect to the Commission's supervisory antitrust jurisdiction. *Houston Lighting and Power Co.* (South Texas Project), CLI-77-13, 5 NRC 1303 (June 15, 1977) (petition for judicial review pending).

Messrs. J. A. Bouknight, Jr., Washington, D. C., and John E. Mathews, Jr., Jacksonville, Florida, argued the cause and filed a brief for the licensee, Florida Power and Light Company, *appellee*.

Mr. Alan J. Roth, Washington, D. C., argued the cause for the petitioners, Fort Pierce Utilities Authority, *et al.*, *appellants*; with him on the briefs were Messrs. Robert A. Jablon and David A. Giacalone, Washington, D. C.

Mr. Benjamin H. Vogler argued the cause for the Nuclear Regulatory Commission staff; Messrs. Lee Scott Dewey and Michael D. Jones on the brief.

DECISION

Opinion of the Board by Mr. Salzman in which Mr. Rosenthal joins; Mr. Sharfman joins in part and concurs in the result:

I

A number of Florida municipal electric systems and the Florida Municipal Utilities Association (Florida Cities) appeal from a Licensing Board order denying their joint petition for leave to intervene out of time and for an antitrust hearing respecting three nuclear power plants.¹ The plants, owned by the Flori-

¹ LBP-77-23, 5 NRC 789 (April 5, 1977). In the same order, the Licensing Board granted Florida Cities' request for like relief in connection with Unit No. 2 of the St. Lucie facility. We affirmed that action in ALAB-420, 6 NRC 8 (July 12, 1977) (petition for Commission review pending).

da Power and Light Company and operated under Commission license, are Unit No. 1 of FP&L's St. Lucie facility and Units No. 3 and 4 of its Turkey Point facility. The denial was based on our ruling in another case that "a licensing board has not been bestowed with jurisdiction to direct a hearing on antitrust matters—by a grant of an intervention petition or otherwise—in the absence of a pending construction permit or operating license proceeding." *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), ALAB-381, 5 NRC 582, 592 (1977).²

The Commission has allowed our ruling in ALAB-381 to stand (see unpublished Commission order of March 31, 1977, referred to in CLI-77-13, 5 NRC 1303, 1308 (June 15, 1977)),³ and we decline Florida Cities' invitation to reconsider its correctness. Thus, all that the Florida Cities' appeal requires us to decide is whether the Licensing Board justifiably concluded that the ruling governs here. Given the fact the operating license proceedings for the three reactors were long ago concluded, the answer obviously must be in the affirmative. In these circumstances we ordinarily would have simply affirmed the Licensing Board summarily. A supervening development, however, has prompted us to examine a broader question not presented to, or decided by, the Board below.

Not content with the prosecution of an appeal to us from the denial of its intervention petition for want of *Licensing Board* jurisdiction to grant it, Florida Cities moved before the Commission for a "clarification of procedures." Interpreting that motion as seeking, *inter alia*, a declaratory order regarding "the most appropriate procedural mechanism for resolution of the Cities' antitrust allegations respecting the St. Lucie and Turkey Point reactors," the Commission determined that the issues raised by the motion should be first addressed by either us or the Director of Nuclear Reactor Regulation. CLI-77-15, 5 NRC 1324, 1326 (June 22, 1977). Upon the receipt of that referral and the briefs of the respective parties in the wake of it, we called for and heard oral argument on whether, even though the Licensing Board may lack the authority at this juncture to trigger a hearing to explore Florida Cities' antitrust grievances, such authority nevertheless resides in the Director of Nuclear Reactor Regulation. On a full consideration of the arguments put before us we hold that that power is lacking. Particularly in light of the Commission's own recent analysis of the statutory scheme, we are constrained to conclude that (with certain exceptions

²Unlike the three operating reactors under present consideration, St. Lucie 2 was the subject of an on-going construction permit proceeding at the time the Licensing Board entered its April 5 order. For this reason the Licensing Board indisputably had the jurisdiction to grant an antitrust hearing with respect to that reactor.

³CLI-77-13 is discussed *infra*, pp. 226-227.

not applicable here) once the operating license proceedings terminated this agency's antitrust responsibilities relating to these reactors came to an end.⁴

II

The former Atomic Energy Commission licensed the construction of all three nuclear power reactors now before us not as commercial facilities subject to Section 103 but as "research and development" reactors under Section 104b of the Atomic Energy Act of 1954.⁵ Construction permits for them were issued before Section 105c of the Act⁶ (defining Commission antitrust procedure) was amended to its present form in 1970. At the time these permits were issued, prelicensing antitrust review by the Commission was neither required nor expected in the case of Section 104b projects. *Cities of Statesville v. AEC*, 441 F.2d 962 (D.C. Cir. 1969). This of course explains why none was undertaken for these three reactors.

Florida Cities seize upon these circumstances as a reason why this Commission ought to consider the antitrust charges they now level against the licensee of the plants. In their view, if antitrust review is refused, the Commission will have licensed what are in fact three large commercial power plants to operate for 40 years and, Florida Cities stress, the Commission will have done so without ever having given thought to the resulting anticompetitive ramifications.

Were this a matter of first impression, Florida Cities' arguments could not be brushed aside lightly. One need look no further than Judge Leventhal's concurring opinion in *Statesville, supra*, for an impressive collection of authorities for the proposition that (441 F.2d at 987):

a statute providing for licensing or other regulation is presumed to permit consideration of antitrust principles, with the harmonizing approach just outlined, unless a contrary intent appears expressly or by necessary implication.⁷

⁴Also before us are motions by two of the Florida Cities, Quincy and Daytona Beach, for leave to withdraw. Quincy's motion is opposed by Florida Power and Light Company. Insofar as the motions are directed to the proceedings now before us—i.e., respecting St. Lucie, Unit No. 1, and Turkey Point, Units 3 and 4—the motions are *dismissed as moot*; insofar as leave is sought to withdraw from proceedings involving two other FP&L facilities, St. Lucie, Unit No. 2, and the South Dade plants, these matters are not before us and the motions are therefore denied without prejudice to renewal before the appropriate Licensing Board.

⁵42 U.S.C. § § 2133, 2134(b).

⁶42 U.S.C. § 2135(c).

⁷Neither the majority nor the dissenters in *Statesville* disagreed. See 441 F.2d at 974, and 993-95. And see *Kansas City Gas and Electric Co.* (Wolf Creek Generating Station, Unit No. 1), ALAB-279, 1 NRC 559, 568 (1975) and cases there cited.

Accord: *Gulf States Utilities Co. v. FPC*, 411 U.S. 747 759-61 (1973).

But this is not a new matter. The legislative history of Section 105c relevant to this point was previously perused by us in the "*Grandfather Clause*" case.⁸ We there noted that the Congress had considered this class reactors—viz., those authorized to be built as research and development projects before the 1970 antitrust amendments but which might later be determined to possess commercial utility when an operating license was sought for them—and elected to exclude them from antitrust review under Section 105c (except in limited circumstances not present in this case).⁹

Florida Cities' response is that antitrust review is nevertheless available before this Commission under Section 186a of the Act.¹⁰ That section, pertaining to license revocations, provides in pertinent part that

Any license may be revoked for any material false statement in the application or any statement of fact required under section 182, or because of conditions revealed by such application or statement of fact or any report, record, or inspection or other means which would warrant the Commission to refuse to grant a license on an original application

Florida Cities reason that, because the Commission may refuse an operating license on antitrust grounds (at least where circumstances change following issuance of the construction permit), Section 186a empowers it to revoke a license previously granted on those grounds.

Even if we assume *arguendo* that Section 186a means what Florida Cities assert it does, their cause is not advanced. The nuclear power plants in question were licensed under Section 104b. As we have already explained, by Congressional mandate antitrust considerations were not grounds for refusing operating licenses to such "research and development" facilities.

Florida Cities would get over this second hurdle by having us give a "common sense" reading to Section 186a that requires us to treat these reactors as what they really are: viable commercial generating facilities that could only be licensed today under Section 103. There appears to be no support for this reading of the section in the legislative history of the Atomic Energy Act and petitioners cite none. Nor is the "meaning" which Florida Cities ascribe to Section 186a necessarily so "plain" as they suggest. But even accepting everything they say, no construction of Section 186 need be made here. As we explain in Part III, other grounds compel rejection of their contentions.

⁸ *The Toledo Edison Co.* (Davis-Besse Nuclear Power Station, Unit 1), ALAB-323, 3 NRC 331 (1976).

⁹ See 3 NRC at 340-41.

¹⁰ 42 U.S.C. § 2236(a).

III

In its own *South Texas* decision,¹¹ the Commission recently considered at length the extent of its authority to hold antitrust hearings. The precise issue in that case involved when an antitrust proceeding under Section 105c may be ordered after a construction permit has been issued but before the necessary additional license to commence operations has been granted. The Commission did not confine its *South Texas* opinion to that relatively narrow question; instead it chose to address the broad spectrum of NRC antitrust responsibilities. In so doing, it manifested the judgment in no uncertain terms that the NRC's supervisory antitrust jurisdiction over a nuclear reactor licensee does not extend over the full 40-year term of the operating license but ends at its inception.¹²

The Commission said

that Congress had no intention of giving this Commission authority which could put utilities under a continuing risk of antitrust review. Had Congress agreed with the proposition that this Commission should have broad antitrust policing powers independent of licensing, the statute that emerged from these discussions would have looked quite different. Little attention would have been paid to defining a two-step review process. The terminology of all participants in the drafting process would not have been focused so directly on "prelicensing" review. And, if a broad, ongoing police power in the antitrust area had been assumed, the language in 105(a) authorizing the Commission to act with respect to licenses already issued, in light of the antitrust findings of courts would have been, if not superfluous, certainly redundant. *Consequently, we find that the Commission's antitrust authority is defined not by the broad powers contained in Section 186, but by the more limited schemes set forth in Section 105.*

5 NRC at 1317 (footnote omitted, emphasis supplied).

Any lingering doubt about the Commission's view of the limited role Section 186 plays in antitrust matters is put to rest by its further pronouncement in that same case that, on the "question whether Section 186 expands the antitrust hearing settings defined in Section 105 . . . we find that the generality of Section

¹¹ *Houston Lighting and Power Co.* (South Texas Project), CLI-77-13, 5 NRC 1303 (June 15, 1977) petition for judicial review pending). This decision was not rendered on appeal from ALAB-381 (our *South Texas* ruling, *supra*) but in an independent proceeding on a staff recommendation that an antitrust hearing be convened in that case in the exercise of the Commission's discretion.

¹² Except perhaps as necessary to enforce the terms of a license or to revoke one fraudulently obtained, or in circumstances where a plant is sold or so significantly modified as to require a new license. See CLI-77-13, *supra*, 5 NRC at 1318.

186 should be treated as subordinate to the specific, limited regime adopted by Congress as recently as the 1970 amendments to the Act." *Id.* at 1311.

To put the whole matter another way, arguments to this Board about the most "common sensical" way to interpret the antitrust provisions of the Atomic Energy Act in general, or Section 186 in particular, fall wide of the mark. Whether we agree with those arguments or not, they are made in the wrong forum. Unless and until the Commission elects to modify its *South Texas* rulings, or is instructed to do so by Congress or the courts, this Board is of course constrained to apply them.

The result for this case is thus ineluctable. Prelicensing antitrust review of these reactors was proscribed by Congress and, even were that not true, postlicensing review is foreclosed by the Commission's *South Texas* decision. The Director of Nuclear Reactor Regulation is not an island of independent authority; his office is a piece of the Commission, "a part of the main." Therefore, the Florida Cities need not send to the Director to learn for whom antitrust jurisdiction tolls when an operating license issues; it tolls for him.

For the foregoing reasons, we (1) *affirm* that portion of the Licensing Board's April 5, 1977, order from which the Florida Cities appeal and (2) *declare* that the Director of Nuclear Reactor Regulation has no authority to initiate an antitrust review in connection with any of these three power reactors on the basis of the petition now before us.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

Concurring Opinion of Mr. Sharfman:

I join in the opinion of my colleagues except with respect to one point. They would affirm the Licensing Board's dismissal of the petition insofar as it relates to the three fully licensed reactors on the basis of their holding in *South Texas* (ALAB-381, *supra*) that a licensing board is barred by 10 CFR §2.717(a) from granting a late petition for an antitrust hearing after all environmental and safety proceedings with respect to issuance of the construction permit have concluded. I disagreed with that holding, for reasons which I stated at length in

my concurring opinion in that case.¹ As is true with a denial of *certiorari* in the Supreme Court, the Commission's election not to review one of our decisions does not necessarily constitute an endorsement of it. In this particular instance, the Commission went out of its way to make that clear. In its own decision on the other aspect of *South Texas*, it said: "In declining to review ALAB-381, of course, we are not to be taken as having agreed with everything that the Appeal Board had said in that opinion."² The Commission apparently was content simply to let the result in ALAB-381, a result in which I fully concurred, stand. I therefore persist in my disagreement with the majority of this Board as to its construction of 10 CFR §2.717(a).

Because, in my view, §2.717(a) does not provide any basis for the denial of the petition, it is necessary, as I stated in *South Texas*, to see whether the grant of an antitrust hearing after all proceedings on licensing have concluded would be consistent with the legislative intent underlying Section 105c of the Atomic Energy Act.³ The Commission has, however, already given us its views in *South Texas* on the intent of Congress with respect to our antitrust jurisdiction over reactors as to which licenses have already been granted. As the majority opinion shows, those views leave not the slightest room for doubt as to what our decision in this case must be.

¹ 5 NRC 595.

² CLI-77-13, 5NRC 1303, 1308 (June 15, 1977).

³ 5 NRC at 598-99.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Jerome E. Sharfman, Chairman
Richard S. Salzman
Dr. W. Reed Johnson

In the Matter of

Docket Nos. 50-354
50-355

PUBLIC SERVICE ELECTRIC AND GAS
COMPANY
ATLANTIC CITY ELECTRIC COMPANY

(Hope Creek Generating Station,
Units 1 and 2)

August 24, 1977

Upon appeal by intervenors from the Licensing Board's supplemental initial decision (LBP-77-22, 5 NRC 694), the Appeal Board concludes that the Licensing Board's findings are not supported by the evidence.

Licensing Board decision reversed and remanded for specified technical findings. Decision on necessity of preparing and circulating supplemental NEPA statement deferred pending such findings. Construction permitted to continue for four months, and Licensing Board directed to establish schedule for submitting and hearing new evidence. If no decision issued in four months, applicant must show cause as to why construction should not be suspended pending issuance. Individual who directed Appeal Board's attention to tanker accident issue denied untimely admission as appellant but is to be treated as party in hearings on remand.

RULES OF PRACTICE: UNTIMELY APPEAL

Where motion to be admitted as party to appeal is filed beyond "a modest period of lateness" and individual so moving apparently does not seek to raise any new issues, no purpose is to be served in granting motion.

EVIDENCE: ANALOGOUS DATA AND THEORETICAL ANALYSES

Where there exist little or no directly applicable data on which to base

estimates of accident probabilities, and where such determinations have safety significance, the probability analyst must be "exceedingly thorough and diligent" in finding and establishing the validity of analogous data and theoretical analyses in order to provide an adequate record for a board to make such determinations.

LICENSING BOARD: RESOLUTION OF ISSUES

A licensing board has an obligation to explain its rejection of evidence that is reasonable on its face and contrary to that which the board accepts. It must "confront the facts" rather than merely reach conclusions.

CONSTRUCTION PERMIT: CONTINUATION PENDING RESOLUTION ON REMAND OF SAFETY ISSUES

Where construction during forthcoming four-month period will not prevent changes in plant which may prove necessary following remand of safety issue, construction may continue during that period.

TECHNICAL ISSUES DISCUSSED: Probability of postulated LNG and LPG tanker accidents which could affect plant; formation and dispersion of vapor clouds.

Mr. Troy B. Conner, Jr., Washington, D.C., for Public Service Electric and Gas Company, applicant.

Mr. Peter A. Buchsbaum, Trenton, New Jersey, (with whom **Mr. Robert Westreich** was on the brief) for the Concerned Citizens on Logan Township Safety, the Boroughs of Paulsboro and Swedesboro, and **Stanley C. Van Ness,** Public Advocate of the State of New Jersey, intervenors.

Mr. Richard L. Black for the Nuclear Regulatory Commission staff.

DECISION

The Concerned Citizens on Logan Township Safety, Stanley C. Van Ness (Public Advocate of the State of New Jersey), and the Boroughs of Paulsboro and Swedesboro ("joint intervenors") appeal from the Licensing Board's supple-

mental initial decision of March 28, 1977.¹ In that decision, the Board below determined that the probability of a liquefied natural gas ("LNG") tanker accident on the Delaware River affecting the Hope Creek plant is so low that the plant need not be designed to withstand it and that a supplement to the final environmental statement need not be issued. Their appeal is opposed by Public Service Electric and Gas Co. ("applicant")² and the NRC staff. For the reasons which follow, we reverse and remand the case for a further hearing.

BACKGROUND

On October 25, 1974, the Licensing Board issued its initial decision authorizing the issuance of construction permits for the Hope Creek plant.³ The plant will consist of two boiling water nuclear power units, each of 1,067 MWe net capacity, located on Artificial Island, actually a peninsula created by land fill between a sand bar and the mainland on the New Jersey side of the Delaware River, 7-1/2 miles southeast of Salem.⁴ This location is about one mile away from the river's deepwater channel.⁵

No party appealed from the initial decision. However, Mr. David A. Caccia, who had made a limited appearance before the Licensing Board, called our attention to a potential threat to the Hope Creek plant from ships carrying LNG to proposed terminals further up the Delaware River. The Licensing Board had inserted a condition in the construction permits providing: "No concrete shall be poured for safety related structures until the Applicants have completed a study of the probability of interaction between river traffic and safety related plant features and applied the results of the study in the design and planned construction of the facility in a manner acceptable to the Regulatory Staff."⁶ We accepted the staff's suggestion that the case be remanded to the Licensing Board for a reevaluation, based on new information as to the LNG hazard, of "its initial determination that the design bases for the Hope Creek facilities conform to the requirements of 10 CFR Part 50, Appendix A."⁷ We requested the staff not to permit the pouring of concrete until further order of the Licensing Board.⁸ In all other respects, we affirmed the initial decision.⁹

¹ LBP-77-22, 5 NRC 694.

² There is only one applicant. However, applicant will "utilize the facilities as a tenant in common with Atlantic City Electric Company which will own and utilize 10%." LBP-74-79, 8 AEC 745, 754 (1974). The latter company has not participated with respect to the matters before us.

³ LBP-74-79, 8 AEC 745.

⁴ *Id.* at 750.

⁵ Appl. Exh. 11, p. 9.

⁶ ALAB-251, 8 AEC 993, 996 (1974).

⁷ *Id.* at 997.

⁸ *Ibid.*

⁹ *Id.* at 998.

THE DECISION BELOW

The evidence shows that the hypothetical series of events resulting from LNG traffic which would present the most serious threat to the Hope Creek Station is as follows: A tanker accident would occur. One or more LNG tanks would rupture. A vapor cloud composed of methane gas would be formed but would not immediately ignite. The cloud would then be carried to the plant by the wind where flammable concentrations of the gas would ignite, producing a fire of great turbulence and intensity.¹⁰

At the hearing on remand, the applicant took the position that the probability of an LNG tanker accident which could affect the plant is so low that such an eventuality should not be considered in the plant's design basis. In support of its position, the applicant relied on the NRC Standard Review Plan (NUREG-75/087, §2.2.3 (1975)) which provides that an event resulting from the presence of hazardous materials in the vicinity of the plant may be disregarded if a "realistic" calculation of the event's probability of occurrence is less than 10^{-7} per year or if a "conservative" calculation indicates that its probability is less than 10^{-6} per year.¹¹ The applicant calculated the likelihood that a postulated LNG event might affect the plant by multiplying together a number of conditional probabilities related to individual events in the sequence that would lead to the presence of a flammable LNG (methane) cloud at the site.¹² The result of the calculation was 3.1×10^{-8} occurrences per year.¹³

The staff presented its assessment of the hazard from LNG traffic in Supplement No. 5 to the Safety Evaluation Report dated March 1976 (Staff Exhibit 1-F). The staff there reviewed the applicant's methodology and the values used in its probability calculation; it concluded that both were reasonable. But, while the applicant assumed 106 LNG annual tanker transits, the staff assumed 360.¹⁴ Using the latter figure and the applicant's values for the other factors in the probability calculation, the staff determined that the probability of an LNG tanker event having the potential to harm the plant is approximately 1×10^{-7}

¹⁰ Staff Exh. 1-F, pp. 10-13.

¹¹ The event referred to is one which has the potential of causing radiation exposures in excess of the guidelines contained in 10 CFR Part 100. A probability of 10^{-6} is simply a scientific expression for one chance in a million, similarly 10^{-7} is one chance in ten million, and 10^{-8} is one chance in a hundred million.

¹² Appl. Exh. 11, pp. 20-27.

¹³ *Id.* at 27.

¹⁴ Appl. Exh. 11, pp. 6 and 20; Staff Exh. 1-F, p. 14. The reason for the difference was that the staff assumed that both LNG terminals proposed for the banks of the Delaware would be built but the applicant assumed that only the smaller one would be built. 5 NRC 694, at 700. However, we fail to understand why the staff used the figure of 360 when its report stated that LNG traffic would be about 400 tankers per year. Staff Exh. 1-F, p. 6.

per year, and concluded that indeed such an event need not be considered in the design of the plant.¹⁵

Mr. Caccia and the joint intervenors attacked the validity of the factors used by the applicant to calculate the probability of an LNG event. Joint intervenors also argued that, because the hazards presented by the proposed LNG traffic were not addressed in the staff's final environmental statement, NEPA requires that a supplemental environmental statement which does address them be prepared and circulated.¹⁶

The Licensing Board found that the probability that a flammable methane cloud released by an accident involving an LNG tanker in the Delaware River would reach the Hope Creek site, conservatively calculated, is 1×10^{-7} .¹⁷ It therefore concluded that applicant "need not include provisions in the design of [the] Hope Creek facility to prevent or mitigate the consequences of such [an] event."¹⁸ It also decided that the environmental impacts of LNG tanker accidents which might affect the plant are so "remote and speculative" that they "need not be considered in any NEPA analysis" and that there is thus "no need for the issuance of a supplement to the FES."¹⁹

THE APPEAL

The joint intervenors have filed exceptions with us which in essence restate their contentions below.²⁰ The applicant and staff urge affirmance of the Li-

¹⁵ Staff Exh. 1-F, pp. 14 and 16.

¹⁶ 5 NRC 694, at 713.

¹⁷ *Id.* at 709.

¹⁸ *Id.* at 710.

¹⁹ *Id.* at 714.

²⁰ Mr. Caccia filed no exceptions. In a motion served on August 1st, 19 days after the oral argument and over four months after the issuance of the decision appealed from, he seeks to be admitted late as an appellant. His excuse is that he was out of town during the time for filing exceptions and assumed on his return that his right to take part in the appeal was foreclosed. No exceptions were filed with the motion which alleges that its grant would not cause any delay in the proceedings, as he will be represented by the attorney for the joint intervenors.

As briefs had already been submitted and oral argument had before the motion was filed and as Mr. Caccia apparently does not seek to bring anything additional to our attention, we see no purpose to be served by admitting him as a party to the appeal at this time. Moreover, while a modest period of lateness might have been excusable, to sanction such a long one would not be conducive to the expeditious functioning of our appellate process. For these reasons, the motion is *denied*. However, we do recognize the public service done by Mr. Caccia in initially bringing the LNG hazard to the attention of this Board and in his participation in the hearing held thereafter. We therefore direct the Licensing Board to treat him as a party in the hearings on remand despite the fact that he did not appeal from the supplemental initial decision.

censing Board's decision. Our consideration of the evidence convinces us that further proceedings are necessary.

Although the point was nowhere explored on the record,²¹ it seems possible that the deflagration of a methane cloud at the plant site could lead to consequences which exceed those normally considered in a reactor safety analysis and hence should be included in the design of the plant unless it can be established that such an event has an exceedingly low probability of occurrence. The Licensing Board accepted, and so do we, the guideline probability values set forth in NUREG-75/087 (10^{-7} for a realistic calculation and 10^{-6} for a conservative calculation) which would permit an applicant not to design a plant to withstand a particular accident due to its low probability. Probability determinations for events having very low likelihoods of occurrence frequently are complicated by a lack of pertinent data upon which to base calculations. Such is the case here, where we are required to assess the likelihood that a riverside nuclear generating station might be affected by an LNG tanker accident on the river. Although the disastrous effects of the methane cloud resulting from an LNG leak from a land-based facility have been observed,²² in the limited experience to date with shipboard transport of LNG, there have been no significant accidents.²³ Thus, there exist little or no directly applicable data upon which to base estimates of probabilities. Under these circumstances, the probability analyst is obliged to use data obtained from analagous experience or from theoretical assessments of the events in question. When, as here, the determination of probability has safety significance, he should be exceedingly thorough and diligent in the quest for pertinent analogous data and theoretical analyses. These same qualities should be exhibited in making the determination that seemingly relevant data and analyses are truly applicable and valid.

In our view, for reasons that will be discussed below, the applicant and staff have not borne this burden. The likelihood of an LNG event which might affect the plant may indeed be as small as their calculations indicate. But the record reveals conflicting evidence regarding data used to determine some of the individual probability factors, confusion in the assumptions that were made in selecting data, and failure to consult a number of sources of information that might have been used to aid in the calculation of other of the probability factors. The case is therefore remanded again to the Licensing Board for further evidentiary hearings. While we do not want to limit the scope of the Board's inquiry, we shall later in this opinion identify those particular areas in which we believe that clarification, more information or exploration is required.

²¹ Applicant took the position that it was unnecessary to do so because the probability of a flammable methane cloud reaching the plant was so low. Appl. Exh. 10, p. 17.

²² See, for example, "The Importation of Liquefied Natural Gas," by E. Drake and R. C. Reid, *Scientific American*, Vol. 236, No. 4, p. 22 (April 1977).

²³ Staff Exh. 1-F, p. 7.

DISCUSSION

I. LNG TRAFFIC

The method used by the applicant to determine the probability that an LNG accident would affect the plant was to consider the chain of events that would have to occur in order for that to happen. Each event in the chain was assigned a numerical value, or conditional probability, and the combined probability was obtained by multiplying together all of these values.²⁴ The factors considered in the calculation were: (a) number of ships per year; (b) accident rate (accidents per mile); (c) probability of an LNG spill in the event of an accident (spills per accident); (d) probability that, if an LNG spill did occur, the natural gas vapor (methane) would not ignite at the site of the accident but instead form a flammable cloud (vapor clouds per spill); and (e) probability that the vapor cloud produced as a result of a spill along the Delaware River would reach the plant site with a methane concentration in the flammable range, *i.e.*, 5-15% by volume (the meteorological factor).²⁵ We shall consider each of the factors appearing in the applicant's analysis *seriatim* and indicate what difficulty we have in accepting the value used. Many of the problems which we discuss were identified by the joint intervenors in cross-examination at the hearing below.

1. Ships per Year

As stated above,²⁶ the Licensing Board accepted the staff's conclusion that the frequency with which a flammable methane cloud produced by an LNG tanker accident could be expected to reach the Hope Creek plant is 1×10^{-7} per year. This conclusion was based on the assumption that 360 loaded LNG tankers would pass the plant each year.²⁷ That assumption, in turn, postulated the construction and operation of both Transco's Raccoon Island LNG terminal and Tenneco's West Deptford LNG terminal further up the river.²⁸ After the Licensing

²⁴ Appl. Exh. 11, pp. 20-27.

²⁵ The calculation of the meteorological factor is illustrated in Applicant's Exhibit 11, at pp. 23-27. It consists of the sum of probabilities that a vapor cloud produced in each one-mile stretch of the Delaware River channel will reach the plant site. These individual probabilities are based on actual meteorological data for the Hope Creek site. For a one-tank spill, the probability that a flammable cloud would reach the site from distances of greater than 12 miles in either direction on the river was taken by the applicant to be zero. *Id.* at 26.

²⁶ At p. 233, *supra*.

²⁷ See Staff Exh. 1-F, p. 14.

²⁸ 5 NRC 694, at 700.

Board rendered its decision, Transco withdrew its application to the Federal Power Commission ("FPC") for approval of the Raccoon Island terminal.²⁹ Thus, based on the Licensing Board's acceptance of the staff's figure, this factor would have to be reduced to 254.³⁰ Although the FPC staff has tentatively recommended that the application for permission to construct and operate the West Deptford terminal not be approved because the transportation of LNG in the Delaware River "would result in an unacceptable risk to the public,"³¹ the proposal is still pending before the agency. Since it is our obligation to be conservative on matters of safety, we must assume that it will be approved and that the tanker traffic will therefore materialize.

2. Accidents per Mile

The applicant used a ship collision rate of 1.5×10^{-6} per mile, based on data represented as applicable to tankers and freighters in the Delaware River.³² This rate was found to be reasonable by both the staff and the Licensing Board.³³ It can be calculated from information presented in Applicant's Exhibit 9—a history of 7 tanker and freighter collisions in 5 years for a traffic level of 9553 ships per year along the 100-mile portion of the river navigable by ocean-going vessels. At oral argument, it was stated by applicant's counsel that the 7 collision figure was obtained from a total number of collisions for this time period of 43.³⁴ The reduction to 7, we were there told, was accomplished by disregarding certain collisions³⁵ of types that allegedly could not occur in the stretch of river adjacent to Hope Creek, such as those between moving and moored vessels and those between large vessels and tugs.³⁶ This distillation process is neither described nor justified in the record.³⁷ In the absence of sworn expert testimony explain-

²⁹ Joint intervenors' brief, p. 4.

³⁰ Joint intervenors argue it should be 292. The Licensing Board should take another look at that question on remand.

³¹ Board Exh. 2, p. 158. It should be noted that the risk referred to by the FPC staff is the direct risk to members of the public near the river resulting from LNG fires. The FPC study did not consider the risk of an LNG fire near a nuclear power plant.

³² Appl. Exh. 9, pp. 9-10 and 19-22.

³³ 5 NRC 694, 703-04.

³⁴ App. Tr. 61-62.

³⁵ We have assumed throughout that the term "collision" means an accident in which two moving ships collide with each other. Applicant's technical experts appear to have used it in this sense as well. See Appl. Exh. 11, p. 32.

³⁶ App. Tr. 62-63.

³⁷ *Id.* at 68-72. Applicant's counsel asserted (*id.* at 72), that it was shown in the answers to questions 1 and 9 and in the appendix to question 9 of Applicant's Exh. 11. That is not so. Although the appendix to question 9 does set forth reasons for concluding that a collision is the only type of tanker accident which could result in the release of LNG, it neither explains nor even reveals the reduction from 43 to 7 collisions.

ing and justifying it, and in the absence of the opportunity for cross-examination on such testimony, we cannot accept the validity of this reduction.

On December 1, 1976, the FPC staff issued draft environmental impact statements for the proposed Raccoon Island and West Deptford LNG terminals. These were made available to the parties before the hearing and later admitted into evidence as Board Exhibits 1 and 2, respectively.³⁸ The data used by the FPC staff in its analysis indicate a total of 28 tanker collisions along the Delaware River in a six-year period (1969 through 1974) and an average of 2280 tanker trips per year.³⁹ The FPC data can be used to calculate a per-mile tanker collision rate for the entire river yielding a value of about 2×10^{-5} , which is an order of magnitude greater than the one arrived at by the applicant.⁴⁰

At oral argument, counsel for both the applicant and the joint intervenors cited differences between the FPC's study and the applicant's study which might explain this variance. However, the record is devoid of any systematic analysis by expert witnesses for either the applicant or the staff of the differences between the two studies and a reasoned thesis as to which of the two approaches is more reasonable.⁴¹ And although it admitted the FPC drafts into evidence, the Licensing Board failed to explain why it disagreed with the FPC staff's conclusions as to accident rate. These considerations alone would be grounds for reversal. As we recently made clear in *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33 at 41, 76-77 (July 26, 1977), a licensing board has an obligation to explain its rejection of evidence which is reasonable on its face and contrary to that which the board accepts. "A board must do more than reach conclusions; it must 'confront the facts.'"⁴²

The problem here is aggravated because the record does not contain sufficient evidence to reject the FPC staff's methodology. As the accident rate is an important factor in determining the safety issue involved in this case, it was incumbent on the applicant, the staff and the Board below to ensure that the discrepancy was properly explained, even if this meant that additional evidence was needed.⁴³

³⁸ 5 NRC 694, at 698.

³⁹ Board Exh. 1, Attachment A, pp. 12-13; Board Exh. 2, pp. 180-81.

⁴⁰ Dr. Read, a witness for the staff, agreed that the FPC accident rate would be much greater than the one arrived at by the staff and acknowledged that he had not looked into the basis for the FPC's accident rate (Tr. 2935-37).

⁴¹ This is true even though the FPC drafts were issued over a month and a half before the Licensing Board hearing and were available to the parties before that hearing. As to the latter point, see Tr. 2628, 2666; App. Tr. 114, 124-25. If the staff or the applicant did not have enough time to make a thorough comparative analysis of the FPC study with theirs in that time, they should have asked for a postponement of the hearing.

⁴² *Id.* at 41, quoting from *Wingo v. Washington*, 395 F.2d 633, 636 (D.C. Cir. 1968).

⁴³ See *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-124, 6 AEC 358, 362 (1973).

The accidents-per-mile data situation is not helped particularly by statements in Staff Exhibit 1-F (at p. 8) which report an average of 15 vessel "casualties" per year for Delaware River traffic of 5,000 ocean-going vessels.⁴⁴ Despite the fact that this casualty figure apparently includes incidents of all types (collisions, rammings, and groundings) and it appears from oral argument that applicant's study excluded many of these types of incidents,⁴⁵ the staff made no attempt to corroborate applicant's collision rate value with these figures.

A study by the Oceanographic Institute of Washington is cited in the FPC drafts which indicates a tanker casualty rate for the Delaware Bay of 5×10^{-3} casualties per trip.⁴⁶ For a trip which involves the 200-mile passage up and down the river, this information yields a casualty rate of 2.5×10^{-5} per mile. This figure, modified by additional information in the FPC study which indicates that approximately 40% of tanker casualties in harbors or entrances are collisions,⁴⁷ yields a tanker collision rate for the Delaware Bay of 1×10^{-5} .

Of all the tanker accident rates which can be determined from information appearing in this record, applicant's is by far the lowest. We were told at oral argument that there is a rational basis for disregarding certain types of accidents and some of these are discussed in the record.⁴⁸ But no clear picture is provided of how the applicant finally determined a tanker accident rate based on the data at hand; nor is this rate justified in the face of apparently conflicting and larger values.

The record shows that there have been some six million miles of actual LNG tanker traffic in the world to date and that this traffic has occurred "without major accident."⁴⁹ The average voyage length for an LNG tanker was stated to be 4,000 miles.⁵⁰ From these data, the number of LNG tanker calls at port could be estimated. However no attempt was made to analyze existing LNG tanker experience in ports and harbors as a check on the validity of applicant's accident rate.⁵¹ It is applicant's position that LNG tankers should operate with a lower

⁴⁴For the navigable 100-mile stretch of the Delaware River, the data referred to by the staff can be used to calculate a per mile "casualty" rate of 3×10^{-5} , a value 30 times as large as the applicant's "collision" rate.

⁴⁵Appl. Tr. 61-76, 85-88.

⁴⁶Board Exh. 1, pp. 7-8; Board Exh. 2, pp. 175-76. As this was a study of "major port areas" (*ibid.*), the term "Delaware Bay" must be taken to include the Delaware River up to Philadelphia.

⁴⁷Board Exh. 1, p. 9; Board Exh. 2, p. 177.

⁴⁸Tr. 2627; Appl. Exh. 11, pp. 30-33.

⁴⁹Staff Exh. 1-F, p. 7.

⁵⁰Appl. Exh. 10, p. 15.

⁵¹The FPC environmental statements refer to an Oceanographic Institute study of tanker casualties for seven major port areas of the United States. Board Exh. 1, pp. 9-10; Board Exh. 2, pp. 175-76. These indicate that, at least for those ports considered, there is a generally applicable casualty-per-port-trip probability (4.4×10^{-3}) which is independent of miles traveled within the port itself.

casualty rate than conventional ships because of certain design features of these ships and the special procedures utilized when bringing LNG tankers into port.⁵² The actual LNG tanker data might be able to shed light on the soundness of this position. From the evidence of LNG experience now in the record, it is not clear whether the absence of a "major accident" also means that there have been no accidents of the type which would have been counted within the guidelines established by the Coast Guard.⁵³ Thus, it may be that there have been casualties of nonmajor proportions which might be used to estimate a casualty rate for LNG ships.⁵⁴

3. Spills per Accident

The applicant employed a spills-per-collision probability of 0.005 which it explained was determined by a Minorsky-type calculation⁵⁵ of the depth of penetration into the LNG tanker by a colliding ship.⁵⁶ If this depth is equivalent to the distance inboard of an LNG tank, the tank's contents are assumed to be rapidly spilled. In performing these calculations, the relative velocity of colliding ships was assumed to be uniformly distributed between 0 and 12 knots, an assumption presented with no basis.⁵⁷ Further, except for the one-mile region of the Delaware River channel directly adjacent to the Chesapeake & Delaware Canal, the collisions were assumed to occur only at angles between 90° (grazing) and 45°. ⁵⁸ Collisions between ships moving more nearly perpendicularly to each other (beam-on collisions) were eliminated on the basis of the limited width of the ship channel and the judgment that mooring in the vicinity of Hope Creek is unlikely.⁵⁹ The substantial effect of this elimination is shown by the calculation of a spill probability of 0.05 for collisions near the C&D canal, where beam-on

⁵² Appl. Exh. 11, pp. 20-22.

⁵³ The applicant's technique for computing the probability of an LNG spill involves multiplying the collision probability by a spills-per-collision factor for which the value 0.005 was employed. Therefore, a mere collision, in a probabilistic sense, may be a far cry from an incident of the kind which might cause the release of LNG and hence be termed a "major accident."

⁵⁴ See App. Tr. 27, 136.

⁵⁵ This approach is based on a relationship between structural damage and the magnitude of the energy lost in a collision between two ships, as determined in a published empirical study by Minorsky (Appl. Exh. 9, p. 37).

⁵⁶ Appl. Exh. 11, p. 22; Appl. Exh. 10, pp. 1-3.

⁵⁷ Tr. 2703, 2705-08. The fact that 12 knots may be the speed limit for Delaware River traffic hardly constitutes justification for such a uniform distribution. Tr. 2705-06.

⁵⁸ Appl. Exh. 10, p. 3; Appl. Exh. 11, p. 22. In the Minorsky analysis, the impact angle is considered to be 0° when the ships are moving perpendicularly to each other. Appl. Exh. 10, p. 2.

⁵⁹ Appl. Exh. 10, p. 3; Appl. Exh. 11, pp. 28-29; Tr. 2668-70.

collisions were deemed possible.⁶⁰ Since the angle-of-collision assumption and the relative-speed assumption used by the applicant tend to result in low spill probability values, additional foundations for them should have been provided using actual ship collision experience.

It is noteworthy that the FPC environmental statements⁶¹ cite two studies of actual tanker collisions in which the average penetration depth was found to be approximately 5 meters.⁶² This exceeds the distance inboard of the LNG tank wall (approximately 4 meters)⁶³ and raises some doubt regarding the validity of the Minorsky calculation predictions. This matter should be pursued in the hearing on remand.

The applicant did not consider grounding or ramming accidents in calculating the probability of an LNG event.⁶⁴ Groundings were eliminated for the reason that the bottom of the Delaware River is principally sand and mud, so that, if a tanker ran aground, there would be no breaking open of an LNG tank and hence no spilling of its contents. The FPC environmental statements include grounding accidents as having the potential for the penetration of LNG tanks but use a spill probability for them which is lower than that used for collisions.⁶⁵ Although the river bottom argument tends to support the applicant's position that a grounding incident itself would release no LNG, such a mishap might occasion subsequent abnormal events (such as emergency off-loading of LNG⁶⁶ or a collision involving the stranded vessel) in which an LNG release would be a possibility. Therefore, we question whether grounding incidents should be totally discounted rather than an attempt made to assign to them a spill probability appropriate to their nature.

4. Vapor Clouds per Spill

Both applicant and staff assigned a value of 0.1 (10%) to the probability that an LNG spill would result in the formation of a cloud of methane gas.⁶⁷ For the vast majority of spills (90%), it is assumed that the vapor would ignite at

⁶⁰ Appl. Exh. 11, p. 22.

⁶¹ Board Exh. 1, p. 23; Board Exh. 2, p. 191.

⁶² D. M. Bovet, "Preliminary Analysis of Tanker Grounding and Collisions," U. S. Coast Guard (January 1973); J. P. Comstock, J. B. Robertson, Jr., "Survival of Collision Damage Versus the 1960 Convention on Safety of Life at Sea," *Society of Naval Architects and Marine Engineers Transactions*, Vol. 69, p. 461 (1961). The FPC statements erroneously give the date of the latter as 1969.

⁶³ App. Tr. 119.

⁶⁴ See Appl. Exh. 11, pp. 31, 33 and 39.

⁶⁵ Board Exh. 1, p. 21; Board Exh. 2, p. 189.

⁶⁶ Tr. 2683-85.

⁶⁷ Appl. Exh. 9, p. 6; Tr. 2715; Staff Exh. 1-F, p. 14.

the site of the collision, consuming the methane and preventing the creation of a flammable cloud.⁶⁸ Evidence was presented to show that a single tank spill which ignites an LNG fire at the collision site in the Delaware River would not present a hazard to the Hope Creek facility.⁶⁹

Though various arguments were made in support of the thesis that, in the event of a tank rupture accident, sufficient ignition sources would be present to cause the vapor to burn at the accident site,⁷⁰ no quantitative basis was presented for the use of the 0.1 cloud formation probability value. Staff Exhibit 1-F (at p. 10) refers to a study performed by Science Applications, Inc., which suggests that an LNG spill on land would have a 94% probability of ignition. The staff report opines that, if the sources of ignition on the deck of the tanker were similar to those on land, that study would predict the same probability of ignition on the tanker.⁷¹ Intuitively, we have some trouble making a direct comparison between ignition sources that might exist on land and those that would be present at the site of and surrounding a ship collision. And none is made by the staff. Moreover, although (as noted above) the staff report suggests that an analytical method exists for calculating the likelihood of the formation of a cloud following an LNG spill, we are aware of no such calculation being performed for the specific type of accident at issue here.

In sum, we find insufficient support in the record for the assumed probability value for vapor cloud formation.⁷² We believe that a greater effort can and should be made to arrive at reasonable estimate of that probability.

5. The Meteorological Factor

The applicant's meteorological factor was determined by computing both the likelihood that an LNG cloud formed in any one-mile section of the Delaware River would be transported by the prevailing wind to the Hope Creek site

⁶⁸ Appl. Exh. 10, pp. 4-5; Appl. Exh. 11, p. 23; Tr. 2882.

⁶⁹ Appl. Exh. 11, pp. 9-12; Tr. 2723-27. Unfortunately, however, only the effects of the single spill fire itself were investigated. It is not at all clear that the spill of one tank and its ignition at the collision site might not result in conditions that would cause the contents of the other LNG tanks to become involved in the fire or to explode. Calculations presented in the FPC study (Board Exh. 1, p. 77 and Table 1 on p. 80)(Board Exh. 2, p. 244 and Table 1 on p. 247) indicate that the thermal radiation effects and the size of the pool fire roughly double for a 5-fold increase in the value of the LNG release (25,000 to 125,000 cubic meters).

⁷⁰ Appl. Exh. 9, p. 6; Appl. Exh. 10, pp. 4-5; Appl. Exh. 11, p. 23.

⁷¹ Staff Exh. 1-F, p. 10.

⁷² The FPC environmental statements use the same ignition probability as does the applicant but without presenting any more basis for it than the qualitative or intuitive judgment of experienced persons. Board Exh. 1, p. 26; Board Exh. 2, p. 194.

and the chance that it would arrive at the site in the flammable concentration range. The sum of these probabilities for all one-mile sections of the river yield an effective length of travel along the river which would result in a cloud at the site, if indeed a cloud were formed.⁷³ Actual site meteorological data were used to perform these calculations and a spectrum of meteorological stability conditions was assumed. Using the applicant's data, a vapor cloud formed from a one-tank (10,000-ton) spill could reach the site in a flammable concentration from a distance of up to 12 miles in either direction on the river.⁷⁴ For the cloud to remain flammable for such an extended period of travel would require very stable atmospheric conditions.

The FPC analysis of this factor results in a maximum flammable range of less than 4,000 feet.⁷⁵ Its critical assumption is that a Pasquill Type D stability condition will prevail because "[t]he more stable 'E' and 'F' categories are normally limited to rural areas on clear nights and having a low wind."⁷⁶ However, applicant's meteorological data collected on Artificial Island show that Pasquill Type E and F conditions occur there 23% of the time.⁷⁷ Moreover, although the FPC environmental statements argue that Type E and F conditions "would have little effect on a methane cloud,"⁷⁸ they offer no support for this conclusion. For these reasons, we reject the FPC's evaluation of the meteorological factor. We accept applicant's analysis of this question because it is reasonable and appropriately conservative.

The joint intervenors contend that, given the statistical nature of the Gaussian cloud dispersion prediction model, flammable pockets (regions of higher than average concentration) may well exist beyond the calculated flammable range of a cloud.⁷⁹ That is indeed true. However, it was pointed out during the hearing that, even if such a small pocket were to ignite, only the pocket itself (not the entire cloud) would burn, and the fire would quench itself.⁸⁰ Further, ignition in these circumstances would require the coincidence of a discrete ignition source and a gas pocket in the flammable range. We conclude that calculating the range of flammability on the basis of average cloud characteristics properly addresses the likelihood of harm.

⁷³ Appl. Exh. 11, pp. 23-27.

⁷⁴ *Ibid*; see Appl. Exh. 9, p. 50.

⁷⁵ See Board Exh. 1, pp. 27, 66-74; Board Exh. 2, pp. 195, 233-41.

⁷⁶ Board Exh. 1, p. 70; Board Exh. 2, p. 237. For an explanation of Pasquill's stability categories, see Atomic Energy Commission, "Meteorology and Atomic Energy 1968" (TID-24190), at 101-03.

⁷⁷ Appl. Exh. 10, p. 6.

⁷⁸ Board Exh. 1, p. 70; Board Exh. 2, p. 237.

⁷⁹ Joint Intervenors' Brief, p. 16.

⁸⁰ Tr. 2752-53.

II. LPG TRAFFIC⁸¹

The main subject of the hearing below was an assessment of the threat posed to the Hope Creek facility by LNG traffic on the Delaware River. However, Staff Exhibit 1-F and Applicant's Exhibit 9 also deal with hazards presented by other forms of river traffic. In particular, the staff concludes that the probability of a flammable vapor cloud at the plant due to a liquefied petroleum gas (LPG) tanker accident on the Delaware River is 5×10^{-8} per year, assuming a yearly traffic of 50 loaded LPG ships.⁸² This probability is half as great as that estimated for a similar LNG event, where the hypothetical traffic is 360 ships per year (more than seven times as many).⁸³ These figures suggest that the threat posed to the plant by each passing LPG tanker is much greater than that presented by each passing LNG vessel.

We have carefully reviewed the evidence in the record to ascertain the adequacy of the Licensing Board's assessment of the threat posed by LPG traffic. We find there areas of uncertainty similar to those related to LNG. The method used to determine the likelihood of an LPG vapor cloud (propane gas) at the site is similar to that utilized in the case of LNG.⁸⁴ We will address ourselves in turn to the various conditional probability factors used in analyzing the LPG threat, commenting on specific items.

1. Ships per Year

The staff used a value of 50 LPG ships and 10 butane ships per year, the former figure being based on the assumption that a large LPG storage facility already built upstream of Hope Creek will operate near its planned capacity.⁸⁵ The applicant used actual traffic as of 1972 which was 2 LPG ships and 10 butane ships per year.⁸⁶ Some clarification is required as to the expected magnitude of the traffic during the life of the plant.

⁸¹In the prior section of this opinion, we dealt solely with LNG traffic. In this section, we focus primarily on liquefied petroleum gas (LPG) traffic. (Although Staff Exh. 1-F at p. 14, refers to "propane and LPG," they are virtually the same.) However, our concerns include other forms of river traffic which could lead to flammable vapor clouds at the site, *i.e.*, butane tankers. The Licensing Board added up the values at p. 14 of Staff Exh. 1-F and found that "the cumulative probability that a flammable gas cloud of some type could reach the Hope Creek facility is 1.6×10^{-7} ." 5 NRC 694, 710-11. Although, on this record, we cannot accept all of the probability values found by the Licensing Board, we do agree that it is the cumulative probability which must be considered in deciding whether it is necessary to design the plant to protect against a gas cloud fire.

⁸²Staff Exh. 1-F, p. 14.

⁸³*Ibid.*

⁸⁴Compare Appl. Exh. 9 at p. 6 with pp. 9-10; see Staff Exh. 1-F, pp. 13-14.

⁸⁵Staff Exh. 1-F, pp. 5-6 and 14.

⁸⁶Appl. Exh. 9, pp. 17-18.

2. Accidents per Mile

The applicant and staff used the same value here as for LNG traffic. This seems reasonable, subject to all of the concerns we have already expressed regarding LNG accident rates.

3. Spills per Accident

For LPG traffic, a spills-per-collision value of 0.02 was used.⁸⁷ This is four times greater than that for LNG ships. Applicant seeks to explain this difference with the following reasons; (1) LPG ships are smaller, (2) they do not incorporate the latest technology for cargo containment and ship safety, and (3) collisions from all angles are thus possible in the Delaware River Channel, not just collisions at angles from 90° to 45° as was assumed for LNG ships.⁸⁸ However, the spill probability of 0.02 generated under these conditions is questionable when it is remembered that the applicant calculates a spill probability for the larger LNG ships of 0.05 in the vicinity of the C & D Canal, a point in the river where collisions at all angles were considered possible for LNG ships.⁸⁹ It is not clear why the spill probability for the smaller LPG ships under all-angle collision conditions should not be at least as large as that for the LNG ships.

4. Vapor Clouds per Spill

The value of 0.1 is used for LPG spills as well as LNG.⁹⁰ The concerns expressed in our discussion of this value with respect to LNG spills is equally applicable to LPG spills.

5. The Meteorological Factor

The meteorological factor used by the applicant and staff for the two types of accidents, LPG and LNG, are approximately the same. The applicant outlined the calculation in its Exhibit 9 and noted that the volume of liquefied gas released in a spill (10,000 tons) would be the same for both types of accident.⁹¹

The record indicates, however, that the magnitude of concentrations in which propane (LPG vapor) is flammable is lower by a factor of 2.5 than that for methane (LNG vapor), *i.e.*, 2% to 6% compared with 5% to 15%.⁹² It seems

⁸⁷Id. at p. 6; Staff Exh. 1-F, p. 14.

⁸⁸Appl. Exh. 9, pp. 23-24.

⁸⁹Appl. Exh. 11, p. 22.

⁹⁰Appl. Exh. 9, p. 6; Staff Exh. 1-F, p. 14.

⁹¹Appl. Exh. 9, p. 50.

⁹²Staff Exh. 1-F, p. 10.

to us that this difference should cause the range (distance from the collision) within which propane remains flammable to be larger than that for methane, resulting in a larger meteorological factor. The calculations referred to may incorporate and account for this difference, but, to the extent that the calculations are explained in the record, the flammability range factor does not appear. This matter should be pursued and clarified on remand.

SPECIFIC CONCERNS TO BE ADDRESSED AT REMAND

We expect that, on remand, the Licensing Board will address *all* of the doubts and concerns expressed in this opinion. However, we list the following matters as among the most important of those which must be resolved.

1. The ship casualty data used to generate the accidents-per-mile probability should either be shown to be consistent with all other Delaware River accident data or rationally adjusted. Removal of any types of casualties from the data base must be justified. The category of casualty known as "rammings" should be defined. If this category includes accidents involving a moving and a stationary ship, those events either should be included in the collision data base or a reasonable basis provided for their elimination. The accident rate arrived at should be tested by a comparison with actual experience in comparable shipping traffic.

2. Existing LNG tanker experience should be analyzed to the extent possible to determine whether the special precautionary traffic rules for this type of ship have resulted in a lower casualty rate in rivers and harbors. Obviously, if there have indeed been no casualties, this experience can only be expected to yield an upper bound of casualty rate within specified limits of confidence.⁹³

3. The record indicates the existence of several studies which, from their titles, would appear to bear directly on the LNG hazard issue but which were not considered by the applicant or, more pertinently, by the staff in its review of the applicant's analysis (e.g., "Risk Assessment for LNG Marine Operations, Raccoon Island, New Jersey," by Science Applications, Inc. (December 1975); "Analysis of Marine Transportation for the Maritime Administration," Vol. 1, Booz-Allen Applied Research, Inc. (November 1973)).⁹⁴

We reiterate that, in a probability analysis such as this in which little actual data exist, it is incumbent upon the analyst to survey thoroughly the existing

⁹³The discussion of existing LNG traffic experience which appears as an addendum to Appl. Exh. 10 includes a calculation of an upper bound accident rate based on total miles traveled, rather than the more pertinent value—that of miles traveled in rivers and harbors.

⁹⁴Tr. 2862-64. Another valuable source of information, which contains an extensive bibliography of LNG studies covering, *inter alia*, risk analysis, explosion hazards and spills is the U. S. Coast Guard publication, "Liquefied Natural Gas, Views & Practices, Policy and Safety," CG-478 (February 1, 1976).

literature for pertinent studies of analogous or, as here, exactly the same circumstances. We expect such an effort to be made by the parties prior to the further hearing on this matter.

4. In consideration of the spills-per-collision probability, at the minimum, the reports of Bovet and Comstock (see n. 62, *supra*) should be compared with the results of the Minorsky-type analysis to ascertain the validity of the latter.

In addition, an attempt should be made to determine if there is a difference in spill vulnerability between LNG ships of the "free-standing tank" or "membrane tank" types which have undergone a collision. Also, the basis for applicant's limitation of collision angles should be more fully explored.

5. A defensible basis for the 0.1 cloud-per-spill probability assumption should be sought. It is possible that the methods used in the Science Applications, Inc., study referred to in Staff Exhibit 1-F (at p. 10) would be sufficient to provide a supportable value.

6. In the event of a collision which results in a single tank LNG spill and fire in the river near the plant, the likelihood and consequences to the plant of the subsequent involvement of the entire LNG cargo should be considered.

7. The questions we have raised with respect to LPG traffic should be examined.

SUSPENSION OF CONSTRUCTION

On August 1, 1977, joint intervenors moved for a stay of construction pending our decision of this appeal. By the time we received responses from both of the other parties, we were well on the way toward issuance of this decision. The motion has thus become essentially moot and need not be dealt with.

However, now that we have decided to reverse and remand for further hearings, we must consider whether construction of the plant should be suspended pending the issuance of the Licensing Board's decision on remand. The plant is in the early stages of construction. It is our judgment that nothing that will be done in the next four months will prevent applicant from making changes in the plant to protect it against fire from a methane, propane or butane cloud, should it be decided that the probability of such a fire is great enough to require such protection. Moreover, as the applicant recognizes,⁹⁵ any construction carried out before final resolution of this matter is at its own risk. Nevertheless, we think it hardly in the public interest to permit construction to proceed to such a stage where changes needed to deal with a safety problem have either been

⁹⁵See its response to joint intervenors' motion for a stay, dated August 9, 1977, at p. 12, n. 26.

foreclosed or made prohibitively expensive. And we are disturbed that it took two and a quarter years to complete proceedings on the last remand in this case, despite the fact that the hearing only lasted two days and that the Licensing Board's opinion was issued within a reasonable time thereafter.

Taking all of the foregoing considerations into account, we will permit construction to continue for four months following the issuance of this decision. At the same time, we direct the Licensing Board to establish a schedule for the submission of new evidence and a hearing thereon which will permit it to issue a decision within that four-month period. If a decision is not forthcoming within that time (and we do not intend to require it to be issued by then if it should turn out to be impossible to do an adequate job in that time frame), the applicant will be required to show cause to the Licensing Board as to why construction should not be suspended pending its issuance. In so doing, applicant will have to make a showing that it will be feasible to adapt the plant design so as to protect against gas cloud fires and that continued construction will not prevent it from doing so or make such adaptation prohibitively expensive. The Licensing Board should conduct that show cause proceeding on an extremely expedited basis. Applicant should not be heard to complain at that time that it needs extensive time to prepare its evidence; it is forewarned now and should be prepared to proceed.

CONCLUSION

For all the reasons stated, the supplemental initial decision of March 28, 1977, is *reversed and remanded* for further proceedings consistent with this opinion.⁹⁶ Decision of the issue raised as to the necessity to prepare and circulate a supplemental NEPA statement is *deferred* pending resolution of the issues on remand.⁹⁷ The motion to admit David Caccia as an appellant out of time is *denied*, but without prejudice to his continued participation in the hearings below on remand. Joint intervenors' motion for a stay of construction pending our decision of this appeal is *dismissed as moot*. Construction of the plant may continue for now, subject to the possibility of suspension later, as explained in detail above.

⁹⁶As should be obvious from our discussion in the previous section, we are not reinstating Condition 3E(19) which was deleted from the construction permits by the decision below and is, in any event, *passé*.

⁹⁷Proper resolution of this issue may be affected by the outcome of the remand of the safety question.

It is so ORDERED.⁹⁸

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margeret E. Du Flo
Secretary to the Appeal Board

⁹⁸ Counsel unfamiliar with NRC procedures would be well advised to consult two new Commission regulations effective June 1, 1977 (42 Fed. Reg. 22128-22130 (May 2, 1977)). They are 10 CFR §2.786(b) which permits a party to seek Commission review of one of our decisions and 10 CFR §2.788 which governs motions for stays pending the filing of and decision on such petitions for review. Both courses are open only for a limited period.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Sheldon J. Wolfe, Chairman
Dr. John R. Lyman
Dr. Marvin M. Mann

In the Matter of

Docket No. STN 50-437

OFFSHORE POWER SYSTEMS

(Manufacturing License for Floating
Nuclear Power Plants)

August 1, 1977

Upon motions by intervenors to amend and expand contentions based on new matters raised in Part II of the Final Environmental Statement, Licensing Board rules on admissibility of proffered contentions.

Motions granted in part and denied in part.

RULES OF PRACTICE: CONTENTION REQUIREMENT FOR
INTERVENTION

In order to be admissible, contentions must be specific and factually supported. Contentions which are conclusional or barren and unfocused are of no assistance in the resolution of the issues to be decided and are inadmissible.

MEMORANDUM AND ORDER
RE: MOTIONS TO AMEND AND
EXPAND CONTENTIONS

On November 19, 1976, the following intervenors filed motions to amend and expand (environmental) contentions: the City of Brigantine (CB), National Resources Defense Council (NRDC), and Atlantic County Citizens Council on Environment (ACCCE) which also moved on behalf of Atlantic County Board of Chosen Freeholders. On December 6 and December 9, 1976, Applicant and the NRC Staff respectively answered these motions.¹

¹ Beginning on September 20, 1976, the Board proceeded to hear evidence on radiation health and safety contentions. The latest hearing was held in May 1977.

The motions by ACCCE and CB, were submitted as being based upon a stipulation dated March 8, 1976, and upon this Board's Order of September 28, 1976.² The stipulation and the Order, among other things, provided in part that (a) a party might move to amend or expand contentions upon a showing of a rational connection between any new matters in Part II of the Final Environmental Statement (FES) and in Part III (the Draft) and the proposed contentions, (b) within seven days after the date of filing of any proposed amended or expanded contentions, discovery with respect thereto should be requested, (c) responses to such discovery and completion of such discovery should be no later than seven days after the receipt of such discovery requests, and (d) within ten days thereafter, any party must submit to the Board its amended or expanded contentions which the Board would then rule admissible or inadmissible for evidentiary purposes. None of the intervenors sought discovery after initially filing their motions to amend and expand contentions. Only the Staff sought discovery through interrogatories served upon the three intervenors. Answers to most of the Staff interrogatories were concluded on May 3, 1977—it appears that ACCCE has not responded to all of the interrogatories.

On May 20, 1977, the Board heard the parties' oral arguments.³

ACCCE

Contention I

ACCCE merely asserts that, in Part II of the FES, the Staff inadequately considered and improperly dismissed various alternatives to the licensing of the proposed floating nuclear plants. ACCCE's motion is denied with respect to subparts A and C through G of this contention. The contention is in the main inadmissible because it is conclusional and fails to provide the necessary specificity and factual bases as required by §2.714 of the Rules of Practice. *Tennessee Valley Authority* (Browns Ferry Nuclear Plant, Units 1 and 2), 3 NRC 209, 212 (1976). As indicated, *supra*, ACCCE did not avail itself of the op-

²NRDC was not a party to the stipulation. Applicant argues that we should deny NRDC's motion because, contrary to 10 CFR §2.714(a), said intervenor did not make a substantial showing of good cause for failing to file on time its amended and expanded contentions. The omission is not fatal because obviously Part II of the FES had not been issued at the time NRDC petitioned to intervene.

³On June 24, 1977, the City of Brigantine notified the Board that it withdrew as a party. Deeming said notification to be a motion for leave to withdraw, we granted the motion on July 27, 1977. Inasmuch as the Board admitted one of the CB's contentions on May 20, 1977, for reasons stated on the record, the Board on its own initiative will retain it as an issue. This issue is listed, *infra*, and the parties are requested to submit written direct testimonies thereon.

portunity to seek discovery and thereafter to resubmit particularized, factually supported amended and expanded contentions. Contentions which are barren and unfocused are of no assistance to us in the resolution of the issues to be decided. See *BPI v. Atomic Energy Commission*, 502 F.2d 424, 429 (1974). Further ACCCE's reliance on *Aeschliman, et. al v. NRC*, 547 F.2d 622 (1976), *cert. granted*, 35 L.W. 3570 (1977) is misplaced. As the Appeal Board recently noted, "[t]he effect of *Aeschliman* is simply to reduce the burden which must be assumed by intervenors desiring to have energy conservation considered in a particular licensing proceeding." *Metropolitan Edison Co., et. al.* (Three Mile Island Nuclear Station, Unit 2), ALAB-384, 5 NRC 612, 618 (1977). We are not refusing to admit contentions as issues until or unless ACCCE or any other intervening party first brings forward information satisfying the strictures of a "threshold test"—i.e. we do not require that intervenors show that their contentions are susceptible to a reasonable degree of proof. However, we do insist upon compliance with 10 CFR §2.714, which procedural rule the Court of Appeals for the District of Columbia upheld in *BPI v. Atomic Energy Commission, supra*. Had ACCCE properly proposed this contention, we would have admitted it as an issue, and thereafter at the hearing, pursuant to §2.732, the Applicant would have the burden of proof.

Subpart B of this contention, as particularized and discussed at page 5 of ACCCE's supporting Memorandum, asserts that Part II of the FES did not address the alternative of industrial co-generation, which is a tried and tested technology. We defer ruling on this subpart because it may be mooted in that the Staff advises that this matter will be addressed in a forthcoming addendum to Part II (Tr. 6575).

Contention II

Certain portions of this contention are inadmissible—examples A, B, D, and F set forth at page 6 of ACCCE's supporting Memorandum are conclusional, unparticularized and no factual bases are given as required by §2.714. However, the balance of the contention is admitted and reads as follows:

The FES Part II cost-benefit analysis underestimates the total direct and indirect costs of the FNP's and grossly overstates the benefits because of (1) the conclusion that FNP's will produce a net energy yield (positive), without regard to the energy impact if less than eight are constructed and sold or if the FNP's, due in part to the unique stresses of the alien marine environment, fail to operate for their planned useful life, (2) the failure to consider cost of decommissioning the breakwater as a potential cost, (3) the failure to compute the cost impact if the FNP's are required to use cooling towers at inshore sites, (4) the failure to consider the various direct and indirect costs resulting from the foreclosure of alternative uses of coastline,

and because of (5) the fact that the costs were based upon 1972 costs whereas the benefits are 1988 benefits.

Contention III

Herein ACCCE asserts that the Staff's discussion in Part II of the FES concerning the probability and consequences of severe but allegedly unlikely accidents involving the release of significant quantities of radioactive materials into the environment is based upon inadequate data, unfounded assumptions and unrealistic optimism. At pages 6 and 7 of its supporting Memorandum, ACCCE proceeds to argue that the Staff erred in relying upon the *Reactor Safety Study*, WASH-1400, which has been criticized in various enumerated reports and studies. We find that the contention is conclusional and is not factually supported. The mere assertion that, for example, one of the enumerated reports questioned the use of the fault-tree methodology employed in the *Reactor Safety Study* does not make the contention a viable one. Indeed, during oral argument, counsel for ACCCE conceded that this contention "shouldn't be admitted on its face" but "should be admitted by reference to the other articles and the various criticisms lodged by responsible critics" (Tr. 6597). In any adversary proceeding, a party must do its own homework. There is no duty placed upon a licensing board to recast contentions offered by one of the litigants in order to make those contentions acceptable (*Commonwealth Edison Company* (Zion Station, Units 1 and 2), ALAB-226, 8 AEC 381, 406 (1974)) nor is there any such duty which requires the Staff to plow through various publications cited by an intervening party in order to determine the factual bases, if any, for a conclusional contention.

We note that Section 12.6.5 of Part II of the FES states that "The Staff agrees with the comment (DOI A-22) that the specific probability and consequence estimates of WASH-1400 are not necessarily completely applicable to water-based reactors. In the Staff's view, the principal factor of significance relates to consequences of accidental releases through the liquid pathway. As noted on page iii of this Statement, the results of the Staff's assessment of accidental release through the liquid pathway will be issued as a supplement to the Statement." We understand that this liquid pathway study, also referred to Section 12.1.1.3, will be issued as Part III to the FES in October 1977 (Tr. 5502). While we rule that the instant contention is inadmissible for the reasons stated above, we are not precluding ACCCE from timely moving to amend and expand contentions bearing on new matters set forth in Part III to the FES. (See the wording of the March 8, 1976, stipulation and of the Board's Order of September 28, 1976.) We trust that any such proposed contention(s) will be sufficiently particularized and factually supported.

Contention IV

ACCCE barrenly and conclusionally asserts that Part II of the FES (a) inadequately identifies and assesses the variety of ecological disruption which threatens the human and natural environment as a result of the construction and operation of the floating nuclear plants, and (b) fails to set forth conditions that would serve to prevent or mitigate these various adverse and potentially irreversible impacts. Part (a) of this contention is inadmissible inasmuch as it is conclusional, unparticularized and no factual support is given, and, *a fortiori*, part (b) is inadmissible.

While the instant contention is inadmissible for the reasons stated and the motion is denied, ACCCE is not precluded from timely moving to amend and expand contentions bearing on new matters in the Addendum to Part II of the FES, which we understand will be issued either in late July or in the fall of this year (Tr. 5501) and which may generally relate to the instant contention or at least relate to IV A and B (Tr. 6615). Again, we trust that any such proposed contention(s) will be sufficiently particularized and factually supported.

Contention V

ACCCE asserts that Part II of the FES fails to provide the detailed, complete and programmatic evaluation of the environmental, economic and social implications of committing the nation to a new nuclear technology. Both Applicant and the Staff point out that this contention is redundant in essentially or substantially tracking NRDC's sole contention which was admitted in the First Prehearing Conference Order dated April 15, 1974. This being so, ACCCE's motion is denied.

Contention VI

ACCCE asserts that Part II of the FES inadequately considers the consequences of long-term and accidental short-term exposure of ionizing radiation upon the health, safety and welfare of the work force which will be employed during the operational lifetime of the floating nuclear plants. The contention is inadmissible because it is conclusional and fails to provide the necessary specificity and factual bases as required by §2.714. Accordingly, the motion is denied.

NRDC

Contention A.1

NRDC asserts that Part II of the FES does not comply with the Atomic Energy Act of 1954, as amended, with NEPA, with NRC regulations and with

the guidelines of the Council on Environmental Quality. Further, it avers that Section 10 of Part II, Alternatives, inadequately discusses and analyzes (a) reduction in the rate of growth of energy demand and energy conservation, (b) estuarine or riverine siting, (c) energy sources which increase efficiency of energy production, and distribution, and/or consumption, (d) coal gasification and liquification, (e) oil shale, (f) small scale solar energy sources, (g) large scale energy sources, (h) coal, (i) oil, (j) gas, (k) geothermal, and (l) land-based nuclear power plants.

The contention is inadmissible in that it is obviously conclusional and vague as to wherein Part II of the FES does not comply with statutes, regulations and guidelines. Further, the contention does not explain wherein Section 10 inadequately discusses and analyzes various alternatives.

While the instant contention is inadmissible for the reasons stated and the motion is denied, NRDC is not precluded from timely moving to amend and expand contentions relating to estuarine and riverine siting which may be affected by new matters in the addendum to Part II of the FES.

Contention A.2

Herein, NRDC asserts that Section 10 (Alternatives) and Section 11 (Benefit-Cost Comparison) of Part II of the FES failed to address responsible opposing points of view—*i.e.* essentially none of the treatises, books, articles, or other sources referred to in NRDC's comments on the Draft Environmental Statement (DES) were addressed. NRDC's contention failed to specify those opposing points of view which were not addressed in Part II of the FES and failed to direct our attention to pertinent portions of these opposing view points which would be germane to the issues herein.

During oral argument, however, counsel for NRDC argued that Part II of the FES did not discuss *at all* oil and gas, secondary and tertiary recovery from oil wells, and heat pumps (Tr. 6631-32). After reviewing Part II, we find that oil and gas are discussed at pages 10-20 and 10-21 thereof. While we rule the contention to be inadmissible because of lack of specificity and of factual bases, we note that neither Applicant nor Staff was able to point out during oral argument wherein heat pumps, and secondary and tertiary recovery from oil wells had been dealt with in Part II. Therefore, the Applicant and the Staff are requested to present evidence on the following Board question: To what extent, if any, would the consideration of the utilization of heat pumps and of secondary and tertiary recovery from oil wells serve to modify the discussions and/or conclusions reached in Part II of the FES?

Contention A.3

NRDC asserts that the "Benefit-Cost Comparison" is inadequately discussed

and analyzed in that the economic issues and criticisms raised by many commentators on the DES were not factored into Part II of the FES.

Admissibility is denied. The matters of safeguards, storage of radioactive wastes, the cost of providing materials, and of the need for additional research and development were discussed in Sections 12.6.8, 12.6.9, 12.10.1 and 12.1.2.1 of Part II of the FES. NRDC's contention is faulty in failing to explain wherein the discussion and analysis of these matters are inadequate.

While the instant contention is inadmissible for the reason stated and the motion is denied. NRDC is not barred from timely moving to amend and expand contentions relating to the Benefit-Cost Comparison which may be affected by new matters in the Addendum to Part II of the FES.

Contention A.4

NRDC alleges that the Staff has prepared Part II of the FES under an erroneous view of its obligations under the Atomic Energy Act of 1954, as amended, and NEPA. This is pure argument and does not qualify as a contention. The motion is denied.

Contentions A.5 and A.6

In Contention A.5 NRDC avers that the discussion and analysis regarding research undertaken and not undertaken in Part II of the FES are inadequate, demonstrate a failure to address responsible opposing points of view, and constitute a failure to comply with NEPA, Section 102(2) (E). In Contention A.6, NRDC urges that the discussion of irradiated fuel is inadequate. The contentions are inadmissible because they are conclusional, unparticularized and fail to provide the factual bases as required by §2.714.

Contention A.7

Herein, NRDC asserts that the discussion and analysis of the safeguards issue are inadequate. Obviously, the contention is inadmissible in being conclusional, vague and in failing to set forth a factual basis. While the contention is inadmissible, NRDC is not barred from timely moving to amend and expand contentions relating to the safeguards issue which may be affected by new matters in the Addendum to Part II of the FES.

Contention A.8

In substance NRDC asserts that (a) Part II of the FES inadequately discusses the issues raised in NRDC's comments on the DES, (b) few if any

changes were made thereto in response to NRDC's comments upon the DES, and (c) the reasons offered by the Staff for not effecting the changes recommended by NRDC in its comments were insufficient or inadequate. Parts (a) and (c) of this contention are conclusional, unspecific and are not supported by factual bases. Part (b) fails as a contention because the adequacy of an FES is not adjudged on the basis of the number of changes effected in response to comments. The contention is inadmissible and the motion is denied.

An Issue Retained By the Board⁴

1. Section 12.10.4 of Part II of the FES is inadequate in that it does not take into account the special energy requirements needed to procure breakwater material, to construct the breakwater, to tow plants to the site and to provide shore to barge umbilicals. (Formerly, CB Contention I.4 in part.)

Dr. Lyman concurs but was not available to sign the instant Memorandum and Order.

IT IS SO ORDERED.

THE ATOMIC SAFETY AND LICENSING BOARD

Dr. Marvin M. Mann, Member

**Sheldon J. Wolfe, Esquire
Chairman**

**Dated at Bethesda, Maryland,
this 1st day of August 1977.**

⁴See footnote 3, *supra*. It should be noted that we deferred ruling on CB's Contention I.3 until the Addendum to Part II of the FES has been issued and deferred ruling on Contention III.1 until Part III to the FES has been issued.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Robert M. Lazo, Chairman
Dr. Emmeth A. Luebke
Dr. David R. Schink

In the Matter of

Docket Nos. STN 50-508
50-509

WASHINGTON PUBLIC POWER SUPPLY
SYSTEM

(WPPSS Nuclear Project Nos. 3 and 5)

August 1, 1977

Upon its review of the record and proposed findings of fact submitted by the parties, Licensing Board concludes that certain unresolved questions exist with regard to the fire protection system and in particular with its ability to function in the event of a safe shutdown earthquake.

Record reopened for submittal of additional information.

MEMORANDUM AND ORDER

In its review of the record to date and the proposed findings of fact submitted by the parties, the Board finds unresolved questions and conflicts which require us to reopen the record. The questions concern the fire protection system and in particular the ability of that system to minimize the effect of fires following a Safe Shutdown Earthquake.

The Staff's criteria for Fire Protection System design are listed in Branch Technical Position (BTP) APSCB 9.5-1 entitled "Guidelines for Fire Protection for Nuclear Power Plants" (PSAR 9.5.A, Raney Tr. 708, Bournia Tr. 710). The Board takes official notice of that document. On the subject of fire protection system failures, BTP 9.5-1 states in part:

Postulated fires or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena; e.g., LOCA and fire. However, in the event of the most severe earthquake; namely, the safe shutdown earthquake (SSE), the fire protection system should be capable of delivering water from manual hose stations located within hose reach of areas containing equipment required for safe

plant shutdown. The water supply for this condition may be obtained by manual operator actuation of valve(s) in a connection to the hose stand-pipe header from a normal seismic Category I water system such as the Essential Service Water system. Thus, at least manual hose and portable fire protection capability must be provided for all postulated design bases events requiring plant shutdown.

In their proposed findings Applicant offers:

It is recognized that current regulatory requirements may be altered as a result of the Staff's generic evaluation. For example, the suggestion in NRC Branch Technical Position 9.5-1 (which as a technical position is not a regulatory requirement) that applicants provide a fire protection system designed to withstand a Safety Shutdown Earthquake in areas containing seismic Category I equipment may or may not be adopted as a regulatory requirement. The Applicant takes the position that the design for WNP-3 and WNP-5 obviates the implementation of this suggestion in view of the excellent separation of Category I equipment from potential fire hazards such that no fire in Category I areas should result due to occurrence of the Safe Shutdown Earthquake. In addition, the Applicant maintains that redundant safety trains are separated from each other such that a fire in one should not affect the other. (PSAR 9.5.A, Tr. 704-12)

The Staff position is confusing. Appendix A to BTP 9.5-1 states in part: Although this appendix provides specific guidance, alternatives may be proposed by applicants and licensees. These alternatives will be evaluated by the NRC Staff on a case-by-case basis where such departures are suitably justified. Among the alternatives that should be considered is the provision of a "dedicated" system for assuring continued safe shutdown of the plant. This dedicated system should be completely independent of other plant systems, including the power source; however, for fire protection, it is not necessary for the system to be designed to seismic Category I criteria or meet single failure criteria. Manual fire fighting capability to protect the other safety related systems would still be required.

While the above statement does not clearly conflict with the previously cited passage from BTP 9.5-1, it does seem less stringent. In any event, the present plant design does not meet the requirements of BTP 9.5-1 (Raney, Tr. 709). Nevertheless, the Staff concluded that the system would meet Criterion 3 of the General Design Criteria for structures and systems with respect to fire detection and fire fighting (10 CFR Part 50, Appendix A).

As a result of generic investigations conducted by the Staff, additional fire protection requirements were imposed and accepted as described in PSAR

Amendment 38 (Bournia, Tr. 711). Additional requirements are under study and may be incorporated in the final design (SER Supp. 1, Tr. 710-712). At the time of the hearing (May 24-25, 1977), Staff review of Amendment 38 was incomplete. No position was taken by Staff on the compliance with BTP 9.5-1, but all issues were expected to be resolved about September (Bournia Tr. 711). The Staff did not recommend a limitation on the construction permit, but rather regarded this as a post-CP item (Tr. 712).

The Board is concerned with the consequences of earthquake-induced fires. If such fires occur following a Safe Shutdown Earthquake, the fire protection system must be assumed inoperative. This combination (fire plus loss of fire protection) should be treated as a single failure since "multiple failures resulting from a single occurrence are considered a single failure" (10 CFR Part 50, Appendix A). Under such conditions, the concept of "defense in depth" finds itself severely strained. Applicant has reviewed the fire hazards associated with Category I equipment and finds little risk (PSAR 15.2.12). However, absent evidence of similar evaluation by the Staff, we are unwilling to forego the security of postearthquake fire fighting capability.

Accordingly, the Board is unable to conclude that the review has been adequate and the present design meets Criterion 3. The issue seems too important to leave for postconstruction permit discussion and, therefore, before rendering a decision on issuance of construction permits, the Board is compelled to seek additional information. The following questions should be addressed:

1. Does the Staff concur with the Applicant's contention that separation of Category I equipment from potential fire hazards provides reasonable assurance that no fire in Category I areas should result due to Safe Shutdown Earthquake: (a) Are the hazards analysis performed by Applicant and the listing of combustibles in critical areas complete and correct (PSAR 15.2.12, Amendment 38), (b) Might a future lapse in housekeeping or routine operating procedures invalidate this analysis; might some unforeseen concentration of transient combustibles lead to serious consequences?
2. Have Staff and Applicant consulted experts on the incidence of earthquake-induced fires and have such experts examined the special circumstances related to this facility design: (a) What probabilities do they find for earthquake-induced fires associated with Category I areas; should an earthquake and a fire be treated as a single failure resulting from a single occurrence, (b) Might an SSE cause similar fires in redundant safety trains, (c) In particular are the control room and adjacent areas sufficiently free from fire hazards that no fire protection is needed immediately after an earthquake?

3. Has the Staff analyzed the capability, following breakdown of the fire protection system, to treat fires in non-Seismic Category I areas and to minimize the dangers of such fires?

Answers to the above questions shall be submitted under affidavit in the form of proposed written testimony by August 17, 1977. In the event that a hearing is deemed necessary, the evidentiary hearing will be reopened on August 25, 1977, in Bethesda, Maryland, pursuant to notice designating time and location of the hearing.

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Robert M. Lazo, Chairman

Emmeth A. Luebke, Member

David R. Schink, Member

Dated at Bethesda, Maryland,
this 1st day of August 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

John M. Frysiak, Chairman
Dr. Oscar H. Paris
Frederick J. Shon

In the Matter of

Docket No. 50-322

LONG ISLAND LIGHTING COMPANY

(Shoreham Nuclear Power Station,
Unit 1)

August 1, 1977

Upon untimely petition to intervene filed by county, Licensing Board rules that the county has failed to show good cause for its untimely filing; that on weighing the factors set forth in 10 CFR §2.714(a), the county should be admitted as a party; and that the county has failed to set forth with adequate specificity its contentions and their bases.

Petitioner granted leave to amend petition within 30 days.

MEMORANDUM AND ORDER

The Licensing Board has before it a petition for leave to intervene out of time pursuant to 10 CFR §2.714 dated May 17, 1977, and filed by the County of Suffolk, New York (Suffolk). The original notice of receipt of application for facility operating license was published in the *Federal Register* on March 18, 1976, 41 FR 11367. That notice set April 19, 1976, as the date for filing petitions to intervene.

Presently, two parties have been admitted to this proceeding. The State of New York acting through the New York State Energy Office has been admitted pursuant to 10 CFR §2.715(c) and has filed no contentions. The Oil Heat Institute of Long Island (OHILI) and the North Shore Committee Against Nuclear and Thermal Pollution (North Shore) acting together were admitted as parties pursuant to 10 CFR §2.714 and presently have before the Licensing Board seven areas of contention.

Applicant has filed a reply in opposition to Suffolk's petition for leave to intervene out of time.

The Commission's Regulatory Staff (the Staff) does not oppose the Suffolk's participation in these proceedings, but, in light of the "unusual volume and scope of contentions in Suffolk's petition," requests the Licensing Board to direct Suffolk "to review and resubmit its contentions, striking those portions which are clearly inappropriate and restating contentions in a proper form."

On the question of timeless 10 CFR § 2.714(a) provides:

... Nontimely filings will not be entertained absent a determination by the Commission, the presiding officer or the atomic safety and licensing board designated to rule on the petition and/or request that the petitioner has made a substantial showing of good cause for failure to file on time, and with particular reference to the following factors in addition to those set out in paragraph (d) of this section:

- (1) The availability of other means whereby the petitioner's interest will be protected.
- (2) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.
- (3) The extent to which petitioner's interest will be represented by existing parties.
- (4) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

In the instant case Suffolk has filed its petition eleven months late but explains that it wasn't until November 23, 1976, the County of Suffolk legislature approved (by resolution) intervention in this proceeding. It is alleged that the sponsors of the resolution introduced it as soon as they became aware of the NRC proceeding some four weeks before the date of the resolution (Petitioner's Affidavit, p. 70). Staff suggests and we agree that this situation substantially parallels the West Valley case.¹ In that case the County of Erie, New York, filed a petition nine months late and offered the excuse that the county legislature did not act until it received petitions from residents (who filed petitions only after the allowable time for intervention passed). The Commission in West Valley ruled that good cause had not been established. The situation here is analogous to the West Valley case. We are not apprised of any factors that might have precluded Suffolk from being put on notice prior to the filing of the resolution. No explanation has been offered as to why the County of Suffolk did not act in the prescribed time. Without more information, the Board is con-

¹ *Nuclear Fuel Services, Inc.* (West Valley Reprocessing Plant), CLI-75-4, 1 NRC 273 (1975).

strained to find that petitioner has not established good cause for the lateness of its petition.

Failure to establish good cause for filing late, however, need not be fatal to Suffolk if the Board assesses the other four factors under Section 2.714(a) in favor of Suffolk and in its discretion finds that the four factors outweigh the defect of late filing without good cause (*West Valley, supra*).

After reviewing the pleadings we find that a consideration of the four factors results in an assessment favorable to the petitioner, Suffolk.

Under the first factor the only other means available to Suffolk for the protection of its interest would be a limited appearance under 10 CFR §2.715. But a limited appearance clearly is not an adequate alternative for party status to a petitioner seeking some 100 plus areas of contention.

Secondly, we believe that Suffolk's participation may reasonably be expected to assist in developing a sound record. Suffolk alleges that it has in-house expertise in evaluating LILCO's application which includes meteorology, transportation and traffic safety, evacuation and emergency planning and certain aspects of radiological monitoring (Petitioner's Affidavit at p. 71). With such expertise at hand, chances are that Suffolk will be a constructive participant.

Thirdly, we note that Suffolk's interest will not be represented by existing parties. New York State Energy Office will participate under Section 2.715 and has filed no contentions. OHILI and North Shore acting jointly have raised some seven areas of contention. These contentions coincide only in a minimal way with the numerous contentions raised by Suffolk. Even in areas where they do overlap, Suffolk's interests are broader.

Lastly, Suffolk's participation will not unduly delay the proceeding inasmuch as discovery and hearing schedules have not been set nor have contentions been finally agreed upon for litigation. Furthermore, we note that the target date for fueling is December of 1978. Whether participation by Suffolk will unduly broaden the issues is uncertain at the moment. Staff believes that the great bulk of the contentions raised are not proper for this proceeding and would be eliminated through the normal prehearing process. Our own review of Suffolk's petition and affidavit indicates that many of the contentions raised are inadmissible.

As noted above we find that the four factors under Section 2.714(a) weigh in Suffolk's favor and we conclude that they overcome Suffolk's inexcusable delay for filing late.

What remains for us to resolve is whether Suffolk has met the other requirements of intervention. Section 2.714(a) requires that a petitioner identify the specific aspect or aspects of the subject matter of the proceeding as to which he wishes to intervene and set forth with particularity both the facts pertaining to his interest and the basis for his contentions with regard to each aspect on which he desires to intervene.

Certainly there is no question that Suffolk, by reason of its governmental and representative position, clearly has an interest in both the environmental and health and safety aspects of the Shoreham facility.

However, we do not feel that Suffolk has adequately identified the specific aspects of the subject matter of the proceeding nor has set forth with particularity the basis for its contentions with regard to each aspect on which it desires to intervene.

None of the 117 contentions raised are in litigable form. Each contention would have to be rephrased to be acceptable in form. As Staff points out, simply asking questions is not an appropriate way to put matters into issue.

Many of the contentions raised are challenges to the Commission's rules or deal with generic issues which are not proper subjects of an operating licensing proceeding.

Furthermore, many of the contentions are vague and/or nonspecific. It appears that virtually all of the contentions need to be rephrased.

Section 2.714(a) clearly puts the onus on the petitioner to identify the contentions on which it wishes to intervene and set forth the basis of each contention. This is not too great a burden especially on this petitioner which has appeared in another NRC proceeding or Special Counsel who likewise is experienced in NRC proceedings. As the matter now stands neither the Applicant nor Staff are adequately apprised of the issues that petitioner seeks to raise.

Staff recommends that Suffolk be given additional time to review and resubmit its contentions "striking those portions which are clearly inappropriate and restating contentions in a proper form." We adopt Staff's recommendation.

Accordingly, the Board grants Suffolk thirty (30) days from the date of service of this Memorandum and Order to file an amended petition complying with the requirements of 10 CFR §2.714(a) regarding specificity and basis for contentions.

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

John M. Frysiak, Chairman

Dated at Bethesda, Maryland,
This 1st day of August 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Edward Luton, Chairman
Oscar H. Paris
Frederick J. Shon

In the Matter of

Docket Nos. 50-282
50-306

NORTHERN STATES POWER COMPANY

(Prairie Island Nuclear Generating
Plant, Units 1 and 2)

(Spent Fuel Pool
Modification)

August 12, 1977

Licensing Board, after evidentiary hearing, issues an Initial Decision authorizing modification of the spent fuel pool so as to increase the storage capacity of the pool from 198 to 687 fuel assemblies.

NEPA: REQUIREMENT FOR IMPACT STATEMENT

Increase in storage capacity of spent fuel pool from 198 to 687 fuel assemblies cannot reasonably be said to be an action "significantly affecting the quality of the human environment."

TECHNICAL ISSUES DISCUSSED: Incremental burden of radioactivity resulting from expansion of spent fuel pool capacity, occupational radiation dosage to workers engaged in modification to spent fuel pool, criticality excursions in spent fuel pools.

INITIAL DECISION

Appearances

Gerald Charnoff, Esq., Bruce W. Churchill, Esq., and Jay E. Silberg, Esq., on behalf of the Applicant, Shaw, Pittman, Potts and Trowbridge

Jocelyn Furtwangler Olson, Esq., and John-Mark Stensvaag,
Esq., on behalf of the Intervenor, Minnesota Pollution
Control Agency

Ellen B. Silberstein, Esq., and Edwin J. Reis, Esq., on
behalf of the Nuclear Regulatory Commission

Introduction

This proceeding is on the application of the Northern States Power Company ("Applicant") for amendments of the operating licenses for the Prairie Island Nuclear Generating Plant. The proposed amendments would permit the Applicant to install new storage racks in the spent fuel pool thereby increasing the storage capacity of the pool from 198 to 687 fuel assemblies. The Minnesota Pollution Control Agency ("Intervenor") has intervened in this proceeding pursuant to the Commission's "Notice of Consideration of Proposed Modification to Spent Fuel Storage Pool," dated December 16, 1976.¹ In addition to the Applicant and the Intervenor, the Commission's Regulatory Staff ("Staff") is also a party to this proceeding.

By our Order Following Prehearing Conference issued on May 6, 1977, we admitted Intervenor's Contentions 12 through 31 as issues in controversy.² We declined to admit certain other contentions of the Intervenor, and deferred ruling on still others. Contention 1.D, which we had originally declined to admit, was subsequently admitted as an issue in controversy by our order in response to Intervenor's motion of May 12, 1977.³ Ruling has been deferred on Intervenor's Revised Contentions 1.A, B, C, E and 2.A, B because those contentions state the Intervenor's views of what an environmental impact statement must contain. Since the question of whether an impact statement is required at all in this case

¹ An organization known as Northern Thunder filed a petition to intervene on February 8, 1977. Northern Thunder ceased its intervention efforts on March 15, 1977, by giving written notice of its withdrawal from this proceeding.

² By motion dated June 24, 1977, the Intervenor requested that it be permitted to withdraw its Contentions 12, 15, 18, 19, 20, 21, 22, 23.A, 24, 25, 26, 29, 30 and 31. The reason for the request was Intervenor's belief that the issues raised by those contentions had been satisfactorily addressed during the course of discovery and at the evidentiary hearing. The motion was granted and the contentions dismissed by our order of July 6, 1977.

³ Contention 1.D asserts that the National Environmental Policy Act ("NEPA") requires a consideration of certain alternative courses of action in this proceeding. The statutory language requires a description of alternatives in a proposal involving "unresolved conflicts concerning alternative uses of available resources . . ." Although we are not wholly convinced that the quoted language applies to the situation that we have here, no party objected to our consideration of Contention 1.D. We therefore address in this decision the matter of the consideration given to those alternatives raised by Contention 1.D.

is in dispute among the parties, our decision on that question should logically precede any concern about the proper content of an impact statement. We determine herein that an environmental impact statement is not required to be prepared in this case. We thereby necessarily determine that Intervenor's Revised Contentions 1.A, B, C, E and 2.A, B are not admissible herein.

The evidentiary hearing in this matter was held on June 14-17, 1977. The Licensing Board ("Board") received evidence at the hearing on all the contentions admitted as issues in controversy. After the close of the hearing, proposed findings of fact and conclusions of law were submitted by all the parties. Briefs have been submitted by those parties on one contention (designated Contention 1) which the parties elected to have considered by the Board without any additional evidentiary presentation.

Contention 1

1. The first contention raised by the Intervenor Minnesota Pollution Control Agency (MPCA) in this proceeding states the following:

Approval of the proposed license amendments would be a major action of the Commission significantly affecting the quality of the human environment. The National Environmental Policy Act of 1969 requires the preparation of an environmental impact statement before the licenses can be amended.

The Commission's Regulatory Staff has not prepared an environmental impact statement in this case. What the Staff has done is prepare an environmental impact appraisal,⁴ stating its determination that the proposed license amendments will not significantly affect the quality of the human environment. Staff's ultimate determination on the question is that the National Environmental Policy Act (NEPA) does not require an environmental impact statement in this case and that, in accordance with 10 CFR §51.5(c), a negative declaration to that effect is appropriate.

2. For its position that an environmental impact statement is required by NEPA, the Intervenor places almost total reliance upon a Commission notice of "Intent to Prepare Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," 40 *Fed. Reg.* 42801 (1975), ("Notice"), and "Guidelines for Federal Agencies Under the National Environmental Policy Act," issued by the Council on Environmental Quality, 40 CFR §1500.6 ("CEQ Guidelines").

⁴"Discussion and Conclusions by the Office of Nuclear Reactor Regulation Relating to Environmental Considerations Associated With Modifications to the Spent Fuel Pool of the Prairie Island Nuclear Generating Station, Units 1 and 2, Docket Nos. 50-282 and 50-306" ("Staff Appraisal").

3. Section 102(2)(C) of the National Environmental Policy Act, 42 U.S.C. §4332(2)(C), provides that:

... all agencies of the Federal Government shall—

... (C) include in every recommendation or report on proposals for legislation and other major Federal action significantly affecting the quality of the human environment, a detailed statement by the responsible official on—
... the environmental impact of the proposed action . . .

NEPA does not require an environmental impact statement every time a Federal agency takes any action. Before such a statement is required, the proposed action must be "major" and its effect on the human environment must be "significant."⁵ In *Davis v. Morton*, 469 F.2d 593 (1972), a lease between private parties of certain lands on an Indian reservation was required by law to be approved by the Department of Interior before the lease could take effect. The court concluded that Federal approval of the lease was enough to constitute "major Federal action." In *Greene County Planning Board v. Federal Power Commission*, 455 F.2d 412 (1972), the only involvement necessary to constitute "major Federal action" was the approval by the Federal Power Commission of a project under its jurisdiction. On the basis of these authorities, we conclude that the action proposed here is "major." The Federal involvement is as pervasive as it was in each of the cited cases.⁶ However, on the evidence before us, we do not believe the action proposed can reasonably be said to be one "significantly affecting the quality of the human environment." We therefore conclude that no environmental impact statement is required in this case and affirm the Staff in its determination to make a negative declaration to that effect.

Nature of the Proposed Action and Environmental Effects

4. The license amendments would permit the Applicant to install new storage racks in the spent fuel pool increasing the storage capacity of the pool from 198 to 687 fuel assemblies. The increased capacity would be achieved by reducing the rack spacing from 21 inches center-to-center to 13.3 inches center-to-center spacing of each spent fuel cavity (Staff Appraisal, p. 1). The external

⁵ "There is no doubt that [NEPA] contemplates some agency action that does not require an impact statement because the action is minor and has so little effect on the environment as to be insignificant We agree with defendants that the two concepts are different and that the responsible federal agency has the authority to make its own determination as to each in deciding whether an impact statement is necessary." *Hanly v. Mitchell*, 460 F.2d 640 (1972), at 644.

⁶ The Commission's notice of "Consideration of Proposed Modification to Facility Spent Fuel Storage Pool" (42 *Fed. Reg.* 2140, January 10, 1977) states that, "Prior to approval of the proposed modification and the license amendments, the Commission will have made the findings required by the Atomic Energy Act of 1954, as amended . . . and the Commission's rules and regulations."

design of the spent fuel pool will not change, and there will be no change in the present use of the pool. Spent fuel is stored under water for a time to allow radioactive isotopes to decay and to reduce the thermal heat content. The longer the fuel assemblies remain in the pool, the less radioactivity they will contain. As now designed, the pool will accommodate spent fuel assemblies from five normal plant refuelings. The proposed capacity expansion would enable the pool to receive fuel assemblies from seventeen normal plant refuelings (Appraisal, p. 5). Thus, in addition to an increase in the number of spent fuel assemblies stored in the pool, the capacity expansion will result in some of those assemblies being stored there for longer periods of time.

5. For its assessment of radiological impacts away from the plant site, the Staff assumed additional releases of krypton-85 attributable to storing more fuel assemblies for a longer period of time. Its estimate is that 142 curies per year of this gas may be released from the spent fuel pool when the modified pool is completely filled (Appraisal, p. 7). If such releases should occur, it would result in an additional total body dose at the site boundary to an individual of less than 0.001 mrem/yr. The calculated total body dose to the estimated population within a 50-mile radius of the plant is less than 0.01 man-rem/yr. These exposures are less than a one percent increase in the exposure earlier evaluated by the Staff in its Final Environmental Statement for the individual and the population. We thus find no significant contribution to radiation levels or exposure to persons offsite resulting from the proposed modification.

6. The existing fuel racks are to be disposed of as solid waste (Wiot Testimony, Contention 16, p. 2, Tr. following 134). The Staff estimates the volume of such waste to be approximately 230 cubic feet—less than a 0.2% increase in the total volume of solid waste expected to be shipped from the plant during its lifetime (Appraisal, p. 9).

7. The evidence indicates that the occupational radiation exposure of workers at the facility resulting from the additional fuel stored will be less than 1% of the total annual occupational exposure (Appraisal, p. 10); the modification will cause no change in the chemical or biocidal effluents from the plant (Appraisal, p. 11); and any increase in the heat discharged to the atmosphere or to the Mississippi River will be negligible.

8. All of this evidence is essentially without contradiction on the record before us. As indicated above, the Intervenor essentially relies for its position concerning the need for an environmental impact statement on a Commission Notice and the CEQ Guidelines. We turn to an examination of these materials and the arguments based upon them.

Arguments of the Intervenor

9. In a Notice entitled "Intent to Prepare Generic Environmental Impact

Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," dated September 16, 1975, the Commission recognized that "the spent fuel pools at a number of reactors may soon be filled, and still other reactors will have their pools filled before the end of 1978." The Notice states that in the event a particular onsite spent fuel pool should become filled, and no alternative form of spent fuel storage could be found, "the reactor would be eventually forced to shut down and 'store' the last spent reactor fuel in the reactor pressure vessel." The Commission explained that it had not as yet found it necessary to develop any overall program "to deal with the problem." The Notice alludes to a number of possible alternatives for increasing spent fuel storage capacity, including increasing the storage capacity at present reactor sites, and construction of independent spent fuel storage facilities. The Commission explained its determination to prepare a generic environmental impact statement in the following terms:

The Commission [has] the *discretion* to deal with issues of this type on a generic basis through the exercise of its rulemaking authority and/or the issuance of a "generic" environmental impact statement. (Emphasis supplied.)

10. Having determined to prepare such a statement, the Commission expressly concluded that licensing actions intended to alleviate a possible shortage of spent fuel storage capacity, "including such actions as the issuance of operating license amendments to permit an increase in the storage capacity of reactor spent fuel pools," were to continue during the period required for preparation of the generic statement.

11. On the basis of this Notice the Intervenor, echoing the language of NEPA, argues broadly that:

... *the Commission itself has recognized* that the shortage of spent fuel storage capacity is a major national problem the resolution of which involves a major federal action significantly affecting the quality of the human environment (Emphasis supplied.)

First, even if the quoted statement were true (and we believe it to be demonstrably false), we fail to see that it would in any way tend to establish a NEPA requirement for an environmental impact statement in this particular license adjudication. It is not the "national problem" that we are concerned with here. Additionally, the quoted language, fairly construed, contains an implication that the generic statement is being prepared because of a Commission view that NEPA requires it. A careful reading of the Notice fails anywhere to reveal any Commission conclusion that it presently has underway a national program which constitutes a "major Federal action significantly affecting the quality of the human environment." The Notice explicitly states that:

Indeed, the Commission has not, to date, found it necessary in the discharge of its licensing and related Regulatory functions to develop any overall program of action to deal with the problem.

12. At page 6 of its brief, Intervenor argues that the "Commission concluded in the Notice that environmental impacts could be addressed on a *case by case* basis as shortages of spent fuel storage capacity occur at individual reactors" But in the very next sentence, at the top of page 7 of its brief, the Intervenor attributes to the Commission a "recognition that the spent fuel capacity shortage required [presumably, pursuant to NEPA] preparation of a generic environmental impact statement." It is manifest from the Notice that the Commission did not conclude both that (1) a case-by-case review was permissible, and (2) a generic statement was *required by NEPA*. As pointed out above, the Commission's determination to prepare the generic impact statement is *an exercise of discretion*, and that exercise of discretion is for the following reasons:

Rulemaking proceedings and/or the issuance of a generic environmental impact statement might, as appropriate, serve as the context for the promulgation of more definitive criteria regarding size and design of spent fuel pools and/or the licensing of independent spent fuel storage facilities, and for consideration of possible revision of the fuel cycle environmental impacts set forth in 10 CFR §51.20(e) in light of additional spent fuel storage and attendant transportation. Also, the possible implications of increased spent fuel storage on the options available for intermediate and long-term storage of nuclear waste materials could profitably be examined within this context.

It is clear that the Commission, in determining to prepare a generic environmental impact statement, has not taken the view that NEPA requires it to do so, since the Commission is well aware that compliance with NEPA is not "discretionary" on its part.⁷

13. In its notice, the Commission expressed the view that any environmental impacts associated with any individual licensing action could be adequately addressed within the context of the individual license application "without overlooking any cumulative impacts." The Intervenor argues that the environmental impacts to result from the proposed modification at Prairie Island are "significant" in themselves, and are particularly significant "in view of their cumulative effects in connection with spent fuel pool modifications all over the country." We have already reviewed in this decision those environmental impacts suggested by the evidence to result from the proposed modification at the Prairie

⁷ *Calvert Cliff's Coordinating Committee, Inc. v. AEC*, 449 F.2d 1109.

Island facility. We have stated our view to be that those impacts are not so significant as to require that an environmental impact statement pursuant to NEPA be prepared. With respect to so-called "cumulative impacts," it appears that the Intervenor intends that the search for them be conducted on a national scale in connection with this individual application. That this is so can fairly be derived from the following portion of Intervenor's argument:

... the NRC Staff has chosen instead to focus on each license amendment as it comes in, to find the environmental impacts of each minimal in itself, and to declare that no EIS is needed. As Applicant points out in its brief at 3-4, the Commission has received 28 applications for spent fuel pool modifications. In 15 of those cases spent fuel pool modifications have received approval without a single EIS being prepared. Thirteen more applications are pending, and past performance suggests that the NRC Staff is likely to take the same narrow approach and issue negative declarations as to these modifications as well.

... the cumulative environmental impacts of spent fuel pool expansions at reactors all over the country are being ignored. By determining that the impacts at each reactor are "minor," the NRC Staff avoids preparation of an impact statement in every case.

The Commission has not expressly said how wide the Staff must search for any impacts that may be cumulative. It is clear, however, that no "overall program of action" involving capacity expansion of spent fuel pools is underway. That being so, it makes no sense to say that the Commission intended the search for cumulative impacts be conducted on a national basis *as though an overall program was in existence*. The court in *Hanly v. Kleindienst* 471 F.2d 823 (1972), articulated the view that a proposed action should be evaluated for NEPA purposes in the light of at least two relevant factors, one of which is "... (2) the absolute quantitative adverse environmental effects of the action itself, including the cumulative harm that results from its contribution to existing adverse conditions or uses in the affected *area*" (emphasis supplied), 471 F.2d 823, at 830. We think that what is intended by the Commission's Notice in this regard is nothing other than that the search for cumulative impacts be conducted in the *area* of each facility.

14. Our review of the evidence in this case convinces us that the environmental impacts of the proposed action have been adequately addressed without overlooking any cumulative impacts in the area of the Prairie Island facility.

15. In deciding whether an environmental impact statement is required for certain proposed actions, the Commission is to be "guided by the Council on Environmental Quality Guidelines, 40 CFR 1500.6."⁸ Those Guidelines state, in part, the following:

⁸ 10 CFR §51.5(b).

In considering what constitutes a major action affecting the environment, agencies should bear in mind that the effect of many Federal decisions about a project or a complex of projects can be individually limited but cumulatively considerable. This can occur when one or more agencies over a period of years puts into a major project individually minor but collectively major resources, when one decision involving a limited amount of money is a precedent for action in much larger cases or represents a decision in principle about a future major course of action. . . .

Intervenor argues that the present license amendment requests are similar to spent fuel pool storage modifications already authorized without benefit of an environmental impact statement and "represent a decision in principle about a future major course of action"; thus, the Guidelines require an environmental impact statement in this case. This is mere argument, having for its basis no evidentiary foundation whatever. The fact that other spent fuel pool modifications have been authorized without an environmental impact statement having been prepared with respect to any of them is simply no basis for us to conclude that an environmental impact statement is required here.

16. The CEQ Guidelines, at Section 1500.6(a), provide that "proposed major actions, the environmental impacts of which is likely to be highly controversial, should be covered [by an environmental impact statement] in all cases." Intervenor's argument on this point is that "this project was controversial from the beginning and remains controversial today"; and, had the existence of this controversy been "factored into" the Staff's determination of the need for an impact statement, Staff would necessarily have determined that such a statement was required in this case. To show that this project was and is controversial, the Intervenor points to its own intervention in this proceeding, the withdrawn intervention petition of an organization called Northern Thunder, a limited appearance evincing opposition to the project by an organization called Clean Air, Clean Water Unlimited, and a written limited appearance statement in opposition to the project submitted by the Minnesota-Wisconsin Boundary Area Commission.

17. The argument misconstrues the CEQ Guidelines. The Guidelines state that the "environmental impacts must be likely to be highly controversial," and not merely that a project itself must be controversial. In *Rucker v. Willis*, 484 F.2d 158 (1973), it was held that "controversial" in the context of the Guidelines does not mean merely opposition to the Federal action:

We reject, however, the suggestion that "controversy" must necessarily be equated with opposition. The term should properly refer to cases where a substantial dispute exists as to the size, nature or effect of the major federal action rather than to the existence of opposition to a use. Otherwise, to require an impact statement whenever a threshold determination dispensing

with one is likely to face a court challenge would surrender the determination to opponents of a federal action, no matter whether major or not, nor how insignificant its environmental effect might be. 484 F.2d 158 at 162

18. Upon consideration of all the evidence before us, we conclude that the action proposed is not one significantly affecting the quality of the human environment so as to require the preparation of an environmental impact statement in this proceeding.

Contention 1.D

The National Environmental Policy Act requires consideration of all alternatives for managing the spent fuel in the short term, including, *inter alia*, the alternatives of: enforcing existing contractual obligations for removal of spent fuel from the pool; establishing new contractual arrangements with existing offsite storage facilities to secure removal of spent fuel from the pool; cooperatively financing an offsite storage pool to be shared with other nuclear power plants; and expanding the physical area of the existing storage pool.

19. The current capacity of the spent fuel pool at Prairie Island is 198 spent fuel assemblies. Forty assemblies were placed in the pool in March 1976 when Unit 1 was shut down for its first refueling. An additional 40 assemblies were placed in the pool in October 1976 when Unit 2 was refueled. Now, Unit 1 has been refueled for the second time making a total of 120 spent fuel assemblies in the pool. The pool thus has room for the receipt of 78 more fuel assemblies—less capacity than that needed to off-load a full core consisting of 121 fuel assemblies should that become necessary. Additionally, after Unit 2 is refueled in the fall of 1977 and Unit 1 is refueled in March 1978, the spent fuel pool will be completely filled. Thus, Unit 2 would have to cease operation in the fall of 1978 and Unit 1 would have to shut down in the spring of 1979 if expanded spent fuel pool capacity was not then available.

20. The Applicant currently has a contract with Nuclear Fuel Services, Inc. ("NFS") for the reprocessing of spent fuel from Prairie Island. However, on September 20, 1976, NFS announced its withdrawal from the fuel reprocessing business. That company has refused to accept spent fuel from the Applicant for storage (Testimony of David H. Peterson, Tr. following 258, p. 3). Enforcing "existing contractual obligations for removal of spent fuel from the pool" does not appear to be a practical alternative to the proposed project.

21. The evidence indicates that there are no offsite storage facilities in the United States available for the storage of spent fuel from Prairie Island. Allied-General Nuclear Services' Barnwell facility is not presently licensed to store spent fuel, and the General Electric facility at Morris, Illinois, has no capacity

beyond that for which it is already contractually committed (Peterson, p. 4; Testimony of Richard J. Clark, Tr. following 737, p. 3). Also, it appears that there are no other reactors whose spent fuel pools have space for the receipt of spent fuel from Prairie Island (Clark Testimony, pp. 3-4; Peterson Testimony, p. 4).

22. Cooperative financing of new storage facilities is not a reasonable alternative to the proposed project. The Regulatory Staff estimates that it would take about five years to construct and license such a facility (Staff Appraisal, pp. 14-15). Physical expansion of the existing spent fuel pool seems an impractical alternative because that would require major modifications of the plant and this could not be accomplished in the time that the added space is needed (Testimony of Dale M. Vincent, following Tr. 269, p. 2).

23. The evidence suggests that the return of spent fuel to the reactors for further burnup is physically possible, and that this would reduce to some extent the need for spent fuel storage at the reactor site. Neither the Applicant nor the Staff has analyzed in detail the possibility of further fuel burnup. The evidence is, however, that returning spent fuel to the reactors for further burnup or increasing the extent of burnup prior to refueling would necessarily result in a reduction of the power output of the plant and would reduce the need for additional storage capacity only "slightly" (Tr. 270; Tr. 413; Tr. 748).

24. The alternative of using racks constructed of materials containing boron (poison racks) in order to increase pool capacity was raised at the hearing. The evidence indicates that such a course of action would entail an approximate two-year delay in achieving the needed pool capacity expansion (Tr. 271-2; Tr. 411; Tr. 776), and is not a presently available alternative. Finally, the evidence is that a two-step procedure, involving first the installation of nonpoison racks and then of poison racks, is also not a present alternative (Tr. 412-13).

25. We conclude that adequate consideration has been given to possible alternatives to the proposed action.

Contentions 13 and 14

Contention 13

The request and supporting documentation fail to establish that the plant will adequately and safely handle the incremental burden of radioactivity resulting from the proposed expansion of capacity.

Contention 14

The radioactive waste treatment system for the spent fuel pool has not been shown to be adequate for the proposed expansion of capacity, whether or not damaged fuel is stored in the expanded pool.

26. These two contentions appear to the Board to be inextricably interwoven with one another. All parties have treated them, in testimony as well as in proposed findings, as connected. The alleged "incremental burden of radioactivity" of Contention 13 is apparently that extra radioactivity which will manifest itself as contamination of the pool water (Intervenor's Proposed Findings at p. 14; Applicant's Proposed Findings at p. 15, *et seq.*; Staff's Proposed Findings at p. 17, *et seq.*).

27. Radioactivity in the spent fuel pool water results primarily from the release of corrosion products (crud) (Wiot Testimony on Contentions 13 and 14, p. 2; *Id.*, Contention 15, pp. 2-3). Crud contributes over 90% of the dose rate from the spent fuel pool. *Id.*, p. 2. Loose crud is dislodged from the fuel assemblies and enters the spent fuel pool water during movement of the assemblies. *Id.*, Contentions 13 and 14, p. 2; *Id.*, Contention 15, pp. 2-3; Tr. 151. This material is largely formed on the fuel assemblies during operation (Wiot Testimony, p. 2) and it then is transferred to the pool water either by being shaken loose in the reactor and carried over when reactor water mingles with pool water, or by being shaken loose when fuel assemblies are handled in the pool (Wiot Testimony, pp. 2-3; Tr. 151; Donohew Testimony, Contention 14, p. 2).

28. Since all technical witnesses seem agreed that the source of this radioactivity is active only during refueling, it seems reasonable that the mere presence of additional fuel in storage would not increase the total amount of radioactive material added to the water (Wiot Testimony, pp. 2-3; Donohew Testimony, Contention 14, p. 2). Indeed, it appears that any increment resulting from fuel failure during storage would be minor (Tr. 671).

29. Thus the Board would expect no substantial increment in radioactivity in the pool were it not for the one-time activities associated with the rack installation itself. This latter aspect was not addressed by either Staff or Applicant in prepared testimony. It was, however, developed at some length during the hearing (Tr. 153, *et seq.*; Tr. 716, *et seq.*).

30. There will be some crud released in moving 120 stored fuel elements out of the old racks and back into the new (Tr. 153; Tr. 716). In addition, some material will be added to the pool when the old racks are washed down in the process of removing them from the pool (Tr. 156; Tr. 716). Neither Staff's witness nor Applicant's witness was able to quantify the amount of material expected to be released from either the fuel handling or the rack washing operations (Tr. 181; Tr. 727), although the Staff's witness said he expected more crud to be dislodged in a normal refueling operation, in which about forty fuel elements would be removed, than in the movement of 120 elements, moving each element twice (Tr. 731).

31. The Staff witness noted that the cleanup system for this pool is presently used at reduced flow rate, and runs only part of the time (Donohew

Testimony, Contention 14, pp. 2-3) and that the cleanup circulation rate could be tripled and operation could be extended. Applicant's witness noted that even at the reduced circulation rate, the system removes "essentially all" the material introduced in a refueling before the next refueling (Wiot Testimony, Contention 14, p. 3).

32. Under questioning by the Board, however, the Staff's witness was unable to state why he felt that the moving of 240 fuel elements, plus washing of the old racks, could be accommodated by an increase in flow rate of a factor of only 3 (Tr. 723, *et seq.*), when experience had only demonstrated an ability to handle 40 fuel moves, a factor of six less than the fuel rearrangement alone.

33. The Board recognizes that engineering judgment must often be relied upon when problems cannot be exactly quantified. Further, this operation is, indeed, planned to occur only once, which would preclude the continuous buildup of activity suggested by the Intervenor (Intervenor's Proposed Findings at paragraph 32) even should the cleanup system be undersized. We are concerned, however, that radiation and contamination levels should generally be kept within the limits contemplated when the plant was originally licensed, and within those experienced to date. We will therefore condition the license amendments authorized herein as follows: before work begins on the project the licensee shall measure and record ambient radiation levels around the fuel pool. After the replacement of the storage racks and the fuel elements currently stored in them, the licensee shall again measure radiation levels around the pool, monitoring such levels and operating the cleanup system until the levels return to those typical of the period before the rack modification work was begun. No further activities which would increase the radioactive content of the pool (activities, for example, such as refueling) shall be carried out until the levels return to those typical of the period before the modification.

Contention 16

The evaluation of additional radiological impacts offsite due to the proposed expansion of the spent fuel pool is inadequate.

34. Analyses by Applicant and Staff suggest that there will be very little additional radiological impact offsite as a result of the fuel pool modification. With operations conditioned as we have directed, *supra*, there should be no increase in radioactive corrosion products (crud), or at least, no increase of significant duration, above that level which would obtain with the present storage system. Clearly, if the pool crud does not increase there will be no increase in offsite radioactivity from that source.

35. There may be some slight increase in fission products released to the pool, but this material, too, will be removed by the pool cleanup system (Wiot

Testimony, Contentions 13 and 14, p. 4). The release of fission products occurs primarily immediately after removal of the fuel elements from the core, *i.e.*, while they are still generating decay heat, if, indeed, it occurs at all (Wiot Testimony, Contentions 13 and 14, p. 3; Staff Appraisal, p. 16). The only significant fission product which might escape from failed fuel and reach the atmosphere is krypton-85. The Staff has calculated, using very conservative assumptions, that an additional 142 curies per year of this substance might be released when the modified pool is completely filled. Such a release would occasion an additional 0.001 mrem/yr to an individual at the site boundary, and an additional 0.01 man-rem/yr to the population within 50 miles (Staff Appraisal, pp. 7-8). These calculations are based on an assumed fuel failure and leakage rate greater than that which has been experienced (Donohew Testimony, Contention 14, p. 2). The results show a negligible offsite impact.

36. As to the possible release of iodine isotopes, their short half-lives and the action of the pool cleanup system remove them adequately, preventing their escape (Staff Appraisal, p. 8). Any additional tritium release will be minor compared to that presently attributable to leakage of reactor coolant. *Ibid.* Incremental liquid releases will be negligible (Donohew Testimony, Contention 16, p. 2; Staff Appraisal, p. 10).

37. There may be some increase in radioactive waste shipped offsite. The licensee does not expect any change, but the Staff believes an additional resin bed per year may be disposed of as a result of the change (Staff Appraisal, p. 9). The increase estimated by the Staff would represent less than 1% of the average volume of solid waste shipped per year from 1974 to 1976. *Ibid.* The Board views such an increase as negligible.

38. Disposal of the old racks themselves will increase the total waste volume shipped from the plant in its lifetime by only 0.2%. *Ibid.*

39. The Board believes that the incremental offsite radiological impact resulting from the amendments will be negligible and has been adequately analyzed.

Contention 17

The licensee has failed to supply sufficient information to assess the occupational radiation dosage to workers who will be engaged in the activity of rearranging stored spent fuel and installing new spent fuel storage racks.

40. Applicant has estimated that the total occupational radiation exposure to be received by workers during the process of expanding the spent fuel pool capacity will be less than 28 man-rem. (Vincent Testimony, Contention 17, p. 2; Tr. 437-8, 448-53). The Staff considers this to be a reasonable estimate. (Safety Evaluation, p. 7; Staff Appraisal, p. 10; Block Testimony, p. 1). Appli-

cant's estimate was arrived at by consulting with the management of the construction firm it has contracted with to perform the installation (which estimated the man-hours that would be required for each phase of the job), and by relying on the engineering judgment of Applicant's Project Engineer for the proposed capacity expansion (who estimated the radiation levels which would be experienced for each task) (Vincent Testimony, p. 3; Tr. 438-9, 442-3 and 488-91). Applicant Witness Vincent testified that because of conservative assumptions he made about dose rates associated with certain phases of the work, the actual total dosage should be less than the calculated dose (Vincent Testimony, pp. 3-4; Tr. 448, 492).

41. Actual radiation exposures experienced at other nuclear facilities in performing similar modifications of spent fuel pools (involving replacement of racks) indicate that Applicant's calculated dose is, indeed, reasonable (Block Testimony, pp. 1-2; Vincent Testimony, p. 4; Tr. 453-6, 784). Staff Witness Block testified that actual exposure for this type of activity at Zion was 0.56 man-rem (to diver only), at Connecticut Yankee 20 man-rem (18 man-rem actual + 2 man-rem estimated to completion), at Ft. Calhoun 2 man-rem, and at Ginna 18 man-rem (Block Testimony, p. 1). Witness Vincent testified that the spent fuel storage pool modification at Point Beach resulted in an exposure of 2.62 man-rem (Vincent Testimony, p. 4; Tr. 507-8). Not all of these numbers are directly comparable to the 27.9 man-rem estimate for Prairie Island, because some of them are exposures resulting from only components of fuel pool modifications rather than from entire jobs (Tr. 455-6, 506-10). The exposures for Connecticut Yankee, Ginna, and Point Beach apparently are for entire jobs (Block Testimony, p. 1; Vincent Testimony, p. 4; Tr. 455). Witness Block testified that the exposure at Ginna, 18 man-rem, was "more germane" than others to the estimate of 28 man-rem for Prairie Island. He thought that there was more radiation exposure to personnel at Ginna than would be the case at Prairie Island, however, because at Ginna fuel elements had been stored in the pool longer than at Prairie Island, resulting in higher contamination levels (Tr. 800-1). Witness Vincent testified that at Connecticut Yankee radiation levels experienced during washing of the racks were higher than would be expected at Prairie Island because at the former facility the racks were contaminated with rotten wood and resin spots, which had to be removed (Tr. 509-10). Radiation exposure at Point Beach, on the other hand, was lower than would be expected at Prairie Island because at Point Beach the bottom of the pool was cleaned before rack removal and also at Point Beach the contaminated racks were disposed of intact, rather than cut up as is planned for Prairie Island (Tr. 492-9, 500-3). We find it reasonable to expect that the total exposure to be experienced at Prairie Island will fall somewhere between the high dosages experienced at Connecticut Yankee and Ginna and the low dosage experienced at Point Beach.

42. The total annual occupational exposure for the Prairie Island plant was

greater than 400 man-rem in 1976 (Vincent Testimony, p. 2). Even if the estimated 28 man-rem exposure were experienced during the modification of the fuel pool, it would constitute less than 7 percent of the probable total occupational dose experienced at the plant during 1977. This dose is comparable in magnitude to doses experienced in routine maintenance operations at Prairie Island and in maintenance and repair operations at other nuclear power plants (Vincent Testimony, p. 2; Block Testimony, p. 2). We do not find the projected total dose of 28 man-rem, *per se*, to be unacceptable.

43. Intervenor argues that Applicant's estimate of occupational dose does not take into account the crud which will be released in the pool water as a result of 240 fuel assembly movements and the washdown of old racks (Intervenors' Proposed Findings, paragraphs 36-37). The argument is based on testimony of Applicant's witness Vincent, who acknowledged that he had not accounted for the effect of washing down the racks on the exposure to be experienced by the diver. Mr. Vincent said he did not consider it necessary because of the conservatism inherent in his estimate (Tr. 459-60). Staff argues that radiation from increased crud in the pool, resulting from the movement of spent fuel assemblies and the washing down of racks, "is encompassed in the 28 man-rem estimate" (Staff's Proposed Findings, p. 21). The evidence it cites, however, contradicts the argument (Tr. 789). Applicant points out that (1) removal of old racks from pool and the installation of new racks will occur before the first movement of 120 fuel assemblies, (2) disposing of the old racks will take place outside the pool, and (3) the return of the 120 fuel assemblies to pool #2 will occur after the in-pool work has been completed (Applicant's Reply to Proposed Findings of Intervenor, paragraph 28). We expect the increment of exposure resulting from crud released by the movement of fuel elements and washdown of racks to be small, and we believe it will be accounted for by conservatism in the 28 man-rem estimate.

44. Much ventilation has been given to the question of whether the occupational dose resulting from the pool modification would be a nonrecurring dose, or whether another pool modification might be necessary in the 1980's, thus leading to another dose of this type (Intervenor's Proposed Findings, paragraphs 22-24, 34; Applicant's Proposed Findings, paragraph 34; Staff's Safety Evaluation, p. 7; Staff's Appraisal, p. 10; Tr. 483-5, 791-2). We do not see the relevance of speculation about a future pool modification to our consideration of the instant application for a license amendment. Consequently, we do not view the question of whether the occupational dose would be nonrecurring as properly before us.

45. Intervenor argues that Applicant's estimate of a 28 man-rem occupational exposure during the fuel pool modification is no more than an "educated guess," based on testimony by Staff Witness Block (Intervenor's Proposed Findings, paragraph 34; Tr. 785, 805-7). When asked to define "educated guess," Block responded as follows:

“Educated guess” can be taken in many ways. One way it would be based on relevant experience. I think that is pretty clear. Other ways of educated guess would be to determine, based on the operation itself, the time that would be spent for a specific operation, and the dose rate that would be applicable during the operation, and integrating all of this.

The witness testified further that he doubted if there is a better way to estimate doses from an operation of this type (Tr. 805-6). Mr. Vincent testified, as noted *supra*, that he estimated dose rates based on his engineering judgment, and that he confirmed the contractor’s estimate of man-hours on the basis of his own knowledge of construction projects (Vincent Testimony, p. 3; Tr. 438-9, 442-4 and 486-91). We recognized, as the Applicant has acknowledged (Applicant’s Reply to Proposed Findings of Intervenor, paragraph 31), that the actual dose cannot be predicted with great precision. Nevertheless, the evidence indicates that Applicant has, indeed, used appropriate methods to assess the occupational dosage that will be incurred during the fuel pool modification.

46. Based on the evidence before us, the Board finds that the Applicant has supplied sufficient information to assess, as reasonably as possible, the occupational radiation dosage to workers who will be engaged in the activity of rearranging stored spent fuel and installing new spent fuel storage racks.

An Issue Examined By The Board In Its Discretion

47. During the taking of evidence on Intervenor’s Contention 17, the question was raised as to whether the Applicant’s plans for carrying out the fuel pool modification will enable the Licensee to meet the requirements of 10 CFR §20.1(c), which state, in part that:

persons engaged in activities under licenses issued by the Nuclear Regulatory Commission . . . should . . . make every reasonable effort to maintain radiation exposures . . . as low as is reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socio-economic considerations, and in relation to the utilization of atomic energy in the public interest.

Intervenor argues that the Licensing Board should not “find that the Applicant’s proposed procedures for implementing the requested amendment will result in occupational exposure levels which are as low as reasonably achievable” (Intervenor’s Proposed Findings, paragraph 50). The Applicant argues that this “is a new issue which was not raised by Contention 17 and has not been placed before this Board for determination” (Applicant’s Reply to Proposed Findings of Intervenor, paragraph 21).

48. In considering an application for a license amendment, the Commission

is "guided by the considerations which govern the issuance of initial licenses," 10 CFR §50.91. The issuance of operating licenses is governed by 10 CFR §50.57, which state, in part, that such a license may be issued upon a finding, *inter alia*, that:

The facility will operate in conformity with. . .the rules and regulations of the Commission. 10 CFR §50.57(a)(2).

We believe that this Licensing Board is empowered to examine the question of whether there is reasonable assurance that the Applicant will perform the proposed modification in a manner that meets the requirements by 10 CFR §20.1, even though that question is not raised by a contention of one or more of the parties. Our discretionary authority to do so is found, we believe, in 10 CFR §2.760(a), which states the following:

Matters not put into controversy by the parties will be examined and decided by the presiding officer only in extraordinary circumstances where he determines that a serious safety, environmental, or common defense and security matter exists.

49. We view the question of whether there is reasonable assurance that the Applicant will carry out the proposed modification in compliance with 10 CFR §20.1 as constituting a serious safety matter. Further, the issue was extensively ventilated during the evidentiary hearing and is argued in the proposed findings of fact and conclusions of law submitted by the parties following the close of the hearing (Intervenor's Proposed Findings, paragraphs 45-50; Applicant's Reply to Proposed Findings of Intervenor, paragraphs 21-27; Staff's Proposed Findings, pp. 21-4; Tr. 445-56, 461-83, 489-91, 494-512, 794-98, 809, 916-19). There is sufficient evidence before us, we believe, to support the decision which we reach on this issue.

50. The "as low as is reasonably achievable" (ALARA) issue was raised during the testimony of Applicant's Witness Vincent on Contention 17:

COUNSEL FOR STAFF – "Did NSP give any consideration to the low as reasonably achievable standard that also appears in 10 CFR Part 20?"

WITNESS – "Well, that's part of it certainly."

COUNSEL – "Part of what?"

WITNESS – "Part of Part 20 and part of the overall consideration."

CHAIRMAN LUTON – "Does that mean that NSP did in fact give some consideration to reducing these exposures to as low as reasonably achiev-

able or are you simply telling us that the concept is incorporated in Part 20?"

WITNESS — "Well, you know, that's something that is in Part 20 and our people are familiar with Part 20 and particularly the plant personnel who were involved in this that are responsible for monitoring the radiation exposures and it's something that is much in discussion these days and so they have to give consideration to it at least on a general basis and a specific basis for each job."

CHAIRMAN LUTON — "Do you know specifically whether they in fact gave consideration to it on this occasion?"

WITNESS — "No, I do not." Tr. 447.

Subsequently, upon redirect examination by the Applicant, Mr. Vincent testified as follows:

COUNSEL — "Mrs. Vincent, are you familiar with how the so-called rule as low as is reasonably achievable is applied out at plant operations?"

WITNESS — "During the break, I was able to check with plant personnel, and they do apply the ALARA."

COUNSEL — "I am sorry; the what?"

WITNESS — "ALARA, as low as reasonably achievable regulations in their plant procedures for radiation protection, and this is a consideration that they have to use at all times. And they are actually audited against this by the NRC, as I understand it."

COUNSEL — "Are you saying all of the plant operations are conducted against the standard of as low as reasonably achievable?"

WITNESS — "Yes."

* * * * *

COUNSEL — "Would it be fair to say then that the work to be performed would be tested and actually performed in compliance with the standard as low as reasonably achievable?"

WITNESS — "Yes, as I said, the radiation protection superintendent will review the procedures. . . If he did not feel that these procedures in some

way were consistent with plant philosophy, and the ALARA philosophy, he would be in a position to reject those procedures, make comments and force us to revise them." Tr. 489-91.

In prepared testimony, Mr. Vincent testified that the work will be performed in a manner which complies with 10 CFR Part 20 (Vincent Testimony, Contention 17, pp. 4-5). However, the oral testimony, *supra*, is less convincing, causing us to doubt that Applicant has, in fact, given full consideration to the requirements of 10 CFR §20.1(c) in planning the proposed modification.

51. The Applicant did not attempt to assess the total occupational dose that would result from the procedures to be used in modifying the spent fuel pool prior to deciding on what procedures to follow (Tr. 451-2). Nor was information regarding the radiation doses experienced during the spent fuel pool modification at the Point Beach or other facilities available to the Applicant at the time that decision was made (Vincent, p. 4; Tr. 451).⁹ The Applicant did, however, consider the quarterly dose limits set out in 10 CFR Part 20 and determined that the doses to individuals working on the job would not exceed those limits (Vincent, pp. 2-3; Tr. 446). Thus, whether the method selected will expose workers to doses that are as low as is reasonably achievable is in need of some further examination.

52. Actual occupational radiation exposures during fuel pool modification at Point Beach and Ft. Calhoun were 2.62 man-rem and 2 man-rem, respectively. These low dosages contrast with those experienced at Ginna and Connecticut Yankee, 18 man-rem and 20 man-rem (18 actual + 2 estimated to completion), respectively (Vincent Testimony, p. 4; Block Testimony, pp. 1-2). The estimated total exposure for the proposed fuel pool modification at Prairie Island is higher still, 28 man-rem. The evidence indicates that the low exposure at Point Beach resulted in part from the fact that the racks were not cut into pieces prior to shipment offsite, as is planned for Prairie Island; at Point Beach the racks were crated and shipped intact. Mr. Vincent testified that consequently he expected the exposure associated with rack disposal to be greater at Prairie Island than at Point Beach (Tr. 449-50). The higher exposure would result from the man-hours required to cut the racks, estimated by the Applicant to be approximately 100 man-hours (Tr. 461). Witness Vincent estimated the exposure associated with cutting up the racks to be approximately 10 man-rem (Tr. 498). Staff Witness Block testified that he was unable to evaluate the difference in exposure associated with the two methods in the absence of specific knowledge of the procedures used at Point Beach (Tr. 798). The sum of this evidence indicates that

⁹The Board notes that information on radiation exposure levels experienced during similar operations at other facilities also was not available to the NRC Staff at the time it prepared the Safety Evaluation and environmental appraisal for the proposed modification at Prairie Island.

there may be some reason for believing that cutting the racks and placing the pieces in drums for shipment offsite might result in greater occupational exposure than if the racks were left intact and placed in crates for shipment offsite.

53. Another factor which probably contributed to the relatively low total occupational exposure at Point Beach was the fact that there the bottom of the pool was cleaned prior to removal of the old racks (Tr. 478, 492-3). At Zion, on the other hand, an attempt at vacuuming the pool bottom prior to removal of old racks was apparently ineffective (Tr. 502-3). Staff Witness Block testified that he thought cleaning the pool bottom would not have a major effect on the total man-rem budget and suggested that the dose incurred in cleaning the pool might cancel any benefit gained from cleaning. In his view, the occupational dose will be as low as reasonably achievable if the pool bottom is not cleaned (Tr. 785-6). We believe the evidence shows that cleaning the pool bottom might reduce the total occupational exposure somewhat, but it would not contribute significantly to reducing the dose.

54. The record is silent on why total occupational dose was only 2 man-rem during the fuel pool modification at Ft. Calhoun.

55. Apparently the reason that Applicant decided to cut the racks into pieces and pack them in drums was that drums are easier to handle than are crates for intact racks (Tr. 451). The reasons which might prevent the Applicant from employing the Point Beach method for rack disposal now are: (1) Applicant's contract with a construction firm that is to perform the work; and (2) an estimated additional cost of \$30,000 to \$50,000 if the Point Beach method should be used (Tr. 452, 501).

56. Applicant points out that while cleaning the bottom of the pool might result in somewhat less radiation exposure to divers, some occupational exposure would be involved in the cleaning process (Applicant's Reply to Proposed Findings of Intervenor, paragraph 27; Tr. 501-2, 795). Similarly, while shipping the racks intact would eliminate the exposure associated with cutting them up, it would require decontamination procedures prior to crating which would involve some radiation exposure. *Id.*, Tr. 495-6. Shipping them intact would also be more expensive. *Id.* Applicant argues further that the Director of Nuclear Reactor Regulation made the finding, based on the NRC Staff's review of the operating license application, that there was reasonable assurance that NSP would conduct its plant operating activities in compliance with NRC regulations (pursuant to 10 CFR §50.57(a)(3)). *Id.*, paragraph 22. The Applicant claims that there is nothing in the record of this proceeding to suggest the contrary. *Id.*, paragraph 26. Applicant also argues that the ALARA standard of 10 CFR §20.1(c) requires that a number of considerations be balanced—that the requirement is not a simple directive that the method resulting in the lowest dose must be employed. *Id.*, paragraph 25.

57. Staff argues that the requirement in 10 CFR §20.1(c) that the Licensee

make every effort to maintain radiation exposure "as low as is reasonably achievable" does not mean that it must maintain exposure "as low as is conceivably possible." It maintains that the record, "particularly those parts dealing with Applicant's radiation protection program," indicates that the Applicant has carefully considered the ALARA standard in 10 CFR §20.1(c) in planning the proposed modification. The evidence cited to support this statement is the testimony by Vincent (Tr. 490-91), quoted *supra* (Staff's Proposed Findings, pp. 22-3).

58. We believe the evidence suggests a possibility that the total occupational dose associated with the proposed spent fuel pool modification could be reduced by as much as 10 man-rem if the Applicant crated the old racks for shipment offsite rather than cutting them and packing the pieces in drums. The technology for crating the racks is available, as evidenced by the fact that the method has been used at other facilities. The additional financial burden that would be imposed by crating the racks, \$30,000 to \$50,000, is not, in our view, prohibitive and is a reasonable amount to expend for a possible radiation exposure reduction of as much as 10 man-rem. In any event, the alternate method of rack disposal is deserving of more analysis than this record indicates that method has received.

59. We have found, *supra*, that the estimated 28 man-rem occupational exposure is not, *per se*, an unacceptable total dose for the proposed project. We do not now decide that such an exposure is not in fact as low as is reasonably achievable. Consequently, we do not deny the requested license amendments on this account. It might be reasonable for the Applicant to modify its plans to reduce the radiation exposure associated with this job. We *do* decide that this issue needs further exploration. Accordingly, we condition the license amendments authorized herein as follows: the Licensee shall be authorized to proceed with the fuel pool modification as requested, except for rack disposal. After the old racks have been removed and washed down, measurements shall be made of the radiation levels that would be experienced by workers cutting the racks and packing the pieces in drums and by workers preparing the racks for crates and crating them. The Applicant will then assess, based on these measurements, the total occupational dose that would result from each method of disposal: cutting and packing the pieces in drums, and loading the drums for shipment offsite; and preparing intact racks for placement into crates, placing them in crates, and loading the crates for shipment offsite. This assessment will be submitted to the Regulatory Staff for its evaluation. Following its evaluation, the Staff shall recommend to this Licensing Board whether the Licensee should be allowed to proceed with disposal as planned or shall be required to crate intact racks for shipment. Upon considering the Staff's recommendation, and any additional evidence presented to us at that time, the Board will issue its further decision on this matter.

Contention 23.B

The Licensee's discussion of spent fuel pool boiling is inadequate in that: The assertion that the time to boiling could be increased to ten hours by distributing the spent fuel in the pool is unsupported.

60. The Prairie Island spent fuel pool is composed of two pool compartments of different sizes. Analyses were made by the Staff and the Applicant of the time it would take for the water in the pools to reach boiling, assuming the worst possible conditions of a complete failure of the spent fuel cooling system immediately following the placement of an entire off-loaded core in the small pool, with the large pool full of spent fuel assemblies (Lantz Testimony, Contentions 18-23, following Tr. 823, p. 4; Contention 19, p. 13; Contention 23.B; Staff Safety Evaluation, p. 5; Tr. 840-1; Lampe Testimony, Contention 23.B, following Tr. 211, pp. 1-2; Tr. 242-245).

61. Under these circumstances, it would take between 3 and 4 hours for boiling to occur in the small pool, where the greatest heat load would occur, under the conservative assumption that coolant does not flow between the two pools. Lengthening the time to boiling could be accomplished by opening the gate between the two pools. No calculation has actually been made of the time which would elapse to boiling with the gate between the pools open, but it would certainly be longer (Tr. 245). If the recently off-loaded core were placed in the large pool instead of the small pool, the time to boiling would be about 10 hours (Lantz Testimony, Contention 23.B, p. 13). However, there is neither any plan, nor any apparent need to shuffle fuel in order to increase time to boiling (Tr. 245, 843). The time available, were the cooling system to fail after a core had been off-loaded to the small pool, would be adequate to allow any of several auxiliary sources of water to be employed, any of which could serve to supply water faster than it would boil away (Tr. 195-197; Lantz Testimony, Contention 19, p. 4; Tr. 831-2).

62. It appears to the Board that the contention has little or no relevance to either the safety or the environmental impact implications of the license amendments. While it is apparently true that time to boiling could be increased by proper distribution of fuel, such a move would not be needed. Protection against overheating or boiling away of the pool water is adequate from other sources and the Board finds nothing in the evidence concerning this matter which militates against approval of the license amendments.

Contention 27

The license amendment request and supporting documentation do not discuss all possible consequences associated with criticality excursions due to errors in spent fuel spacing or to accidents during fuel handling operations.

63. This was the only contention concerned with criticality which the Intervenor did not withdraw by its motion of June 24, 1977. It appears from Intervenor's Proposed Findings (pp. 27-30) that Intervenor's chief concern is that a fuel cask may be dropped into a full storage pool, and that such an event could lead, perhaps indirectly, to a criticality incident. The Board notes prepared testimony of both Staff and Applicant (Staff Safety Evaluation, following Tr. 685, pp. 1-3; Fisher Testimony following Tr. 121, Contentions 25-27) to the effect that dropping fuel elements could not cause such an incident, nor could the erroneous positioning of such elements, nor could an overly tight lattice resulting from manufacturing tolerances.

64. The particular scenario which the Intervenor seems to suggest is as follows: a 100-ton fuel shipping cask falls onto the racks in a pool; the racks are compressed to a denser configuration; a leak is simultaneously induced in the pool; unborated water is added to the pool; criticality occurs when the pool's boron concentration drops. Intervenor suggests that the results of this sequence should be analyzed.

65. We note that criticality would not occur if a "heavy object" crushed the racks, provided that the refueling concentration of boron is maintained (Tr. 702) and we are led to wonder whether the fall of a "heavy object" could simultaneously cause a leak. Although the Intervenor says it could (Intervenor's Proposed Findings, p. 29, §61), the transcript citation there offered (Tr. 882) says:

The results of our analysis show the small fuel pool can withstand the consequences of a dropped cask with minimal, if any, leakage.

That citation scarcely suggests that leakage would be substantial.

As to the makeup water being unborated, Intervenor asserts that that would indeed be the case, citing the transcript at p. 857. We read the cited exchange as follows:

Q. "... Mr. Lantz, do you know if, in the event of pool leakage from one of the pools, the source of makeup water would contain boron, the makeup water which could be used would contain boron?"

A. "No."

66. The Board views this answer as simply stating that the witness did not know whether such water could be borated. Indeed, other testimony by witnesses more familiar with the plant's configuration states (Testimony of Shimabayama, Contention 12, p. 1):

The Prairie Island configuration includes as a source for filling the spent fuel pool the Chemical Volume and Control System. . . .

67. It is, the Board believes, common knowledge that that system can supply borated water.

68. Even the triggering event for the Intervenor's scenario seems remote. No cask presently exists, and, indeed, no cask design has even been specified (Tr. 881). There is no crane available to lift such a cask over pool #2 (Lantz Testimony, Contentions 28-31, p. 3), and a Technical Specification (3.8.B.1) forbids moving any heavy object over pool #1 when it contains fuel (Vincent Testimony, Contentions 28-31, p. 5). (For a discussion of the Intervenor's challenge to the effectiveness of this Technical Specification see Contention 28, *infra*.)

69. The Board views the sequence of events: violation of a Technical Specification (or, perhaps somewhat more probable, the tipping of a cask into pool #2 (Tr. 862); crushing of the storage racks; inducement of substantial leakage (despite the racks' cushioning effect); and replacement of leaked water with unborated water—as being too remote to be considered an undue hazard to health and safety. We are content to here address only the safety questions surrounding the modification of the fuel pool, and to leave any such speculative event chains for analysis by the Staff when approval is sought in the future for cask design and operating procedures.

Contention 28

The amendment request and supporting documentation do not establish the method by which the Licensee will positively preclude the movement of heavy objects such as shipping casks, over pit #1 at all times when the pool holds stored spent fuel, thereby precluding:

- A. The possibility of an accidental leak from pit #1, exposing the stored spent fuel; and
- B. The possibility of damage to spent fuel from the accidental dropping of such objects.

70. Intervenor contends that there is no method presently in force which "positively precludes the movement of heavy objects, such as shipping casks, over pit #1" when that pool contains stored fuel (Intervenor's Proposed Findings, paragraph 65). This contention apparently addresses the movement of objects over pool #1 after the proposed modification has been completed. All parties recognize that heavy objects will be moved over pool #1 while it contains spent fuel during the process of carrying out the proposed modification. Intervenor's Contentions 29-31 raised the possibility of accidental damage to stored spent fuel in this pool as a result of activities carried out during the modification procedure. These contentions were withdrawn by the Intervenor by its motion of June 24, 1977, on the grounds that the Intervenor believed these matters had been satisfactorily addressed in the course of discovery and at the evidentiary hearing.

71. The movement of heavy loads over pool #1 when it contains irradiated

fuel is prohibited by Technical Specification 3.8.B.1 for the Prairie Island facility, as implemented by Applicant's administrative procedures (Safety Evaluation, p. 6; Lantz Testimony, Contentions 28-31, p. 3; Vincent Testimony, Contentions 28-31, p. 5; Applicant's Proposed Findings, paragraph 70; Applicant's Reply to Proposed Findings of Intervenor, paragraph 34). Intervenor argues that administrative controls do not make "a cask drop accident over a loaded pool #1 so unlikely that the consequences of such an event can be ignored" (Intervenor's Proposed Findings, paragraph 65). The Intervenor is concerned about "the potential dangers which are inherent in controls based on human judgment about the meaning of technical specifications." *Id.*, paragraph 66. As evidence to demonstrate the validity of its concern, Intervenor cites testimony by Applicant's Witness Vincent, and maintains that upon cross and redirect examination Vincent made "frequent changes in his interpretation" of Technical Specification 3.8.B.1. *Id.*, paragraphs 67-68. Intervenor says additionally that the fact that the Staff did not recognize, until after the Safety Evaluation was issued, that the installation and removal of the protective cover on pool #1 would require an exemption from Technical Specification 3.8.B.1 further undermines confidence in administrative controls (Intervenor's Proposed Findings, paragraph 71). Intervenor would have us find Technical Specification 3.8.B.1, as implemented by Applicant's administrative controls, does not provide reasonable assurance that the health and safety of the public will be protected. *Id.*, paragraph 72.

72. The Applicant argues that "technical specifications are the controlling requirements which provide the basis for the day-to-day administrative procedures which govern a plant operation," and points out that a vast majority of an NRC license consists of technical specifications. Applicant maintains that Intervenor is in error when it assumes that technical specifications cannot be relied upon to provide reasonable assurance of public health and safety (Applicant's Reply to Proposed Findings of Intervenor, paragraph 34). Applicant claims that the Intervenor "has mischaracterized the testimony of NSP witness Vincent on this point," and says that Vincent did not change his testimony. The Applicant points out that Vincent admitted, when confronted under cross-examination with a request for a literal interpretation of a particular phrase, that his prior understanding of Technical Specification 3.8.B.1 may have been too broad. But, says the Applicant, this does not change the fact that Vincent had always believed that the Technical Specification prohibited the movement of heavy objects over pool #1 when it contained spent fuel and that he would continue to hold that interpretation in the future. *Id.*, paragraph 35.

73. The Licensing Board has examined the record closely and as a result believes that the Applicant has fairly characterized witness Vincent's testimony. It is true that the witness exhibited some confusion under intense interrogation about the meaning of certain phrases of Technical Specification 3.8.B.1. But

upon looking at Vincent's testimony as a whole, we are convinced that he has an adequate understanding of the Technical Specification (Tr. 337-41; Tr. 404-7; 418-19; 458-9; 528-33; 539-41). We do not agree with the Intervenor that Vincent's testimony is grounds for concern about the efficacy of administrative controls.

74. We have also examined Intervenor's assertion that the Staff did not recognize that an exemption from Technical Specification 3.8.B.1 would be required for Applicant to carry out the proposed modification (Intervenor's Proposed Findings, paragraph 71). The evidence shows this assertion to be, in fact, true. Staff witness Grotenhuis testified that the relationship of the technical specification to the protective cover was overlooked when the safety evaluation was prepared (Tr. 903). There is other evidence to suggest that the Staff failed to consider all relevant information before preparing the Safety Evaluation. Two of three documents cited by Staff Witness Lantz to provide the basis for the Staff conclusion "that there is reasonable assurance that the health and safety of the public will not be endangered by the installation and use of the new racks" were dated later than the Safety Evaluation¹⁰ (Lantz Testimony, Contentions 28-31, p. 4; Tr. 885-890). Lantz did testify that the Staff had information in addition to the cited documents. *Id.* We do not doubt this, but we would have preferred to see Staff cite sources which were used in reaching a conclusion, rather than supportive documents which postdate the conclusion. Moreover, it appears that the Safety Evaluation was issued before Applicant had reached a firm decision about certain details of safety-related procedures (Tr. 890-9). Fortunately, the procedures eventually chosen will, in our opinion, provide reasonable assurance that the health and safety of the public will be pro-

¹⁰ A letter from Applicant to Staff dated April 14, 1977, was the document cited in testimony by Lantz which predated the Safety Evaluation. It was introduced into evidence as Applicant's Exhibit 1-E. Introduced with the letter was a drawing (designated NF-38303-29) which, according to Counsel for Applicant, was referenced in the letter (Tr. 105). The reference to the drawing in the letter stated, "Full-sized drawings of the cover were provided to Mr. M. Grotenhuis earlier. . . ." The drawing contains four paragraphs under the heading "Instructions for Manipulations of Racks and Cover, " which provide a reasonably complete description of procedures for handling the cover. Counsel for Applicant, in questioning Staff Witness Grotenhuis, asked whether Staff had possession of the drawing prior to April 14, 1977, to which the witness replied, "I believe so" (Tr. 903-905). The Licensing Board observes, however, that the drawing designated NF-38303-29 was released April 20, 1977, and the designs depicted on it were not approved until April 19, 1977. Clearly, it is not the drawing referenced in the letter dated April 14, 1977. We are concerned not only that the Staff appears to have prepared the Safety Evaluation before it had available to it all of the information which, in our opinion, should have been considered in preparing the report, but also that Counsel for the Applicant appears to have misrepresented (perhaps unwittingly) the amount of information that the Staff had in hand when the Safety Evaluation was written.

tected. Consequently, our decision in this case need not be affected by a lapsus on the part of the Staff. In any case, we do not see any relevance of the fact that Staff testimony cites documents which postdate the Safety Evaluation to the contention that the Applicant has not established the method by which the movement of heavy objects over the spent fuel pool will be precluded.

75. Finally, Intervenor argues that Applicant should be prohibited from storing more than 555 spent fuel elements in the pool to prevent the necessity of a possible future amendment of Technical Specification 3.8.B.1 (Intervenor's Proposed Findings, paragraph 70). We do not see the relevance of this issue, which is based on speculation, to the instant proceedings.

76. The position of the Staff on Contention 28 is that Technical Specification 3.8.B.1 and Applicant's administrative procedures provide reasonable assurance that movement of heavy loads over irradiated fuel in the spent fuel storage pool will not occur without Commission approval (Staff's Proposed Findings, p. 30).

77. We conclude, based on the evidence before us, that the Applicant has established the method by which the movement of heavy objects over pool #1 will be precluded when the pool contains spent fuel, and that this method provides reasonable assurance that the health and safety of the public will be protected.

Conclusion

78. In accordance with the Atomic Energy Act, as amended, and the Commission's regulations, and on the basis of the evidentiary record and the foregoing findings of fact and conclusions of law, the Atomic Safety and Licensing Board has herein determined all of the matters in controversy among the parties, and all such matters are resolved in such a manner as to support the issuance of the requested operating license amendments, upon the conditions set out below.

ORDER

It is ORDERED, in accordance with the Atomic Energy Act, as amended and the regulations of Nuclear Regulatory Commission, and based on the findings and conclusions set forth herein, that the Director of Nuclear Reactor Regulation is authorized to make appropriate findings in accordance with the Commission's regulations and to issue the appropriate license amendments authorizing the expansion of the spent fuel storage pool capacity at the Prairie Island Nuclear Generating Plant, Units 1 and 2, upon the following conditions:

1. The licensee shall be authorized to proceed with the fuel pool modification as requested, except for rack disposal. After the old racks have been removed and washed down measurements shall be made of the

radiation levels that would be experienced by workers cutting the racks and packing the pieces in drums and by workers preparing the racks for crates and crating them. The licensee will then assess, based on these measurements, the total occupational dose that would result from each method of disposal: cutting and packing the pieces in drums for shipment offsite; and preparing intact racks for placement into crates, placing them in crates, and loading the crates for shipment offsite. This assessment shall be submitted to the NRC Regulatory Staff for its evaluation. Following its evaluation, the Staff shall recommend to this Licensing Board whether the licensee should be allowed to proceed with disposal as planned or shall be required to crate intact racks for shipment. Upon considering the Staff's recommendation, and any additional evidence presented to us at that time, the Board will issue its further decision on this matter.

2. Before work begins on the project, the licensee shall measure and record ambient radiation levels around the fuel pool. After the replacement of the storage racks and the fuel elements currently stored in them, the licensee shall again measure radiation levels around the pool, monitoring such levels and operating the cleanup system until the levels return to those typical of the period before the rack modification work was begun. No further activities which would increase the radioactive content of the pool (activities, for example, such as refueling) shall be carried out until the levels return to those typical of the period before the modification.

It is further ORDERED, in accordance with Sections 2.760, 2.762, 2.764, 2.785 and 2.786 of the Commission's Rules of Practice, that this Initial Decision shall be effective immediately and shall constitute the final action of the Commission forty-five (45) days after the date of issuance, subject to any review pursuant to the above cited Rules of Practice.

THE ATOMIC SAFETY AND
LICENSING BOARD

Oscar H. Paris, Member

Frederick J. Shon, Member

Edward Luton, Chairman

Dated at Bethesda, Maryland,
this 12th day of August 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Elizabeth S. Bowers, Chairman
Dr. Marvin M. Mann
Dr. Quentin J. Stober

In the Matter of

Docket Nos. STN 50-546
STN 50-547

PUBLIC SERVICE COMPANY
OF INDIANA, INC.

(Marble Hill Nuclear Generating Station,
Units 1 and 2)

August 22, 1977

The Licensing Board issues a Partial Initial Decision on environmental and site suitability matters, authorizing issuance of a Limited Work Authorization and specifying conditions for any construction permits which may be issued in the future.

FWPCA: NRC AUTHORITY

Argument by a state adjoining the site on which the proposed facility is to be located that certain unspecified permits (other than Section 401, FWPCA, Certification) are necessary from the adjoining state before a license may be issued is not well taken. NRC may issue an LWA or construction permit while leaving the enforcement of the adjoining state's laws to an appropriate state forum.

FWPCA: NRC AUTHORITY

NRC has no authority to entertain Intervenor's motion that the NRC record be reopened because the certifying state under Section 401, FWPCA, had not granted the intervening party a public hearing prior to the issuance of the 401 Certification.

FWPCA: STATE AUTHORITY

States have no authority, pursuant to FWPCA, to impose conditions upon an NRC license relating to radiological health and safety matters.

TECHNICAL ISSUES DISCUSSED: Low level radiation releases, need for power, cooling tower plumes, impacts on local governmental services, loss of farmland, herbicides, alternative sources of energy, alternate sites, chlorinated organics, concentration of heavy metals, condensor tubing, design of intake and discharge structures, and environmental effects of transmission lines.

PARTIAL INITIAL DECISION LIMITED WORK AUTHORIZATION

Appearances

Harry H. Voigt, E. David Doane, and Michael F. McBride, Esqs., LeBoeuf, Lamb, Leiby and MacRae, 1757 N Street, N.W., Washington, D.C. 20036; **Charles W. Campbell, Esq.,** General Counsel, **Jim Pope, Esq.,** Associate Counsel, and **Greg Kimberlin, Esq.,** Assistant Counsel from Public Service Company of Indiana; on behalf of the Applicant, Public Service Company of Indiana.

Bill V. Seiller, Esq., 2100 Commonwealth Building, Louisville, Kentucky 40202; on behalf of the Joint Intervenors, Sassafras Audubon Society, Knob and Valley Audubon Society and Citizens Energy Coalition.

Thomas M. Dattilo, Esq., 404 East Main Street, Madison, Indiana 47250; on behalf of Save the Valley-Save Marble Hill.

Joseph B. Helm, Mark B. Davis, Jr., Esqs., 1600 Citizens Plaza, Louisville, Kentucky 40202; on behalf of Louisville Water Company.

Robert G. Grant, Esq., 1330 W. Michigan Street, Indianapolis, Indiana; on behalf of the Indiana Environmental Management Board.

Michael J. Walro, Esq., 427 East Main Street, Madison, Indiana 47250; on behalf of the Plan Commission and Board of Zoning Appeals of Jefferson County, Indiana.

John Ready O'Connor, Esq., Suite 15, K of P Building, Madison, Indiana 47250; on behalf of Saluda Township.

George A. Leininger, Jr., Esq., P.O. Box 826, Madison, Indiana; on behalf of the City of Madison.

Charles Kaplan, Esq., Lynch, Sherman, Cox and Fowler, City Hall, Louisville, Kentucky 40202; on behalf of the City of Louisville.

Walker C. Cunningham, Stuart L. Adams, Marvin R. O'Koon, Esqs., 1112 Kentucky Home Life Building, Louisville, Kentucky 40202; on behalf of Jefferson County, Kentucky.

Ted R. Todd, Esq., P.O. Box 407, Madison, Indiana 47250; on behalf of the Board of Commissioners for the County of Jefferson, Indiana.

David K. Martin and David C. Short, Esqs., Room 34, State Capitol Building, Frankfort, Kentucky 40601; **George L. Seay, Jr., Esq.,** Fifth Floor, Capital Plaza Tower, Frankfort, Kentucky 40601; on behalf of the Commonwealth of Kentucky.

Lawrence Brenner, Harry H. Glasspiegel, Lawrence J. Chandler, and Richard J. Goddard, Esqs., Office of the Executive Legal Director, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555; on behalf of the NRC Staff.

TABLE OF CONTENTS

	Page
A. INTRODUCTION AND BACKGROUND	297
B. FINDINGS OF FACT UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969	303
General	303
1. Contention 1, Low-Level Radiation Releases	304
2. Contention 2, Need for Power	306
3. Contention 3, Cooling Tower Plumes	311
4. Contentions 4 and 5, Impacts on Local Governmental Services	313

5. Contention 6, Loss of Farmland	317
6. Contention 7, Herbicides	318
7. Contention 8, Electrical Impact of 765 kV Transmission Lines	319
8. Contention 9, Alternative Sources of Energy	321
9. Contention 10, Alternate Sites	329
10. Contention 11, Environmental Impact of Construction	330
11. Board Questions	332
C. COST-BENEFIT BALANCE	335
D. COMPLIANCE WITH THE FEDERAL WATER POLLUTION CONTROL ACT	337
E. SITE SUITABILITY FROM THE STANDPOINT OF RADIOLOGICAL HEALTH AND SAFETY	339
1. Contention 14, Tornadoes	339
2. Contention 15, Ground Water Contamination	340
3. Uncontested Site Suitability Matters	341
F. CONCLUSIONS OF LAW	346
G. ORDER	348

A. INTRODUCTION AND BACKGROUND

1. Public Service Company of Indiana, Inc. ("Applicant" or "PSI") filed its Application for Licenses with the U.S. Nuclear Regulatory Commission on July 1, 1975, pursuant to Section 104b of the Atomic Energy Act, as amended ("the Act"). The Environmental Report ("ER") accompanied the Application. Subsequently, Applicant filed four supplements to the ER and seventeen amendments to its Application. PSI seeks authority to construct two pressurized water reactors designed for initial operation of each at core power levels of 3411 megawatts thermal, to be known as Marble Hill Nuclear Generating Station, Units 1 and 2 ("Marble Hill"). Marble Hill will be located on a bluff immediately west of the Ohio River in Saluda Township, Jefferson County, Indiana, approximately ten miles south and slightly west of Madison, Indiana.

2. The Application was reviewed by the Regulatory Staff ("Staff") of the Commission and the Advisory Committee on Reactor Safeguards ("ACRS").

Both the Staff and the ACRS have concluded that there is reasonable assurance that Marble Hill, Units 1 and 2, can be constructed and operated at the Marble Hill site without undue risk to the health and safety of the public. (NRC Staff's Report to the ACRS, September 1976; ACRS letter of October 22, 1976.)

3. In accordance with the requirements of the Act, a notice of hearing was published in the *Federal Register* on October 8, 1975 (40 FR 47219 (1975)). In response to that notice, numerous petitioners petitioned to intervene in this proceeding. Petitions were received from the Saluda Township Advisory Board, the Board of Commissioners of Jefferson County, Indiana, the Plan Commission and Board of Zoning Appeals of Jefferson County, Indiana, the City of Madison, Indiana, the Knob and Valley Audubon Society, the Sassafras Audubon Society, the Citizens Energy Coalition, Inc., Save the Valley, Inc., Save Marble Hill, and an untimely petition of the Louisville Water Company. All these petitioners were admitted as intervenors in this proceeding by the Board's Order of March 12, 1976 (Saluda Township later withdrew on October 21, 1976). Mr. Jeff Tallent and the Kentucky-Indiana Municipal Power Association were denied admission as intervenors (Board's Orders of January 19, 1976, and March 12, 1976; Appeal Board Order of March 3, 1976). Thereafter, in its June 24, 1976, Order, the Board granted the untimely petitions to intervene filed by the City of Louisville and Jefferson County, Kentucky.

The Commonwealth of Kentucky and the State of Indiana were admitted as interested states to this proceeding. (Board's Order of March 12, 1976.)

Save the Valley, Inc. and Save Marble Hill consolidated as intervenors. Citizens Energy Coalition, Inc., Sassafras Audubon Society, and Knob and Valley Audubon Society consolidated under the heading of Joint Intervenors. (Board's Order of November 2, 1976.)

4. Two special prehearing conferences, pursuant to 10 CFR §2.751, were held in Madison, Indiana, on January 27-28, 1976, and October 21, 1976. A final prehearing conference, pursuant to 10 CFR §2.752, was also held in Madison on December 2, 1976. Evidentiary hearings on the matters set forth in the October 8 Notice of Hearing were held in Madison intermittently from March 8 to May 3, 1977.

5. During the evidentiary hearing the following exhibits were admitted by the Board:

Applicant Exhibit 1 - Environmental Report

Applicant Exhibit 2 - Chapter 2 PSAR

Applicant Exhibit 3 - LWA Request to Rusche dated June 25, 1976

Applicant Exhibit 4 - Revised LWA Request to Rusche dated February 28, 1977

Applicant Exhibit 5 - Memorandum on Indiana tax law, City of Madison and PSI dated May 2, 1977

Staff Exhibit 1 - Final Environmental Statement

Staff Exhibit 2 - Letter to Gears from Flugum, dated March 10, 1977

6. The "Notice of Hearing on Application for Construction Permits" published in the *Federal Register* on October 8, 1975, (40 FR 47219) stated that PSI was the "applicant." Amendment 12 to the Application issued in September 1976 stated that Marble Hill will be jointly owned by a number of utilities ("participants") as "tenants in common" (Northern Indiana Public Service Company, East Kentucky Power Cooperative, Inc., and Wabash Valley Power Association). The Staff put the Board on notice at the October 21, 1976, prehearing conference that it might consider that the proposal that co-owners not be co-applicants a problem. In the December 2, 1976, prehearing conference, the Staff and Applicant were requested to submit briefs on the question of whether all co-owners must be co-applicants (the Joint Intervenor supported the Staff that co-owners must be co-applicants). PSI was requested to give a report on the "firm" ownership agreement by January 21, 1977. That letter stated that Wabash Valley Power Association will own 17 percent of each unit and East Kentucky Power Cooperative will own 8 percent of each unit. The Board determined in its order of February 1, 1977, that co-owners are *de facto* co-applicants and that an amended notice of hearing should be issued in order to give persons an opportunity to show how their interest might be affected by the new ownership. The amended notice of hearing was issued on February 2, 1977, and was published on February 7, 1977, in the *Federal Register* (42 FR 7180). The matter was referred by the Licensing Board to the Atomic Safety and Licensing Appeal Board. The Appeal Board determined on February 4 and 17, 1977, in ALAB-371 and ALAB-374, that the Licensing Board could proceed with issues not related to the question of co-ownership.¹ On February 11, 1977, PSI informed the Board that East Kentucky Power Cooperative had withdrawn on February 9, 1977. No petitions to intervene were filed in response to the amended notice. The Appeal Board in ALAB-405, 5 NRC 1190, May 31, 1977, declined the referral. The Licensing Board's determination remains in effect. All references to "Applicant" or "Applicants" in this Partial Initial Decision include Wabash Valley as well as PSI.

7. By letter of June 25, 1976, the Applicant requested a Limited Work Authorization ("LWA"). The request was updated by letter of February 28, 1977.²

The contentions of the various intervening parties in the proceeding were organized into sixteen (16) issues for hearing. Thirteen (13) of these issues were determined to be appropriate for hearing in the LWA phase of these proceedings. These 13 issues may be briefly stated as follows (with the renumbering approved

¹ *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), Dockets Nos. STN 50-546/547, 5 NRC 409, 417 (1977).

² Applicant Exhibits 3 and 4.

by the Board, Board's order of November 2, 1976; *see also* Board's order of December 15, 1976, note 1):

- (1) Low-level radiation releases;
- (2) Need for power;
- (3) Cooling tower plumes;
- (4) Increased traffic;³
- (5) Impacts on local governmental services;
- (6) Loss of farmland;
- (7) Herbicides;
- (8) Impact of 765 kV transmission lines;
- (9) Alternate energy sources;
- (10) Alternate sites;
- (11) Environmental impact of construction;
- (14) Tornadoes;
- (15) Groundwater contamination.

Dr. Stober asked that five (5) questions be specifically addressed in the environmental hearings. (Tr. 751-55.) Those questions concerned transmission lines, chlorinated organics, the intake structure, condenser tubes, and concentration of heavy metals.

At the evidentiary hearings, intervenors cross-examined the witnesses of Applicant and Staff on certain issues and presented witnesses in support of their positions on some of the contested issues. (Tr. 1001-5682.) The Louisville Water Company, which had no environmental contentions, did not participate but has satisfied the Board that it will fully participate when its one contention is heard in the health and safety hearing.

8. The Joint Intervenors did not participate at all in the evidentiary hearing although they had advanced numerous contentions applicable to the environmental hearing phase. All of the contentions advanced by the Joint Intervenors were litigated in any event as they were also advanced by other parties. The Joint Intervenors filed no proposed findings of fact or conclusions of law. In our May 9, 1977, "Order Subsequent to the Evidentiary Hearing on Environmental Issues and Site Suitability," the Board gave the Joint Intervenors ten (10) days to show good cause why they should not be dismissed from the proceeding in accordance with 10 CFR §2.707. The Joint Intervenors, by their counsel, responded that they should be retained as a party and be "permitted to participate to the extent they are able, including any subsequent evidentiary hearings and appeals." ("Response to Board Order of May 9, 1977," dated May 20, 1977.) Pursuant to the suggestion of the Staff, the Board deferred ruling on the continued status of the Joint Intervenors and ordered the Joint Intervenors to

³This contention was heard together with Contention 5.

inform the Board by June 13, 1977, if they will present direct testimony and/or conduct cross-examination on their one remaining safety contention. ("Order Relative to Status of Parties and Contentions" dated June 2, 1977.) The Joint Intervenors have failed to file the required response to the Board's order. The Board by its order of July 13, 1977, dismissed the Joint Intervenors as parties to this proceeding. [10 CFR §2.707; *Gulf States Utilities Company* (River Bend Station), ALAB-358, 4 NRC 558 (November 22, 1976); *Northern States Power Company* (Prairie Island Nuclear Generating Plant), ALAB-288, 2 NRC 390, 393 (1975); *Consumers Power Company* (Midland Plant), ALAB-123, 6 AEC 331, 332-34 (1973). See also *Boston Edison Company* (Pilgrim Nuclear Generating Station), LBP-76-7, 3 NRC 156 (February 20, 1976).] Joint Intervenors' Contention 16 was dismissed as a matter in controversy. However, the Board will expect the Staff and Applicants to assure that information in response to the concern raised by Contention 16 is contained in the record of the upcoming radiological health and safety phase.

9. By its orders dated January 12, 1977, and March 1, 1977, the Board found that (1) PSI was responsible for the commencement of construction on a four-and-one-half mile portion of the Bower-Marble Hill Road, known as County Road 1000S in Jefferson County, Indiana, and known as Bower Road in Clark County, Indiana, which runs between State Road 62 and the proposed Marble Hill site; (2) such construction was within jurisdiction of the Board; and (3) PSI violated 10 CFR §50.10(c) of the Commission's regulations by effecting commencement of construction in advance of receiving a limited work authorization ("LWA") or construction permit ("CP") and without prior approval from the Board. The Board's March 1, 1977, order further stated that the Board would expect the NRC Staff to take a position as to an appropriate sanction for the violation.

10. Pursuant to its authority under Subpart B of 10 CFR Part 2, and by virtue of a consent agreement with PSI, the Staff has assessed a civil fine of \$12,500 against PSI. ("Consent Agreement Between the Nuclear Regulatory Commission Staff and Public Service Company of Indiana, Inc." dated and filed with the Board on May 27, 1977.) Pursuant to this consent agreement, PSI has paid the civil fine reserving its right to appeal. Certain Intervenors have urged that the Board withhold approval of a LWA and CP to punish PSI for its violation. The Board does not agree. In this Partial Initial Decision, the Board has found that the NEPA cost-benefit balance favors construction of the proposed facility and that power from the proposed facility will be needed in the early to mid-1980's. It would be contrary to the public interest to disapprove or delay construction. Moreover, although we have found that PSI violated the Commission's regulations, the violation was not a flagrant one, did not threaten the public health and safety, and caused no identified harm to third persons. The Board concludes that the Staff's imposition of the \$12,500 civil fine was an

appropriate sanction in these circumstances. The Board concludes that there is no need for it to take any further action with respect to PSI's violation.

11. Subsequent to the closing of the record on the evidentiary hearing several matters were raised by the parties by letter or by motion, e.g., Save the Valley-Save Marble Hill ("STV/SMH") "Motion to Reopen Record" dated June 13, 1977, and the responses thereto; the Applicant's "Contingency Plan" and the responses to the Board's relevant order of July 6, 1977; STV/SMH's request of July 6, 1977, for a hearing on civil penalties and the responses thereto. The Board has determined that none of the information or argument presented warrants the reopening of the record. Any unauthorized filing by any party has been given no consideration by the Board.

12. Proposed findings of fact and conclusions of law have been filed by the Applicants, the NRC Staff, the Commonwealth of Kentucky, the City of Louisville/Jefferson County, Kentucky, and Save the Valley/Save Marble Hill.

Any proposed findings of fact submitted by the parties hereto, which are not incorporated directly or inferentially into the Partial Initial Decision, are herewith rejected as being unsupportable in fact or law or as being unnecessary to the rendering of this partial decision.

13. Though the notice of hearing set forth all of the issues which must be considered and decided by this Board to determine whether construction permits should be issued to the Applicants, this Partial Initial Decision addresses only the environmental issues specified by 10 CFR Part 51 and the site suitability issues specified by 10 CFR §50.10(e)(2). An initial decision on the remaining radiological health and safety issues, and this Board's ultimate decision on the issuance of construction permits, will be issued after concluding public hearings on the remaining radiological health and safety issues aspects of the application.

14. Requests for limited appearances were made by a number of persons, many of whom either appeared at the hearings and made oral statements or submitted statements in writing for the record. (Tr. 786-895; 1842-43; 2409-19; 5392-93.)

Several of those making limited appearances supported the proposed plant.

The remainder either expressed their opposition to the proposed plant or explained their concerns about various environmental and safety issues.

Many of those opposed to the proposed plant raised issues dealt with by the Commission's regulations and thus outside jurisdiction of the Board. Other persons raised issues outside the jurisdiction of the Commission.

Some persons, however, raised issues appropriate for the Board's review, including the alternative of a coal-fired plant, and other alternate sources of energy, low-level radiation releases, need for power, and alternate sites.

Questions were raised concerning availability of uranium fuel, cooling tower plumes, chlorinated organics in the Ohio River, the use of herbicides on transmission right-of-way, and capacity factors at which nuclear power plants oper-

ate. All of the aforementioned issues were addressed by the Applicant and the Staff.

B. FINDINGS OF FACT UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

General

15. Applicant submitted on July 1, 1975, an Environmental Report ("ER") pursuant to 10 CFR Part 51, and subsequently added Supplements 1 through 4 thereto. The ER and its supplements contain detailed information on and evaluations of the environmental impacts associated with construction and operation of the facility.

16. Based on the information submitted by the Applicant in the ER and its supplements, and on its own independent review and analysis, the Staff prepared a Draft Environmental Statement ("DES"), which was issued in March 1976. Copies of this DES, with requests for comments, were made available to appropriate Federal, state, and local agencies and organizations (FES, p. ii). A notice of availability, with requests for comments from the public, was published in the *Federal Register* on March 11, 1976 (41 FR 10485). Twenty-seven (27) Federal, state, and local agencies and other interested parties commented on the DES. The Staff then prepared a Final Environmental Statement ("FES") which, in September 1976, was issued and made available to the public, to the Council on Environmental Quality, and to the aforementioned organizations and agencies.

The comments from the agencies and interested parties were considered in the FES, and an evaluation of these comments is included therein (FES, §11).

17. The FES covers in detail the environmental impact of both the construction and operation of the Marble Hill Station. It contains a detailed description of the site and the plant, with a discussion of the environmental effects of site preparation and plant and transmission line construction. In addition, the FES covers the environmental impact of plant operation, discusses the environmental monitoring program and assesses the environmental effects of postulated accidents. It also considers in detail the implications of the proposed project, including the need for power, the adverse environmental effects which cannot be avoided, the relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity, and the irreversible and irretrievable commitment of resources. Further, the FES discusses alternatives to the proposed action, with assessments of alternate energy sources, alternate sites and plant design alternatives. It also presents a cost-benefit analysis of the project. The FES contains a summary of its assessments and concludes that after weighing the environmental, economic, technical, and other benefits of construction and operation of the facility against environmental and other costs,

and considering available alternatives, the action called for under NEPA and 10 CFR Part 51 is the issuance of a construction permit for the facility, subject to certain conditions for the protection of the environment.

18. The Board finds that the Staff's FES is a comprehensive review and evaluation of the environmental impact of the construction and operation of the facility, except insofar as the assessments and evaluations in the FES are modified by the findings and conclusions reached in this initial decision. Further, the FES, as modified herein, sets forth an adequate evaluation of the various alternatives to the proposed action.

19. Further, the Board has independently considered the environmental impact of the proposed action and the Board hereby agrees with, incorporates by reference, and adopts the Staff's evaluations in the FES, except where the Staff's evaluations are in conflict with the findings in this initial decision.

1. Contention 1, Low-Level Radiation Releases

STV/SMH

The environmental impact of radioactive releases has not been adequately evaluated for the purpose of the cost-benefit balance.

Joint Intervenor

The impact of radioactive effluents on drinking water supplies and on land and air resources has been inadequately evaluated and inadequate consideration has been given to the impact of such releases on plants and animals in the cost-benefit balance.

20. The evaluation presented by the Staff demonstrates that the calculated releases of radioactive material from the proposed facility to unrestricted areas during normal reactor operations, including expected operational occurrences, will comply with the design objectives of Appendix I to 10 CFR Part 50. Accordingly, the Board finds that the facility as proposed will contain equipment to control releases of airborne and liquid radioactive effluents, so that the releases to unrestricted areas will be kept "as low as is reasonably achievable" in compliance with 10 CFR §50.34a (Staff Test., post Tr. 1817; FES §§3.5 and 5.4). The Staff's calculations, which evaluate all credible potential pathways, are highly conservative and therefore in all probability overstate the doses resulting from the low-level radiation to be released from the facility (*Id.*; Tr. 1851-52; 1919-20; 1930-35). This conservatism was confirmed by Applicants' testimony (Tr. 1603-06).

21. Effluents from other licensed nuclear plants upstream from the pro-

posed facility on the Ohio River system were considered. The two-unit Beaver Valley plant below Pittsburgh, and the one-unit Zimmer plant near Moscow, Ohio, were identified specifically (Staff Test., post Tr. 1817, p. 5). The Board finds that concentration of the liquid and airborne radioactive effluent from the upstream plants is so extremely small in the vicinity of the proposed facility that no cumulative effects can be identified (Staff Test., post Tr. 1817, pp. 5-6; Tr. 1829-32; 1836-37; 1921-22).

22. The Staff's conservative calculation which predicts low-level releases from the proposed facility, demonstrates that the releases from the proposed facility will be so low as to be undetectable against the existing natural background radioactivity (FES §5.4.1.5; Tr. 1906-07; Applicant Test., post Tr. 1601, pp. 2-3).

23. The Joint Intervenors contend that there has been inadequate consideration given to the impact of radioactive releases on plants and animals in the cost-benefit balance. Applying the conservative estimates of risk to humans, based on the linear no-threshold hypothesis of the "Report of the Advisory Committee on the Biological Effect of Ionizing Radiation," National Academy Sciences (1972), ("BEIR Report"), there will be insignificant adverse effects on humans produced by the effluents to be released during the projected period of plant operation (Staff Test., post Tr. 1817, p. 9; Applicant Test., post Tr. 1601, pp. 2 and 5; Tr. 1625-26; 1697-98). Although guidelines have not been established for acceptable limits for radiation exposure to species other than man, it is generally agreed that the limits established for humans are also conservative for other species (FES §5.4.2.4). Since plants and lower animal forms are even less sensitive to radiation than is man, no significant radiation effects are expected in plants or animals either (Staff Test., post Tr. 1817, p. 9; Applicant Test., post Tr. 1601, pp. 6-7). No biota has been discovered which shows a sensitivity to radiation exposures as low as those expected in the area surrounding the proposed facility (FES §5.4.2.4).

24. Dr. Cassidy, STV/SMH's witness, did not contradict the analyses or conclusions of the Staff and Applicants. Dr. Cassidy testified that he did not consider himself an expert on these matters and that he has accepted the dose calculations by the Staff witnesses whom he believes to be experts knowing more about the subject (Tr. 1739-40; 1803-1904; 1810).⁴

25. The only particularized concerns of STV/SMH testimony which can be related to the proposed facility involved concern for plutonium-239 releases from the facility and for cumulative effects of deposition of radionuclides in sediments on the river bottom (STV/SMH Test., post Tr. 1751). The record clearly shows that this criticism ignored the fact that plutonium-239 is a daughter product of neptunium-239 which the Staff did take into account in its

⁴Dr. Cassidy's qualifications, Tr. 1738-50.

source term and resultant dose calculations. The activity of plutonium-239 would be approximately seven (7) orders of magnitude less than the activity the Staff used for the neptunium-239 (e.g., ten million (10,000,000) times less) and therefore negligible (Tr. 1798-1809; 1820-24). With respect to sedimentation, the Staff's detailed evaluation considered the cumulative effect on the deposition of radionuclides in sediments on the Ohio River bottom (Tr. 1902).

26. The Board finds the analysis of the Staff and Applicants to be a conservative, thorough evaluation of calculated low-level radioactive releases from the proposed facility. All credible pathways, including potential impact on drinking water supplies and on land and air resources have been thoroughly evaluated. The Board further finds that adequate consideration has been given to the effect of such releases on biota, other than man, and that such effect will be negligible. The Board finds that the calculated radioactive releases from the facility as proposed will meet all applicable Commission regulations, including the "as low as is reasonably achievable" criterion embodied in the design objectives of Appendix I to 10 CFR Part 50, and that there is no significant environmental impact anticipated from low-level releases of radioactive effluents from the proposed facility. The Board finds that the environmental impact of radioactive releases has been adequately evaluated for purposes of the cost-benefit balance.

2. Contention 2, Need for Power

STV/SMH and Jefferson County, Kentucky/City of Louisville

Realistic projections of demand for power make the proposed facility unnecessary.

Joint Intervenors

The Applicant's projected growth rate and demand for electricity is in error and therefore power from Marble Hill is not needed. The Applicant's evaluation of measures to conserve energy is inadequate.

27. The Marble Hill Nuclear Generating Station will be owned by Public Service Company of Indiana (PSI) and Wabash Valley Power Association (WVPA). PSI will own 83 percent of each unit, and WVPA will own the remaining 17 percent of each unit. PSI's service area is in north central, central and southern Indiana, and contains an estimated population of 1,900,000, the cities of Terre Haute, Kokomo, Columbus, Lafayette, Bloomington, and New Albany, but does not include Indianapolis.

28. WVPA is a not-for-profit organization consisting of twenty-three (23) members, each being a rural electric cooperative. The members are located gen-

erally in the northern portion of Indiana (License Application, pp. A.3.1-A.3.5; Tr. 4174, 4291).

29. The output from Marble Hill, Units 1 and 2, will be shared by three Indiana utilities: (1) PSI, (2) WVPA, and (3) Northern Indiana Public Service Company (NIPSCO). PSI will use 80 percent of Unit 1, or 904 MW; 73 percent will be directly used by PSI and the additional 7 percent will be allocated to WVPA. WVPA's allocation will be used exclusively by WVPA members who are now served by PSI and whose power requirements therefore comprise a part of PSI's total system load. WVPA will receive 10 percent of the Unit 1 output for utilization on the NIPSCO system through 1992. PSI will sell the remaining 10 percent directly to NIPSCO during the period from the commencement of operation through September 1987. PSI will use 1017 MW or 90 percent of Unit 2, consisting of 83 percent for direct use, and 7 percent for allocation to WVPA for use by WVPA members served by PSI. The remaining 10 percent of the Unit 2 output will be allocated to WVPA for utilization on the NIPSCO system.⁵ (Tr. 4204-5; Applicant Test., post Tr. 4004, Table 1.1-1, nn. d and f).

30. Applicant's forecasts of demand (KW), and usage (KWh), are made semiannually by a Load Forecast Committee, consisting of four corporate officers and three managers with responsibilities and experience in system planning and operations. The projection technique used by the Committee consists basically of adjusting an extrapolation of historical demand data. Although Applicant does not separately forecast load growth for each customer class, it evaluates updated information on conditions that affect the growth of each class. In estimating the number of expected new customers, Applicant obtains and reviews current data on such factors as birth rates, household formations, housing starts, mortgage financing costs, and the condition of the economies of Indiana and the U.S. In addition, each year Applicant conducts customer appliance surveys to assist in evaluating residential customer loads. The availability and price of alternate fuels is reviewed to develop estimates of increases in the system's electric heating load. Major industrial customers in Applicant's service area are contacted twice per year to obtain information on planned expansions. Applicant's forecasting process also includes projecting the weather-sensitive load, projecting kilowatt-hour sales by class of customer, and developing and analyzing a projected system load factor (Applicant Test., post Tr. 4189, pp. 5-20).

31. Applicant forecasts do not reflect the possibility that future rate increases or possible radical changes in its present rate design may reduce the future demand for electricity. These factors apparently have not yet had a major effect upon load growth. However, they may have a greater influence in the future (*Id.*, p. 20).

⁵ Some members of WVPA are in NIPSCO's service area and are served by NIPSCO.

32. PSI has historically observed and evaluated usage by WVPA members and includes forecasts of WVPA loads in its own projections, although WVPA supplies estimates to PSI (Applicant Test., post Tr. 4189; Tr. 4291-7).

33. Historically, usage of electricity in the PSI and NIPSCO service areas has grown faster than in the nation as a whole. From 1960 to 1972, sales grew at a rate of 7.8 percent in the PSI service area and at a rate of 8.3 percent in the NIPSCO service area. For the U.S., the corresponding rate was 7.2 percent. About two-thirds of NIPSCO's sales are to industrial users, primarily steel companies, while only one-third of PSI's sales are industrial (Staff Test., post Tr. 4848, p. 8; FES pp. 8-7, 8-8; Tr. 4030).

34. In 1976 PSI's sales were distributed among the several classes of customers as follows: to residential about 26 percent, to commercial about 19 percent, to industrial about 34 percent, and to municipals and rural cooperatives (REMCs) about 21 percent.

35. Consumption of electricity by the REMCs (Rural Electric Membership Corporations) and rural and suburban customers of both PSI and NIPSCO has increased faster than that of urban customers, and this growth is expected to continue (Tr. 4109, 4262, 4558-59).⁶

36. PSI (Applicant) and NIPSCO have fixed as their goals a minimum reserve margin of 20 percent in installed generating capacity. In the past, reserve criteria have been lower. Until recently PSI had used 17 percent reserve as its criterion, but with the addition of large coal-fired plants (PSI Gibson Station) and the planned addition of the Marble Hill nuclear units, a larger reserve margin is in order (Applicant Test., post Tr. 4189, pp. 4-5; Tr. 4321-32, 4417-23).

37. Total generating capacity of the PSI system currently is approximately 4330 MW (FES 8-32). A number of small and older units are now approaching the age of 30 years and others will reach that age in the middle 1980's. These units are at the Edwardsville, Noblesville, and Wabash River Stations and total about 791 MW, of which about 271 MW now are almost 30 years of age. Furthermore, environmental constraints will cause certain of PSI's units to be derated, the result being a reduction of about 271 MW generating capacity (Applicant Test., post Tr. 4189, pp. 23-26; Tr. 4298-4300, 4340).

38. It appears that the aforementioned Edwardsville and Noblesville Stations will be used after 1980 as peaking plants or will be retired. In addition the

⁶By letter of June 30, 1977, the Applicant informed the Board that due to problems developing for Hoosier Energy Division (HED), there was a possibility that PSI might construct a 650 MW coal-fired unit at the Gibson site. A final decision would not be made in this "contingency plan" until mid-1978. By order of July 6, 1977, the Board requested the views of the other parties by July 18, 1977. STV/SMH and Kentucky recommended reopening the record. The Staff in a thorough and well reasoned response concluded that the need for the power from Marble Hill within the general time frame remained unchanged even though the "contingency plan" was adopted and that the existing record retains its validity. The Board agrees with the Staff.

aforementioned Wabash River Units (Units 1-5) and the Gallagher Station (4 units) will be redesignated in 1980 as intermediate or peaking units. The basis for the redesignation is the fact that the units are being operated at capacity factors of about 0.4 or in some cases lower, and are relatively high in cost of generation (Tr. 4428-34, 4445-48).

39. PSI currently forecasts an annual growth in peak demand of 6.9 percent for summers and 7.8 percent for winters. NIPSCO forecasts a growth rate of 6.0 percent in peak load and about the same in sales (Applicant Test., post Tr. 4189, p. 1; Staff Test., post Tr. 4848, p. 11, *et seq.*).

40. While in the period of 1965-73 PSI's peak demand (KW) grew faster than energy usage (KWh), PSI now forecasts energy usage to grow faster than peak load, *i.e.*, an energy growth rate of about 8.1 percent for the period 1977-87 (Tr. 4388-91).⁷

41. Based on the foregoing forecasts Marble Hill, Unit 1, would be needed to meet PSI's projected load in 1982, and Marble Hill, Unit 2, would be needed in 1984.

42. The Staff has reviewed Applicant's (PSI) and NIPSCO's forecasts and methodologies, and has developed its own forecast of electrical energy and peak load growth for Applicant and NIPSCO. Growth rates for PSI and NIPSCO service areas were derived by adjusting the growth rates in national and regional demand forecasts by the Federal Energy Administration ("FEA"), reference *Scenario* case, to account for the anticipated higher-than-average (national) growth rate of population and economic activity in the PSI and NIPSCO service areas. Staff used also an econometric model developed recently by the Oak Ridge National Laboratory. The model included a forecast applicable to the entire State of Indiana. The forecast produced by this model was consistent with results of Staff's application of the FEA model (Staff Test., post Tr. 4848, pp. 3-12).

43. Staff estimates that energy demand in PSI's service area will grow at an average rate in the range 6.0 percent to 6.5 percent per year through 1985, and that peak load will grow at about the same rate as energy usage. Based on these estimates, Staff projects that Marble Hill, Unit 1, will be needed in 1984-85, and Unit 2 in 1986-87.⁸

44. STV/SMH estimates that the growth rate in demand for electricity in PSI service areas will be about 5 percent until 1985. The bases for the estimate appears to be (1) the assumption that total energy consumption in the U.S. will grow at about 3.0 percent or less, (2) Consolidated Edison's projection of about

⁷The energy load noted here (KWh) includes transmission and distribution losses.

⁸Staff did not take into account PSI's current plan to reclassify certain units from base-load units to intermediate- or peak-load units (see ¶ 38, *supra*). Application of that plan in Staff's methodology would produce the same conclusion as that of PSI as to "year of need" (Tr. 4907-08).

2.9 percent rate of growth to about 1990, and (3) the decline of PSI's growth rate in the period 1970-75. In addition, STV/SMH assumes that the introduction of time-of-day pricing will extend the "year of need" to about 1995 (STV/SMH Test., post Tr. 4704, pp. 12-15, 28-30, 43-44; Tr. 4744-53; 4758; 4814-18).

45. The witnesses for Save the Valley/Save Marble Hill projected a 5 percent growth rate for Applicant's system. The projection was derived by taking the mid-point of two simple extrapolations, a linear extrapolation of peak demand experienced from 1965-1975, and a compound growth extrapolation of peaks for 1970-1975 (STV Test., post Tr. 4704, pp. 14, 29; Tr. 4750-53). The witnesses cited national statistics on reduced growth rates in electric load, total energy consumption, and population (*Id.*, pp. 2-11). They assumed that the national statistics were directly applicable to Applicant's service area (Tr. 4744-45). The witnesses apparently did not analyze the particular characteristics of Applicant's service area that could explain the relatively high growth rate it has projected. Moreover, in estimating Applicant's future generating capacity, the witnesses assumed that no reductions in existing capacity would occur as a result of retirements or deratings (Tr. 4745). Also, they incorrectly assumed that Applicant would use all of the output of Unit 1 (Tr. 4757). In light of these deficiencies and errors in the analysis, the Board rejects the conclusions of Save the Valley/Save Marble Hill concerning the need for the Marble Hill plant.

46. Commonwealth of Kentucky estimates a growth rate of 5.0 to 5.5 percent in PSI's peak load. It appears that the forecast was derived by revising downward, primarily on the basis of judgment, forecasts by the Staff and Applicant.

47. The Board does not follow the reasoning by the Commonwealth in support of its projected growth rate. No meaningful comparison can be made between Applicant's most recent 12-year forecast and the 5-year forecasts it submitted to the FPC in annual reports for 1971-1975. It is widely known that the "energy crisis" of 1973 and the economic recession of 1974-75 vitiated many economic forecasts, including those of utilities (Tr. 4252-55). It is not possible to predict years in advance when recessions will occur, and since recessions are transitory in nature, undue weight should not be accorded them in forecasts. Moreover, the witnesses for the Commonwealth collected four sets of data showing Applicant's varying forecasts for particular years, but they were unable to establish that the forecasts could be logically compared. It was evident that the forecasts were prepared at different times, that some forecasts included certain sales for resale and others did not, and that some forecasts referred to peaks measured either on a seasonal basis or a calendar year basis (Tr. 4512-41).

48. The witnesses presented no evidence or analysis to support their reliance on conservation methods, such as increased home insulation or modifications in Applicant's electric rate structure, as factors that would significantly reduce Applicant's future load growth. The witnesses made no estimate of the scope or

nature of the conservation efforts or rate restructuring methods they anticipate, nor did they attempt to show the impact such changes would have on Applicant's projected growth.

49. The Commonwealth relied on projections of selected economic indicators for two economic areas in Indiana designated by the Bureau of Economic Analysis of the U.S. Department of Commerce (Commonwealth Test., post Tr. 4501 at Sch. 4). However, one of the areas includes Indianapolis, a city not served by Applicant and not growing as fast as the neighboring suburban areas that are served by Applicant. The other area excludes not only Indianapolis but also four neighboring counties that are served by Applicant and contain suburbs with higher-than-average population growth rates (Tr. 4554-58; 4561-63; PSI Test., post Tr. 4189, p. 10). Thus, the projections for each area cannot serve as reliable indicators of growth in Applicant's service area. Further, the Kentucky witnesses miscalculated the projections upon which they relied (Tr. 4641-45).

50. Applicant's growth rate over the past 15 years has been significantly higher than the average growth rate for the members of ECAR (Tr. 4565-66). Moreover, the evidence shows that the winter peak growth rate currently projected by ECAR exceeds the 15-year historical average for ECAR (Tr. 4568). In the absence of evidence that the past growth rate relationship between Applicant and ECAR will not continue, the Board does not concur in the Commonwealth's reliance on the ECAR forecasts as a justification for lowering Applicant's forecast.

51. Considering the uncertainties attendant to forecasting, the probable reclassification and/or decommissioning of certain older units on PSI's system over the next decade, the substitution of nuclear base-load plants for older fossil plants, and the probable higher-than-average (national) growth rate in PSI's service area, the Board finds that Marble Hill, Units 1 and 2, will be needed in the early to middle 1980's.

3. Contention 3, Cooling Tower Plumes

STV/SMH, City of Madison

The interactions of the plume and the vapors from said plant with emission of oxides of sulphur and particulates from other existing fossil fuel plants in the area, including a fossil fuel plant located within one mile of the City of Madison, and with temperature inversions common to the area, will produce unacceptable adverse effects on the historic buildings and property in the City of Madison and to the health of the citizens of the City of Madison.

Joint Intervenor

The environmental effect of the cooling tower plume has been inadequately evaluated for the cost-benefit balance.

52. Two mechanical-draft evaporative cooling towers, each about 60 feet high, 50 feet wide, and 1200 feet long, containing 25 cells each will be used to cool the Marble Hill Nuclear Generating Station (FES, pp. 3-7). Applicant and Staff examined the meteorological conditions prevailing at the Marble Hill site including an examination of the related topographic and geographic features. The cooling tower plume will add small increments of moisture to that naturally present in the atmosphere. The amounts of water vapor to be discharged to the atmosphere are small in comparison to the large surplus of ambient atmospheric moisture and will not result in significant changes in fogging, icing, drift effects or humidity beyond the site boundary (Tr. 1958; Applicant Test., post Tr. 1969; Tr. 2132; Staff Test., post Tr. 2129; FES § 5.3.1).

53. Acid rain can be formed by the interaction of oxides of sulfur (SO_x) with water vapor or water droplets. The existing Clifty Creek coal-fired steam-electric plant located on the Ohio River near Madison, Indiana, emits large quantities of SO_x from its stacks. On rare occasions, the moisture plume from the Marble Hill cooling towers will mix with the stack gas plume from the Clifty Creek plant. Since the stack gas plume and the surrounding ambient atmosphere already contains large amounts of moisture necessary to support the conversion of SO_x to acid rain, the incremental moisture contribution from the Marble Hill cooling tower plume will not significantly increase the pollutant burden (Applicant Test., post Tr. 1969). No significant additional acid rain in the Madison or Jefferson County areas will be created by effluents from the Marble Hill cooling towers (Staff Test., post Tr. 2129; Tr. 2132-33; FES, pp. 5-8, 5-9).

54. Generalized descriptions of existing acid rain pollution problems presented by the Intervenor (STV/SMH) did not demonstrate that the presence of the Marble Hill cooling tower plume would alter the existing SO_x cycle in the atmosphere which will be impacted by the plume (Tr. 2058, 2104, 2112, 2115, 2116-21).

55. Several members of the public in limited appearance statements questioned the possible effects of salt deposition, wetting, or icing on local crops. These impacts are not expected to occur offsite (Staff Test., post Tr. 2129; 2160-2162).

56. The Board concludes that there will be very small increases in humidity due to the Marble Hill facility. These increases in humidity will not produce significant adverse effects on the historic buildings and property in the City of Madison, on the health of the citizens of the City of Madison, or on local agricultural crops. There will not be any detectable changes in acid rain or moisture conditions in Louisville or Jefferson County, Kentucky. Accordingly, the Board finds that the environmental effect of the cooling tower plume has been adequately evaluated for purposes of the cost-benefit balance.

4. Contentions 4 and 5, Impacts on Governmental Services

Contention 5, Socioeconomic Impacts

The contention is sponsored by the following parties:

City of Madison, Board of Commissioners of Jefferson County, Indiana, and Plan Commission and Board of Zoning Appeals (as to (A), (B), (E), and (H)).

Inadequate consideration has been given to the impacts of an increase in resident and transient population, resulting from the proposed construction and operation of the Marble Hill facility, on the following governmental services:

- (A) Sewage disposal;
- (B) Water supply;
- (C) Police and fire protection;
- (D) Road maintenance and traffic control;
- (E) Parks and recreational facilities;
- (F) Hospital facilities;
- (G) Sanitation facilities;
- (H) Schools.

Contention 4, Increased Traffic

Board of Commissioners of Jefferson County, Indiana:

Inadequate consideration has been given to the impact of increased use of county roads during construction and operation of the Marble Hill facility and the impact this will have on road maintenance in the area under the jurisdiction of this petitioner.

57. The impact of the proposed plant on local governmental services was initially assessed in both the ER and the FES (ER §8.2.2; FES §§2.8.2.2, 4.4.1.2, 4.4.2, 4.4.5, and 5.8.2.5). Additional evidence was provided at the hearing by Applicant and Staff in supplemental testimony concerning updated information on the adequacy of local governmental services and more detailed assessments of the impacts on such services resulting from an increase in the local population (Applicant Test., post Tr. 1004; Staff Test., post Tr. 1440). The City of Madison testified on the impact of the plant on four (4) city services: (1) police and fire protection, (2) road maintenance, (3) recreational facilities, and (4) hospital services (City of Madison Test., post Tr. 1114; post Tr. 1131; Applicant Exh. 5). The Plan Commission and Board of Zoning Appeals of Jefferson County, Indiana, presented testimony by the Superintendent of the Southwestern Jefferson County Consolidated School Corporation ("Southwestern") concerning the impact on its schools of a significant increase in the student population (Plan Comm. Test., post Tr. 1237).

58. In estimating the demand for services in 1980, the peak year of construction, the following factors were considered: (a) the normal growth in resident population during the 1975-1980 period; (b) the in-movement by 1980 of construction work households, estimated to be 200 (2 percent of the 1980 resident household population); and (c) induced service workers, which were assumed will be negligible. For purposes of analyzing impacts during the construction period, it was assumed conservatively that all in-moving households will live in Jefferson County, Indiana (Staff Test., post Tr. 1440, p. 1; Staff Exh. 1, §§2.8.1.1, 4.4.1.2, 4.4.1.3, and 5.8.2.1).

59. It is estimated that there will be 155 operating staff households, a portion of whom will be local residents, that a percentage of these households will live outside Jefferson County, and that operating staff households will not exert a significant demand for governmental services within the county (Staff Exh. 1, §5.8.2.4; Staff Test., *supra*, p. 2).

60. Similarly, Applicants' witness testified that "approximately 200-250 construction workers, primarily supervisory personnel and specialized labor (*i.e.*, pipefitters, crane operators, etc.) and about 155 station operators will be relocating within 10 miles of the Marble Hill site during construction and operation" (Applicant Test., post Tr. 1004, p. 1). Applicants estimated that relocating construction workers would increase the county population by approximately 880 people (*Id.*, p. 2), which is a slightly larger or more conservative estimate than the Staff's estimate (Staff Exh. 1, §4.4.2; Staff Test., *supra*, p. 1).

61. The Intervenor did not question these estimates. The total in-movement of construction worker households during the peak year of construction will be of the order of 250 households. There will probably be fewer than 200 in-moving households who live in Jefferson County, Indiana, and that these families will bring into the community fewer than 300 children. The Board finds the addition of operating staff households will not be large enough to exert a significant demand for governmental services in Jefferson County.

62. **Sewage Disposal.** The Board finds that existing public and private sewage systems, together with the chemical toilet facilities which will be onsite during the construction period, will be adequate to accommodate the population growth and household in-movement expected during construction and operation stages (Staff Test., post Tr. 1440, p. 2; Applicant Test., post Tr. 1004, pp. 8-9).

63. **Water Supply.** The Board finds that increased demand from expected population growth and household in-movements during the construction and operation periods will be well within the service capabilities of the current water system (Staff Test., *supra*, p. 2; Applicant Test., *supra*, pp. 10-11).

64. **Police and Fire Protection.** It appears that in-movement of worker households and expected increases in the resident population will aggravate somewhat the demands placed on the County Sheriff's Office and the volunteer fire companies. However, it appears also that local taxes from Marble Hill will be avail-

able to remedy service inadequacies. Moreover, if such deficiencies are remedied during the construction period and are maintained thereafter, service levels will be adequate during the operating period (Staff Test., *supra*, pp. 2-3; Tr. 1260, 1272).

65. While the present city police force will be adequate to handle the increased number of workers and families, there may be some additional stress caused by recreation and traffic of transient workers during peak construction periods that will require additional city police staff (City of Madison Test., post Tr. 1131, p. 1; Applicant Test., *supra*, p. 6; FES §2.8.2.2.4). Unless the county reduces its tax rate in the future, there would be no additional direct property tax benefit which would be available to the city to offset this effect (Applicant Exh. 5). However, it is likely that additional city police will be required with normal population increases, with or without the addition of the Marble Hill plant (Tr. 1126).

66. The Board has carefully considered the overall stress on police and fire services which is likely to result from the in-movement of workers and their families, and finds that the impacts will be minimal.

67. **Road Maintenance and Traffic Control.** Three areas of impact are expected from the increased traffic during construction: increase in accident frequency, increased inconvenience to residents on local roads, and structural damage to the roads (FES §4.4.2.1; Applicant Test., *supra*, pp. 12-14).

68. The applicants are committed to observing legal load limits or to seeking variances from appropriate governmental agencies. Applicants have also indicated that heavily traveled roads may be improved to insure local safety. In addition, Applicants have made engineering studies for road improvements and are consulting with local officials regarding needed improvements (Staff Test., *supra*, p. 3; FES §§4.4.2.1, 4.4.5). Finally, the Board is incorporating a condition (Part F, *infra*; Tr. 1179-81) which will assure maximum use of carpooling and bus service to further mitigate expected impacts in this area. Applicants do not oppose the terms of this condition (Tr. 1446).

69. The Board finds that Staff and Applicants have fully considered the road maintenance and traffic control problems which may be caused by the influx of new residents and workers, and the Board finds that with the precautions which the Applicants have committed to and under the additional conditions imposed by this Board, impacts in this area will be minimized to an acceptable level.

70. **Parks and Recreational Facilities.** It appears that existing recreational facilities will be adequate to satisfy the needs of local residents (Staff Test., *supra*, p. 4; FES §4.4.2.5; Applicant Test., *supra*, pp. 7-8). The Mayor of the City of Madison testified that some additional costs would have to be borne by the city to maintain two tennis courts and one nine-hole golf course (City of Madison Test., post Tr. 1114, p. 2). However, Madison has numerous other

community recreation areas and has access to other neighboring facilities (Applicant Test., *supra*, p. 8). On the county level, the Board finds that there will be available tax revenues to allow the county to expand their recreational facilities (Staff Test., *supra*, p. 4; Tr. 1272).

71. **Hospital Facilities.** Jefferson County residents currently receive a service level comparable to those throughout the State of Indiana and the United States (Staff Test., *supra*, p. 4). The hospital Administrator of King's Daughter's Hospital indicates that the anticipated additional demand for hospital services by construction workers could be accommodated in existing facilities (*Id.*). Applicants will maintain a field medical office, an ambulance, and a nurse onsite during the construction of the Marble Hill station. Finally, other hospitals within a 25-mile radius of the site will also help meet the increased demand on King's Daughter's Hospital during the construction period. During the operating period, the increased demand from the net increase in resident population and nonresident plant operators will be met by King's Daughter's and other local hospital facilities (*Id.*). The Board finds that hospital facilities will not be seriously impacted by increased demand from workers and their families.

72. **Sanitation Facilities.** The County's sanitary landfill site has a useful life of five to ten years. The addition of 200 construction labor households will shorten the life of this facility (Staff Test., *supra*, p. 4). However, if the County expands its present site or develops a new site during the construction period, this action could insure an adequate disposal site for the operating period. Further, the Applicant is committed to the disposition of onsite solid waste generated during the construction period in an environmentally and legally acceptable manner (*Id.*, p. 5; FES §4.4.2.6). The Board finds that sanitation facilities will not be seriously impacted during construction or operation by plant personnel or their families.

73. **Schools.** There are three school systems in Jefferson County, two public and one parochial. The two public school systems, Madison Consolidated Schools and Southwestern Jefferson County Consolidated Schools, include two high schools, two junior high schools and nine elementary schools with a total enrollment of 5,946 students (fall 1976). The parochial school system operates an elementary school and a high school, with a total enrollment of approximately 430 students (Applicant Test., *supra*, p. 3; FES §2.8.2.2.1, Table 2.25).

74. The Board finds that while the Madison and parochial school systems will be able to accommodate increased demand from school age children of plant employees, the Southwestern District system will be stressed (Plan Comm. Test., post Tr. 1237; Staff Test., *supra*, p. 5; Applicant Test., *supra*, p. 4). The Board further finds that because of the existing tax freeze on county revenues sufficient revenues may not be generated to cover increased demand (Staff Test., *supra*, p. 5; Tr. 1210).

75. If the County consolidates its system during the construction period, if

new facilities are built, or if transfer arrangements are developed, impacts to Southwestern could be minimized (Staff Test., *supra*; Tr. 1155). However, these alternatives face serious fiscal and political obstacles (Tr. 1152-56, 1232-33). In any case, Southwestern schools will be stressed by over-enrollment during the period of the late 1970's to early 1980's, even without a nuclear plant in the area (Tr. 1147-48; 1274-75).

76. The Board finds that the Staff and Applicant have adequately considered the impact on each of the areas of local governmental services enumerated above. The Board has fully considered each of these areas, and finds that overall, the temporary adverse impacts on services will be acceptably small.

5. Contention 6, Loss of Farmland

STV/SMH

Intervenor contends that the site does not justify acres of prime farmland out of production.

77. The Plan Commission and Board of Zoning Appeals had a similar contention, but withdrew it the first day of the hearings, stating that they were no longer interested in the issue (Tr. 946).

78. About 424 acres of farmland, including pasture, will be preempted by the Marble Hill station. In the transmission corridors, another 85 acres occupied by the tower bases will be withdrawn from agricultural production. In 1974, major crops were produced on 55,800 acres of land in Jefferson County, Indiana. The cropland at the site constitutes only about 0.6% of that actually utilized in the county for crops. In comparison, the United States has a total of over 470 million acres of cropland and the State of Indiana has 13.9 million acres of cropland (Staff test., post Tr. 2379, p. 2; FES § 10.3.6). These statistics indicate that the amount of land included in the Marble Hill site is too small to affect the overall national, state, or county production of crops.

79. Jefferson County, Indiana, has in excess of 20,000 acres of land of equivalent quality to that at Marble Hill, which is used for forest or pasture. Much of this could be brought under tillage if needed. Conversion of pasture to tillage would require maximal one-time expenditures of \$100-\$300 per acre to accomplish (*Id.*, p. 8).

80. Approximately 300-350 acres of the Marble Hill site meet the national definition of "prime" land. None of the land meets the definition of "unique." None of the alternative sites appear to offer advantages over the Marble Hill site in conserving prime land (*Id.*, p. 8; Tr. 2407). The Board finds that the proposed use of land at Marble Hill meets Council on Environmental Quality (CEQ) guidelines as a use which overrides the importance of conservation of prime land (see Staff Test., *supra*, pp. 4-8).

81. We conclude that Intervenor STV/SMH has failed to demonstrate that the acreage of prime farmland that would be taken out of production as a result of the Marble Hill station is excessive (Tr. 2370-71). In light of the findings enumerated above, this Board finds that the loss of farmland attributable to the construction and operation of the plant is justified.

6. Contention 7, Herbicides

Jefferson County, Kentucky

The proposed use of herbicides for the maintenance of transmission line right-of-way has not been adequately evaluated on a cost-benefit basis and the environmental impact of this use when evaluated in conjunction with the use of herbicides, particularly in Louisville, has not been fully explored.

Joint Intervenor

The proposed use of herbicides for maintenance and transmission lines right-of-way is not adequately evaluated for cost-benefit purposes.

82. Conservatively estimated, the transmission lines will occupy 3,385 acres; of this 1,110 acres, or 32 percent of the total acreage, is forested. Applicant will use a combination of chemical and mechanical procedures to control vegetation on the rights-of-way (ROW)(Staff Test., post Tr. 2461). The combination of both chemical and mechanical control procedures planned by the Applicant will minimize adverse impacts resulting from use of only one method (*Id.*, pp. 3-4; Tr. 2488).

83. Applicants' use of herbicides to eliminate tall growing tree species and to prevent resprouting of stumps will be in adherence to the U.S. Environmental Protection Agency (EPA) guidelines adopted pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act of 1972 (*Id.*, p. 2). These guidelines will insure that herbicides are used so as to minimize indiscriminate deposition of nontarget areas such as agricultural crops, waterways, and other human-use areas. In addition, the Board is incorporating as conditions to the license limitations on the use of herbicides which the Staff has recommended (*Id.*; FES § 4.3.1.2, 4.5.2; Conditions, *infra*, p. 346). These conditions do not represent a major deviation from the present practice of Applicant, PSI (Tr. 2448).

84. No herbicides are expected to reach the Ohio River and its tributaries. However, if the herbicides are washed from the target area, the quantity of herbicides which will reach the Louisville area after dilution in the receiving streams probably will not be measurable and should not have a deleterious effect upon that area (Staff Test., post Tr. 2461, p. 5). The Board concludes that the

use of herbicides in the Marble Hill area will not affect Louisville, Kentucky, or other downstream communities.

85. The Intervenor did not offer any testimony on this contention. The Board is satisfied that the record contains a full and complete evaluation of the costs and benefits resulting from Applicants' use of herbicides. The Board finds that Applicants' proposed procedures for utilizing herbicides, as limited, are adequate to insure that resulting environmental costs are less than the benefits derived from ease of ROW maintenance and prevention of noxious weeds.

7. Contention 8, Electrical Impact of 765 kV Transmission Lines

STV/SMH

The electrical impact of the 765,000 volt transmission lines on the environment has not been adequately evaluated.

Joint Intervenor

Inadequate evaluation has been given to the environmental effects of the 765 kV transmission lines to people, animals and flora in the cost-benefit balance.

86. Applicants will design their 765 kV transmission lines so that the maximum possible ("worst-case") steady state current induced by the line is no greater than 5 milliamps, in accordance with the standards set in the National Electric Safety Code (Applicant Test., post Tr. 2196, pp. 1-4). If necessary, Applicants will ground structures on and near the ROW to assure that a maximum induced current of 5 milliamps will not be exceeded (Tr. 2211-2223). Direct physical harm from steady state current occurs only above the "let-go" level wherein involuntary muscle contraction prevents a person from releasing the conducting object (Tr. 2324). Data collected by Staff and Applicants, and expert testimony presented on behalf of Applicants, demonstrate that no serious injuries or after effects would be created by an induced steady state current which is not greater than 5 milliamps (Applicant Test., post Tr. 2196, pp. 9-19; Staff Test., post Tr. 2323, pp. 4-5; Tr. 2224-26; 2254-61). Based on Applicants' criteria of designing the 765 kV transmission line to the conservatively calculated worst-case induced steady state current of 5 milliamps, actual operation of the transmission lines is not likely to result in induced steady state currents as high as the design criteria (Staff Test., post Tr. 2323, pp. 5-7). Steady state currents below the let-go level but above the threshold of perception may cause anything from mild surprise to discomfort or pain, but would not cause any serious injury (Applicant Test., post Tr. 2197, p. 9; Staff Test., post Tr. 2223, p. 4).

87. The Applicants will design the transmission lines so that the maximum electrical field is 12 kV/meter, and the maximum ground level magnetic field is 1 Gauss. The electrical fields off the ROW will be less than 2.5 kV/meter (Applicant Test., post Tr. 2196, pp. 1-4; FES §5.6). The long-term effects of electrical fields has been, and presently still is, being studied extensively throughout the world. The Russians have established guidelines for the general populace based on results from studies of transmission line and substation workers who were exposed to relatively very high field intensities for long periods of time (FES, §5.6; Staff Test., post Tr. 2323, pp. 9-11). These studies have been criticized for their lack of controls, and they have been contradicted by some American studies (FES §5.6; Applicant Test., post Tr. 2196, pp. 3-5; Tr. 2343). In any event, the proposed 765 kV transmission lines will be within Russian guidelines for the general populace. The maximum calculated magnetic field created by the proposed 765 kV transmission line will be well below the level at which any harmful effects may be expected (Staff Test., post Tr. 2323, pp. 10-11; Tr. 2343).

88. Field tests and studies of biological ill effects of electrical field gradients on plants and animals have not been conclusive. Preliminary results of some current research have not indicated any apparent gross injuries or abnormalities at prolonged exposures to very high (50 kV/meter) field strengths. Additional studies are presently being conducted. However, no significant effects on plants and animals have been attributed to electric fields below 20 kV/meter (Staff Test., post Tr. 2323, pp. 12-14; Applicant Test., post Tr. 2196, pp. 7-8). The literature collected by STV had been taken into account by the Staff and is consistent with the above findings (Tr. 2313-16).

89. The Board finds that there has been extensive research conducted and reported on the effects and standards for electrical transmission lines at the field strength and induced current levels proposed by the Applicants' design. Dr. Cassidy's reliance on a newspaper article reporting the views of an ERDA official was shown to be misplaced. The Staff witness had professionally worked with that official and had consulted the ERDA official on the point raised by Dr. Cassidy. The record indicates that the ERDA official had been referring to possible effects for a much higher field created by 1200 kV lines in stating that little work or study had been done. This was not the ERDA official's view with respect to 765 kV lines and the field strengths which may be expected from them (Tr. 2285-98; Staff Exh. 2, received 2313; 2326-28; 2330-32).

90. Based on the above, the Board finds that the Applicants' proposed design for the 765kV transmission line is acceptable (Staff Test., post Tr. 2323, p. 14). If new data on the effect of electrical fields should be developed showing that the field strengths to which the public would be exposed creates impacts which studies to date have not detected, protective measures which would not include changes in power design or conductor size or configuration may be taken

in the future; e.g., use of shield wires or other types of retrofitting techniques which would reduce field gradients to a prescribed level. The Staff is keeping abreast of ongoing studies and any guidelines which may result. The electrical impacts of transmission line operation will be reconsidered prior to operation, taking into account any new information (Staff Test., post Tr. 2323, pp. 11-14).

91. The Board finds that there will be no significant environmental effects from other matters relating to power operation of the transmission lines such as the production of ozone, acoustical noise, and radio and television interference (FES §5.6; Applicant Test., post Tr. 2196, pp. 1-3, 5-6).

8. Contention 9, Alternate Sources of Energy

STV/SMH, Joint Intervenors, and Jefferson County, Kentucky/City of Louisville

Inadequate consideration has been given to alternate sources of energy such as coal, solar energy, and wind power.

Coal and Nuclear

a. Environmental Effects

92. Pursuant to the guidance of the Appeal Board in *Tennessee Valley Authority* (Hartsville Nuclear Plant), ALAB-397, 5 NRC 92, 102-105 (January 25, 1977), the record in this proceeding contains detailed evaluations and comparisons of the environmental effects of coal-fired and nuclear power plants.

93. As stated in our findings with respect to Contention 1, above, there is an insignificant expectation of adverse health effects being produced in humans by the effluents to be released during the entire period of operation of the proposed nuclear facility even if the conservative estimates of risks to humans based on the linear no-threshold hypothesis of the BEIR Report are postulated (Staff Test., post Tr. 1817, p. 9; Applicant Test., post Tr. 1601, pp. 2, 5; Tr. 1625-26; 1697-98). Therefore, the radioactive emissions from the plant will have negligible environmental impact.

94. In addition, pursuant to 10 CFR §51.20(e), Table S-3 (presented as Table 5.18 in the FES), and the Commission's interim rule regarding environmental considerations of the uranium fuel cycle published on March 14, 1977 (42 FR 13803), the Board examined the revised environmental impacts associated with the uranium fuel cycle to determine the effect, if any, on the overall cost-benefit balance for the proposed facility. The uncontradicted evidence demonstrates that the uranium effects presented in FES Table 5.18, as revised by the values in the Commission's interim rule, are sufficiently small in their contribution to the overall environmental costs that the overall environmental

impacts are not significantly affected (Staff Test., post Tr. 5062, pp. 1-9). In addition, the environmental effects of transportation of fuel and waste to and from the facility are summarized in the FES pursuant to 10 CFR §51.20(g) and Table S-4 (FES §§5.4.1.4 and 10.4.2.5). The Board finds that the impacts of the environmental costs of transportation are sufficiently small so as not to affect significantly the conclusions of the cost-benefit balance.

95. The Staff presented comparative environmental costs for 2260 MWe coal and nuclear plants at full output (FES Table 9.2). On the basis of the information summarized in FES Table 9.2 with respect to land use, releases to air, releases to surface water and esthetics, it can readily be said that the environmental costs of the nuclear alternative are no greater than those for the coal-fired alternatives (FES §9.1.2.2 and Table 9.2).

96. In addition to the above-discussed environmental costs attributable to coal and nuclear alternatives, the differing health effects from using coal and nuclear fuels have been considered in the environmental assessment of each alternative. In making these assessments the entire fuel cycle rather than just the power generation phase was considered in order to compare the total impacts of each cycle. For *coal*, the cycle consists of mining, fuel transportation, processing, power generation, and waste disposal. The *nuclear* fuel cycle includes mining, milling, uranium enrichment, fuel preparation, fuel transportation, power generation, irradiated fuel transportation and reprocessing, and waste disposal (Staff Test., post Tr. 4972, p. 1).

97. The extensive Staff analysis conservatively understates the environmental impact of the coal alternative relative to the nuclear alternative. For example, the analysis of the uranium fuel cycle considers the possible effects of accidents on releases, and also includes long-term exposure effects. Due to the lack of a data base these have not been considered with respect to the coal fuel cycle (Tr. 5002-06; 5038). In addition, the assessment of effects from the nuclear plant is done for the entire U.S. population, whereas the assessment of the effects from a coal plant is conservatively done only for the 80 kilometer radius. It is known that there are effects from the coal plant beyond the radius but they have not yet been quantified (Tr. 5053-55).

98. Notwithstanding conservatism in the extensive analysis by the Staff, it is clear that the nuclear fuel cycle is considerably less harmful to man than the coal fuel cycle. The Board so finds. Indeed, the coal alternative may be more harmful to man by factors of 4 to 250, depending upon the effect being considered, than the all-nuclear uranium fuel cycle, or factors of 3 to 22 with the assumption that all of the electricity used by the uranium fuel cycle comes from coal-powered plants (Staff Test., post Tr. 4972, p. 11).

99. The Board notes that although there are large uncertainties in the estimates of most of the potential health effects of the coal cycle, the impact of transportation of coal is based on firm statistics. This impact alone is greater

than the conservative estimates of health effects for the entire uranium fuel cycle (all-nuclear economy), and can reasonably be expected to worsen as more coal is shipped over greater distances. In the case where coal-generated electricity is used in the nuclear fuel cycle, primarily for uranium enrichment and auxiliary reactor systems, the impact of the coal power accounts for essentially all of the impact of the uranium fuel cycle (*Id.*, p. 11).

100. The Board finds, based on the extensive record and our findings above, that the proposed facility is the environmentally superior choice, especially from the most important point of view of health effects on humans. As summarized in our findings below, the Board also heard extensive and detailed testimony on the economic comparison between nuclear and coal alternatives. The testimony supports the conclusion that the proposed facility will have a cost advantage over either coal-fired alternative [flue-gas desulphurization ("FGD" or "scrubbers"), or low sulphur].

b. Economic Comparison of Coal and Nuclear Capacity Factors

101. The Staff's witness on capacity factors, Dr. Easterling, is an expert statistician with impressive credentials as to education and experience in his discipline (Professional Qualifications, post Tr. 3181; Tr. 3209). Dr. Easterling's statistical analysis concludes that a predicted 10-year capacity factor for three 800 MWe *coal* units, at the 95 percent (%) confidence level, would fall in the interval $58 \pm 16\%$. For the proposed *nuclear* facility at the 95% confidence level, the capacity factor would fall in the interval $48 \pm 28\%$, or $66 \pm 23\%$ if it is assumed that there is no linear effect of size (and data are not decisive on this question)(Easterling Test., post Tr. 3181, p. 2). A witness for Kentucky, Mr. Komanoff, who does not possess the statistical education and expertise of Dr. Easterling (Komanoff Test., post Tr. 5420, p. 1; Tr. 5479-81), presented his analysis of capacity factors (Komanoff Test., post Tr. 5420). Mr. Komanoff's testimony, as clarified and modified on cross-examination, predicts a capacity factor for Marble Hill of 55% (Tr. 5476) and a capacity of about 67% for the Applicants' alternative coal-fired choice of three 800MWe supercritical units burning 2-3% sulphur coal (Tr. 5469; 5507-09).

102. The Board rejects the above specific predictions of Mr. Komanoff because the record shows that they are not precise and therefore misleading. Mr. Komanoff adjusted his capacity factor conclusions, at times by as much as 10%, based purely on his "judgment" and "educated guess," rather than on any analysis performed by him (Tr. 5462-3; 5470-76; 5485-6; 5509-10). Under cross-examination, Mr. Komanoff conceded that he did not perform statistical tests to determine the statistical measure of uncertainty surrounding his "best guess." He further admitted that he is aware that the statistical prediction interval at the 95% confidence level would be wide. He finally testified that the

10-year average capacity factor for Marble Hill could be 5 to 20 percentage points higher or lower than his prediction, and that his predictions for the coal-fired plant capacity factors would be within a range of ± 15 to 20% (Tr. 5477-79; 5485; 5518; 5529-30; 5555-56). In addition, Mr. Komanoff's analysis must be rejected because of the numerous very serious errors in his methodology pointed out by Dr. Easterling (Tr. 5618-62).

103. Based on testimony of Dr. Easterling, and also the concessions of Mr. Komanoff on cross-examination, the Board finds that the width of the prediction intervals shows that a considerable shift would be required before there would be a statistical basis for predicting different capacity factors for coal and nuclear plants (Staff Test., post Tr. 3181, pp. 4 and 4a amended, sponsored by Easterling; Easterling Test., post Tr. 3181, p. 17; Tr. 3209-10; 5641; 5678). Accordingly, the Board finds it unreasonable to assume different capacity factors for coal and nuclear plants as was done in the cost comparisons by Kentucky's witnesses (.6 for nuclear and .7 for coal) (Ileo, *et al.* Test., post Tr. 2817, p. 7). The Board finds it reasonable to compare the economics of coal and nuclear plants at equal capacity factors ranging between .5 and .7 as was done by the Staff (Staff Test., post Tr. 3181). For purposes of comparison of the estimates of the Staff, the Applicant and Kentucky below, the Board findings will summarize costs at capacity factors within the range .6 to .7.

c. Economic Comparison of Coal and Nuclear Alternatives

104. The following table summarizes the total generating cost comparisons presented by the witnesses for the Staff and Kentucky (See p. 325):

105. The record sources for the above table are as follows: Ileo, *et al.* Test., post Tr. 2817, pp. 12-13 and Schedule 1, as corrected, Tr. 2814-16; Nash and Roberts Test., post Tr. 3181, p. 19, as corrected, Tr. 3178; Tr. 3191-98; 3086-99.

106. Applicants' estimates of total generating costs were presented in levelized costs of mills/kWh for capacity factors of .65. The nuclear plant estimate is 37.4 mills/kWh. Applicants' estimates for a scrubber equipped coal-fired alternative is 44.1 mills/kWh and its estimate for a low-sulphur coal-fired plant is 49.5 mills/kWh. Applicants' witness further stated that he believed his estimate for a scrubber equipped coal-fired plant is conservatively low (Tr. 3012-15).

107. STV/SMH witnesses testified that nuclear power was "competitive" with coal (Tr. 3724). Their testimony presented estimates for the first ten (10) years of operation only, and the estimates were not applicable to units the size of Marble Hill nor to the 2400 MWe electric size of the coal-fired alternatives. Mr. Komanoff was given as the source of these estimates (STV/SMH Test., post Tr. 3729, p. 5). Mr. Komanoff presented no testimony on this subject himself. The figures quoted by STV/SMH witnesses were 5.06¢/kWh and 5.58¢/kWh for

CAPACITY FACTOR	NUCLEAR					COAL					
	.6	.6	.6	.7	.7	.6	.7	.7	.6	.7	.7
	KY	STAFF RECYCLE	STAFF NO RECYCLE	STAFF RECYCLE	STAFF NO RECYCLE	W/FGD ^a			W/O FGD		
						STAFF	KY	STAFF	STAFF	KY	STAFF
Total Present Value Cost \$10 ⁶	2.893	3.62	3.82	3.74	3.96	4.39	3.187	4.7	4.4	2.876	4.76
Present Value mills/kWh	8.0	9.97	10.53	8.83	9.36	11.61	7.1	10.66	11.64	6.5	10.79
Levelized Cost mills/kWh	(23.3) 28.2*	42.5	44.9	37.7	39.9	49.5	20.7 **	45.3	49.5	19.0 ***	46.0

^a Flue-Gas Desulfurization ("scrubbers")

* KY witnesses gave both values and concluded at least one must be in error (Tr. 3086-7; 3094-9).

** 28.3 at .6 (Tr. 3087).

*** 25.8 at .6 (Tr. 3087).

nuclear plants of 1920 MWe and 1840 MWe in size, respectively; 3.90¢/kWh and 4.50¢/kWh for coal-fired plants without scrubbers; and 4.80¢/kWh and 5.59¢/kWh for coal-fired plants with scrubbers (STV Test., post Tr. 3729, pp. 4-5, as corrected, Tr. 3741, 3767-8). The Board finds no bases presented in the record for these values adopted by the witnesses for STV/SMH.

108. The board finds that substantial questions remain concerning reliability of estimates presented by witnesses for Kentucky. With respect to coal fuel, Staff presented base-cost estimates of \$15.60 per ton for high-sulphur coal and \$20.90 for low-sulphur of 16.3 mills/kWh for high-sulphur and 24.8 mills/kWh for low sulphur (Staff Test., post Tr. 3181, p. 16). These estimates are for delivered prices and are based on reports of 1975 and 1976 coal transactions by the Federal Power Commission (*Id.*, pp. 12-15). Witnesses for Kentucky, Ileo, *et al.*, utilized base-cost estimates of \$18.50 per ton for high-sulphur coal and \$25.00 per ton for low-sulphur coal, as delivered (Ileo, *et al.* Test., post Tr. 2817, at Schedule 4, notes 10 and 11). Applicants' estimates are 19.45 mills/kWh for high-sulphur coal and 31.8 mills/kWh for low-sulphur coal (Tr. 2702). Although we may rely on the more conservative (lower) coal fuel cost estimates of the Staff for purposes of our comparative analysis of coal and nuclear, it is appropriate to note that the Board is troubled by the lack of identifiable bases in the approach of the witnesses for Kentucky. There are some indications in the record that Dr. Ileo, initially, derived these numbers independently of another witness for Kentucky, Mr. Kilpatrick (Tr. 2915-16; 2918). However, Dr. Ileo testified that the overwhelming determination of the coal prices he used was the judgment of Mr. Kilpatrick (Tr. 2922; 2911-30; 2945).

109. Counsel for Kentucky confirmed that it was Kentucky's intention to have the testimonies of Mr. Kilpatrick and of the Ileo panel "interrelated" on this point (Tr. 2943). Presumably, this is why Dr. Ileo stated in his prefiled testimony that "the availability and cost of coal to the Applicant is thoroughly discussed in the testimony of Norman Kilpatrick" (Ileo, *et al.* Test., p. 6; Tr. 2930). In light of this statement, the Board cannot understand why the Commonwealth and Dr. Ileo thought it proper to file this testimony prior to the time that Dr. Ileo had even reviewed Mr. Kilpatrick's testimony (Tr. 2877). As it turns out, estimates for the base price of coal delivered given by Dr. Ileo do not even appear in the prefiled testimony of Mr. Kilpatrick (Kilpatrick Test., post Tr. 3102). Mr. Kilpatrick was not prepared to estimate Applicants' cost of purchasing enough coal to supply power during the expected life of a coal plant of the approximate megawatt capacity of the proposed Marble Hill plant (Tr. 3669-73). While Mr. Kilpatrick testified at one point that estimates presented by Dr. Ileo for high- and low-sulphur coal were "reasonable figures to use" (Tr. 3669), the record does not indicate calculations nor analysis by which these numbers were derived.

110. With respect to base estimates for construction costs, witnesses for

Kentucky relied on Staff's CONCEPT computer based code for the proposed nuclear facility (Staff Test., post Tr. 3181, p. 2; Ileo, *et al.* Test., post Tr. 2187, at Schedule 4, fn. 1). With respect to construction cost estimates for coal-fired plants, the Staff's CONCEPT code is based on older computer codes than is the case for the nuclear CONCEPT computer code. The Staff considers its older coal-fired plant CONCEPT computer code likely to result in costs which are too low, and therefore found it not useful to use this obsolete code (Staff Test., post Tr. 3181, p. 3). The panel of witnesses presented by the Commonwealth used these obsolete computer codes for their coal costs (Ileo, *et al.* Test., post Tr. 2817, Schedule 4, notes 4 and 5), because they thought that the Staff's experts still considered the old code to be useful (Tr. 2898-2907).

111. The Board finds that witnesses for the Commonwealth attempted to rely on Staff's judgment with respect to construction costs, and in doing so had mistakenly relied on obsolete data which Staff itself had replaced with updated data. The Board finds that the current Staff construction cost estimates, as presented in the testimony filed in the proceeding, are soundly based and reasonable (Staff Test., post Tr. 3181).

112. With respect to nuclear fuel costs, witnesses for Kentucky purportedly relied on Staff's data in the FES (Ileo, *et al.* Test., post Tr. 2817, p. 1), yet they changed Staff's assumption that nuclear fuel would escalate at 8% until 1982 and 5% thereafter to an assumption that nuclear fuel would escalate at 8% until 1986 and 5% thereafter (*Id.*, at Schedule 4, note 12; FES §9.1.2.2; Tr. 2882-9). The Commonwealth's witnesses could not provide any basis for their nuclear fuel escalation assumption (Tr. 2889).

113. Staff used a nuclear fuel cost derived by an extensive Staff study performed in preparation of its "Final Generic Environmental Statement on the Use of Recycled Plutonium and Mixed Oxide Fuel in Light Water Cooled Reactors (NUREG-0002)." In this updated testimony on nuclear fuel costs, Staff used an escalation rate of 5% a year and applied this to the "use-weighted average" cost of U_3O_8 of \$28.00 per pound. The use-weighted average takes account of the increase in cost of U_3O_8 due to depletion of high-grade ores (Staff Test., post Tr. 3181, pp. 7-10). Staff's estimated levelized cost of nuclear fuel over life of the plant is 8.88 mills/kWh for the recycle case and 10.32 mills/kWh for the no recycle case (*Id.*, p. 11). Applicant's estimate of levelized nuclear fuel costs is 9.75 mills/kWh (Tr. 2690). The Board finds that the Staff's range of estimates of nuclear fuel costs is reasonable based on extensive supporting documentation for its calculations. Applicants' value falls within that range.

114. With respect to operation and maintenance (O&M) costs, Staff utilized a computer code which specified a plant of the design of Marble Hill (Staff Test., post Tr. 3181, pp. 6-7). The levelized fixed and variable O&M costs of a 60% capacity factor are estimated by Staff to be 2.7 mills/kWh for nuclear, 7.9 mills/kWh for a coal plant with FGD, and 3.6 mills/kWh for a low-sulphur coal plant (*Id.*, p. 7). Applicants' levelized O&M estimates are 4.2 mills/kWh for

nuclear, 4.5 to 5 mills/kWh for a coal plant with FGD, and 2.8 mills/kWh for a low-sulphur coal plant (Tr. 2702; 2799). The Commonwealth's witnesses on cross-examination provided estimates of O&M costs on a present value basis of 169 million for a nuclear plant, 554 million for a coal plant with FGD, and 233 million for a low-sulphur coal plant (Tr. 3021). The Board finds that although these estimates of O&M costs do not permit direct comparisons, all witnesses agree to a substantial cost increase comparing a coal plant with FGD to one without FGD. Both Staff's and Applicants' witnesses estimate a relatively higher O&M cost for nuclear compared to coal than does the Commonwealth. The Board finds it reasonable to utilize either Staff's or Applicants' leveled O&M cost estimates in assessing total generation cost. The O&M costs are relatively small contributors to the total generation costs (Staff Test., post Tr. 3181, p. 19).

115. Based on the record as summarized above, the preponderance of the evidence shows that the proposed Marble Hill Nuclear Generating Station is likely to be economically superior to the coal alternatives.⁹ In any event, there is no doubt that the coal plant alternatives are highly unlikely to be substantially cheaper than the proposed facility. In view of this, and our finding above that the environmental effect of the proposed facility will be substantially less than the environmental effects of a coal-fired alternative, the Board finds that the selection of the proposed nuclear facility as the preferred alternative is reasonable. The Board concludes that adequate consideration has been given to coal-fired plants as alternatives to the proposed nuclear facility.

d. Alternatives Other than Coal and Nuclear

116. The NRC Staff provided a witness from the U.S. Environmental Protection Agency, Office of Solid Waste, to testify on the feasibility of using solid waste as an alternative energy source (Staff Test., post Tr. 3948). Staff's witness has had extensive practical experience as a technical expert in the area of energy recovery from municipal solid waste (Professional Qualifications of David B. Sussman, post Tr. 3948).

117. The Staff testified that the technical feasibility of processing large amounts of solid waste is "questionable." In addition, there was testimony that transporting large amounts of raw solid waste and refuse-derived fuel is economically unfeasible (*Id.*; Tr. 3980-91). These problems aside, the Staff's expert estimated that all the solid waste from Louisville, Indianapolis, and Cincinnati could produce enough energy to fuel only a 225 MWe plant (*Id.*, pp. 2-3). The Staff's testimony also indicated that there were serious technical and

⁹ Pursuant to the on-the-record stipulation entered into by Staff and Kentucky, and approved by the Board, \$45,000 has been applied to the nuclear alternative as a reasonably prudent cost of developing a radiological emergency plan (Tr. 4375-78; 4589). That cost has an insignificant effect on the overall cost-benefit balance and on our conclusion on the comparison of the nuclear and coal alternatives.

economic obstacles to using solid waste as a supplement to a fossil fuel steam plant on a scale comparable to the proposed nuclear option (*Id.*, pp. 2-3; Tr. 3992).

118. Having considered the energy potential of municipal solid waste as a replacement for fossil fuel or nuclear energy, the Board finds that solid waste is not a viable alternative.

119. The Staff testified as to the current state of development of solar technology: Staff witnesses summarized the major technical problems which need to be solved before applications of electric power generation through various types of conversion techniques become commercially feasible on a large scale (Staff Test., post Tr. 3181, pp. 20-24). Staff also addressed the technological, environmental and economic barriers to using wind power as a substitutional or supplementary energy source in this case. It has yet to be demonstrated that a system of large windmills of the type that would be necessary to provide a substantial part of the power output expected of the Marble Hill station, with or without storage capacity, is commercially feasible (*Id.*, pp. 24-26).

120. STV/SMH was the only Intervenor to present testimony on *solar-energy* and *wind-power* (STV Test., post Tr. 3729). The Board finds nothing in STV/SMH's testimony which indicates that a solar-energy alternative to the proposed Marble Hill nuclear plant is available at this time (*Id.*, pp. 14-23). There was brief testimony from STV/SMH on the subject of wind-power. There is passing mention of the use of windmill generators to power "farm and urban industry," and there is reference to the fact that there is extensive wind-energy research and experimentation presently being conducted (*Id.*, pp. 23-24). However, there is no evidence that energy from windmills is a viable alternative with which to meet the requirements of Applicants' customers.

121. The Board has fully considered the testimony and evidence relating to solar and wind-power, and finds that neither is a feasible alternative to nuclear or conventional coal-power. The Board further finds that there are no viable alternatives, alone or in combination, to conventional coal-fired or nuclear plants to provide the power to be produced from the proposed facility (FES §§9.1.2 and 9.1.2.1; Applicant Test., post Tr. 2541, p. 11). The Board finds that adequate consideration has been given to alternate sources of energy in the cost-benefit balance.

9. Contention 10, Alternative Sites

STV/SMH

Inadequate consideration has been given to alternate plant sites in other locations in Indiana.

122. Applicant initially evaluated 23 potential sites located at various places

throughout its service territory. For study purposes, the service territory was divided into three (3) regions: (1) northern and central Indiana, (2) southwestern Indiana, and (3) southeastern Indiana. Of the three regions, the southeastern one (south of I-70 and east of I-65) was identified as the most promising, based on water availability, seismicity, location of Applicant's existing generation, proximity to Applicant's electrical load, and length of transmission lines required (Applicant Exh. 1, § §9.2.3, 9.2.4, 9.2.5; Tr. 5087).

123. Applicants' initial study of the potential sites identified three sites within southeastern Indiana as most favorable: (1) Mexico Bottom, (2) Egypt Bottom, and (3) Marble Hill (Applicant Exh. 1, §9.2.5). Subsequently, Applicant identified two additional sites, Big Graham Creek, and Site B as viable alternatives. Applicant then evaluated fully the environmental, economic, and engineering costs and benefits of each of the five candidate sites (Applicant Exh. 1, § §9.2.6 and 9.3).

124. Considering Indiana water-use criteria, which the State applies to siting selection for large fossil fuel plants, to arrive at water-use criteria for a nuclear plant the size of the proposed Marble Hill plant, it appears that in the northern region of the state only the Wabash River starting near Lafayette has sufficient flow to justify the siting of a nuclear plant. However, population density near Lafayette is high, and the thermal load and consumptive water use between Lafayette and Terre Haute already represent a substantial impact on the river. In comparison, the thermal effects and water-use impacts would be much less serious on the Ohio River. The Staff considered and rejected an alternative site on the Kankakee River in Indiana. This alternative is considered to be infeasible in light of cooling water use limitations, and in any case is preempted by construction of the Schahfer coal-fired generating station (Staff Exh. 1, §9.2).

125. The most promising sites are on the southeastern portion of the Ohio River in the State of Indiana, and the Marble Hill site is less expensive than the next best site and is favored by engineering and environmental comparisons. No alternative site has been shown to be obviously superior to Marble Hill (Tr. 5198-5201; Staff Exh. 1, Tables 9.3, 9.4, 9.5).

126. The Board finds that considerations of consumptive water use, seismicity, and geographical distribution of Applicants' generating capacity and electrical load favor sites in the southeastern region of the state, and that from the standpoint of environmental impact and economics, Marble Hill is the best available site for the proposed plant.

10. Contention 11, Environmental Impact of Construction

STV/SMH

There has been an inadequate evaluation of the degradation of the area from construction of the plant, rail spur, access roads, transmission lines and the visual

and noise pollution from these things and from the influx of traffic into the area.

127. Insofar as the contention relates to degradation from the influx of traffic into the area, the Board's findings on this subject are set forth following Contentions 4 and 5, above. In addition, insofar as the contention addresses construction impacts of transmission lines, the Board has made findings relative to Contentions 7 and 8, and has made findings relative to the Board's specific transmission line inquiry (see "Board Questions," *infra*), which the Board adopts as a partial response to Contention 11.

128. The potential for noise pollution has been adequately addressed by the Applicants' (ER §4.4) and by the Staff (Staff Test., post Tr. 2538, pp. 3-5). Based on the analyses performed, the Board finds that the intensity of noise from construction to local residents will be low and at times inaudible. Noise from construction of the transmission facilities will usually be of short duration and will be only mildly irritating to nearby land owners. There will be some fauna which will be disturbed by the variable construction noise (*Id.*, pp. 4, 5; FES §4.3.1.1).

129. However, the Board finds that the temporary noise disturbances caused by construction activities will be minimal in terms of overall effect (Staff Test., *supra*; FES §4.4.3.3).

130. With respect to visual impact, the Marble Hill site will not be visible from any major transportation routes or nearby communities. The preservation of a major portion of the forested area of the site will further conceal the station from various lines of vision (Staff Test., *supra*, p. 5). The railroad spur and one of the transmission lines will share a ROW thereby minimizing both land use and visual impacts. Grading and stabilization immediately after construction, and revegetation of the areas disturbed by access road, railroad and power line construction will aid in the mitigation of impacts on the aesthetic qualities of these areas (*Id.*; FES §4.3). In addition, since most of the heavy equipment will arrive at the site by rail, visual impact associated with large numbers of heavy trucks, tractors, and trailers on the highway will be minimized (FES §4.4.2.1; Staff Test., *supra*).

131. The Board finds that the majority of the visual impacts associated with the project will be in those areas traversed by the transmission lines, and that the Staff's conditions and the Applicants' commitments listed in the FES §4.5 will help minimize visual impact of the transmission facilities. These procedures include routing of corridors away from recreation and conservation areas, preservation of natural vegetation along streams and riverbanks (buffer zones), vegetative screening along portions of the ROW's by planting shrubs or leaving naturally growing low vegetation, and the seeding and natural revegetation of other portions of the ROW's as soon as possible after construction. The Board adopts these preventative procedures as construction conditions which the Applicant is required to follow.

132. The Board finds that the visual impacts resulting from construction of the Marble Hill facilities as minimized, will not be any greater than those of other construction projects of this magnitude, and finds the impacts to be acceptable.

133. Adverse impacts on air quality, including release of airborne particulates, chemicals, and exhaust fumes, will be held to acceptable limits under the conditions described in the ER and the FES, §4.5.

134. Staff and Applicants have adequately considered potential impacts to terrestrial and aquatic resources. The Board finds that the protective measures and conditions referenced are appropriate and adopts them as conditions. As mitigated, impacts to terrestrial and aquatic resources will be controlled to an acceptable degree.

135. In conclusion, the Board finds that the Staff and the Applicants have adequately evaluated all significant impacts which could reasonably be expected to flow from the construction of the Marble Hill facilities. The Board finds that the severity and duration of adverse impacts attributable to construction of the plant will be adequately minimized under the measures and conditions discussed in FES §4, which the Board approves and adopts (*see* Part F, *infra*; FES Table 4.8).

11. Board Questions

a. Chlorinated Organics

136. The Board specifically inquired of the Staff and Applicants about the effect of the station operation on the concentration of chlorinated organic compounds in the Ohio River (Tr. 752-53). Many chlorinated compounds found in drinking water are known to have toxicological or mutagenic effects on humans and animals after long exposures at sufficiently high concentrations (Staff Test., post Tr. 5346). However, definitive statements regarding the carcinogenic effects on humans of particular compounds at the low concentrations at which they are found in chlorinated drinking water cannot now be made (*Id.*).

137. The contribution of chlorinated organic compounds which may be expected to result from the operation of the Marble Hill plant will be significantly less than the minimum amount of chlorinated organics normally found in the chlorinated drinking water of Cincinnati, Ohio which is drawn from the Ohio River (*Id.*, p. 13; Applicant Test., post Tr. 5225, p. 2; Tr. 5498-5503). The Board finds the time of exposure of aquatic biota to the plume will be small and finds that there will be minimal effects before the mixing of the plume with the river water, and that there will be negligible effects after mixing (Staff Test., post Tr. 5346, p. 14). The Board finds that the overall effect of chlorinated organic compounds attributable to the Marble Hill plant will be relatively insignificant.

b. Concentration of Heavy Metals

138. The Board specifically inquired about possible synergistic effects on aquatic biota from the concentrations of heavy metals expected in the blowdown discharge plume from the station (Tr. 754). Since Applicants will not be using copper alloy condenser tubes (*see* following section), the heavy metals in the discharge will be those concentrated in the ambient water. In the case of cadmium, iron and manganese, ambient river concentrations occasionally approach State of Indiana water quality limits. The limits are then exceeded in the blowdown. However, the heavy metals will be rapidly diluted within the plume area to levels within the normal range of ambient fluctuations (Staff Test., post Tr. 5346, p. 16; Applicant Test., post Tr. 5225).

139. The acute and chronic toxicity to fishes and other aquatic biota attributed to synergisms between metals and also between metals and temperature are associated with long exposure times (Staff Test., post Tr. 5346, p. 16). In the case of Marble Hill, however, exposure times for ichthyoplankton and other aquatic biota passing through the discharge plume will be considerably shorter than those typically found in laboratory studies. Also, the plume will not be located over the biologically productive shallow-overbank area where concentrations of aquatic biota are high (*Id.*). The Board finds that only minimal impacts to ichthyoplankton and other aquatic biota will occur. The Board further finds that large numbers of fish will not be attracted to the thermal plume because of plume location, size, and velocity, thus minimizing any adverse effects.

c. Condenser Tubing

140. The Board also inquired about the composition of the metal of which the condenser tubes will be made, and about possible problems with copper concentrations in the blowdown if the condenser tubing were made of a copper alloy (Tr. 754).

141. The condenser tubes will be fabricated of titanium rather than copper (Applicant Test., post Tr. 5225). If there were any copper alloy tubes employed at all these would represent a very small percentage of the total plumbing in the plant as well as the cooling tower system (Tr. 5283). The Board finds that there will be no ecological effects stemming from the composition of the metal used in the plant condenser tubes.

d. Intake Structure

142. The Board requested further information on the Applicants' intake design, and inquired about possible impingement of various fish species and the alternative of including fish bypass facilities (Tr. 753-54). The Board has fully

reviewed and considered Applicants' new intake design, which is described in detail in Applicants' and Staff's testimonies offered in response to the Board's inquiry (Staff Test., post Tr. 5346; Applicant Test., post Tr. 5225). The Board concludes that Applicants have made significant improvements over the original intake design (see FES §5.3.2; Tr. 5295-5307).

143. The intake openings on the newly designed structure will be restricted to the deeper offshore waters, the intake pipeline will be buried over most of the productive overbank, and the screens will be located parallel to the river flow. Intake velocities will equal a maximum of 0.50 ft/sec but will average less than 0.25 ft/sec under normal operating conditions, which the Board finds to be an acceptably low velocity that will minimize fish impingement. In addition, the new design avoids problems of siltation, entrapment, and diversion of fish to the intake opening, which the Staff identified with the original intake design (*Id.*).

144. Therefore since the design further minimizes the problems of entrainment and impingement, the Board finds Applicants' new design to be more acceptable from the standpoint of biological impact. Since impingement problems will be negligible with the newly designed intake structure, the Board finds that considerations of impingement monitoring and fish bypass facilities recommended by the Staff in Condition 7 (FES, p. iii) are no longer necessary. The Staff concurs (Staff Test., post Tr. 5346, p. 3).

e. Discharge Structure

145. The Board has fully reviewed and considered Applicants' redesigned discharge structure as described in Applicants' and Staff's testimonies (Applicant Test., post Tr. 5225; Staff Test., post Tr. 5346). We find that the new discharge design will yield a significantly smaller surface plume than Applicants' previous designs, that it will keep the plume beyond a 74-foot distance offshore, and will significantly reduce the region of bottom-scour of the plume.

146. The Board further finds that with the buried pipeline there will be negligible loss of benthic habitat, no physical barrier to affect fish movement along the shallow overbank area, no guiding of fish to the thermal plume area, and no erosion or siltation on the overbank area (*Id.*, p. 11). Further, by locating the distal end of the discharge pipeline further offshore, the plume will not affect the shallow overbank area, thus minimizing or alleviating impacts discussed in FES §5.3.3.1 (*Id.*). The Board also finds that greater discharge velocities and the resultant smaller plume will reduce time-temperature exposures to entrained plankton. Finally, we conclude that by angling the distal end of the discharge pipeline off the bottom, scouring effects to benthic organisms will be minimized (*Id.*). For these reasons, the Board finds the new discharge design to be an acceptable design which will minimize adverse biological impact.

f. Transmission Lines

147. The Board specifically asked for further delineation of the environmental effects of the transmission lines (Tr. 751-52). In addition to the testimony presented under Contentions 7, 8, and 11, as referenced elsewhere in this decision, the Staff submitted supplemental testimony specifically addressed to the Board's questions regarding transmission lines (Staff Test., post Tr. 2461; Staff Test., post Tr. 5368).

148. The Staff's assessment of transmission corridors was in three stages. First, the Staff considered alternatives to the proposed Rush and Columbus corridors. After determining the Applicants' choices were acceptable; Staff recommended adjustments in the line in order to avoid or minimize potential adverse impacts. Finally, the Staff evaluated Applicants' commitments and imposed additional protective measures (Staff Test., post Tr. 2461, p. 1).

149. Based on its assessment of alternative corridors which was conducted by both Applicant and Staff, the Board finds that Applicants' proposed corridor is the most acceptable choice from the standpoint of economics, ecology, social impact, and engineering (*Id.*, pp. 1-4; Tr. 5370-73). The Board further finds the routing adjustments which were recommended by Staff and committed to by Applicants will minimize adverse impacts upon sensitive areas (Staff Test., *supra*, pp. 4-5; Tr. 5370-73). Finally, the Board has carefully reviewed and considered the further commitments and conditions described by the Staff and finds that these will adequately minimize adverse impacts to the natural, recreational, and other sensitive areas along the transmission routes.

C. FINAL COST-BENEFIT ANALYSIS

150. The Board believes that the methodology employed by the Staff in its cost-benefit analysis and the judgmental factors used by the Staff are reasonable. The Board believes also that Staff estimates regarding both environmental and monetary costs for the proposed Marble Hill facility are reasonable and that the Staff's weighing of the costs against the benefits of the proposed facility was performed properly (FES §10).

151. Pursuant to 10 CFR §51.20(e), Table S-3 (presented as Table 5.18 in the FES), and the Commission's interim rule regarding environmental considerations of the uranium fuel cycle published on March 14, 1977, in the *Federal Register* (42 FR 13803), the Board has examined the revised environmental impacts associated with the uranium fuel cycle to determine the effect, if any, on the overall cost-benefit balance for the proposed facility. The uncontradicted evidence demonstrates that the uranium effects presented in FES Table 5.18, as revised by the values in the Commission's interim rule, are small in their contribution to the overall environmental costs and that the overall environmental impacts are not significantly affected (Staff Test., post Tr. 5062,

pp. 1-9). In addition, the environmental effects of transportation of fuel and waste to and from the facility are summarized in the FES pursuant to 10 CFR §51.20(g) and Table S-4 (FES §§5.4.1.4; 10.4.2.5). The Board finds that the impacts of the environmental costs of the uranium cycle and of transportation, as reflected in Tables S-3 and S-4, are sufficiently small so as not to affect significantly the conclusions of the cost-benefit balance.

152. The Board has weighed the environmental, economic, technical, and other benefits of the proposed facility against environmental, and other costs, upon the basis of the evidence of record. The principal environmental and other costs identified are those which have been described throughout this decision and include the following:

- (a) The utilization of land during construction and operation of the facility including transmission line rights-of-way;
- (b) Consumption of a relatively very small amount of Ohio River water, primarily due to evaporation in the plant cooling towers, with a resulting increase of dissolved solids in the returned water;
- (c) Temporary impacts to the biota of the river from construction activities;
- (d) Chemical discharges from the plant which will be diluted to concentrations below those which might adversely affect biota, including acceptable amounts of chlorinated organics;
- (e) An added burden on local community resources, especially local roads and schools;
- (f) A very low risk associated with accidental radiation exposure;
- (g) A minute increase in environmental radiation levels resulting from anticipated operational releases;
- (h) The return of acceptable amounts of concentrated heavy metals to the Ohio River;
- (i) The use of herbicides on transmission line rights-of-way, with measures taken to minimize adverse effects; and
- (j) The cost of constructing the plant, the cost of its operation throughout its lifetime, and the cost of its eventual decommissioning.

153. The benefit of the plant is the production of electrical energy to satisfy the needs of the Applicants' and NIPSCO's customers.

154. The Board finds that, based upon the entire record regarding need for power and the available alternatives to the plant, construction of the Marble Hill Nuclear Generating Station is reasonable and prudent to meet the need for electrical power and that the facility, as designed and selected from available alternatives, represents the optimum selection based on overall economic and environmental consideration. The Board further finds that, based on the entire record, the environmental and economic benefits from construction and operation of the facility are greater than the environmental and other costs which will necessarily be incurred.

D. COMPLIANCE WITH FWPCA AMENDMENTS OF 1972

155. Section 401(a)(1) of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA) requires that:

Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permit[t]ing agency a certification from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or will originate, that any such discharge will comply with the applicable provisions . . . of this Act.

156. Pursuant to §401 of the FWPCA, Applicants have secured a §401 certification from the State of Indiana, and have entered that certification into the record of this proceeding (post Tr. 5403). Since the Marble Hill facility will be located in Indiana, any discharge from it will originate in Indiana within the meaning of the above-quoted section of the FWPCA. Accordingly, the Applicants have obtained a §401 certification demonstrating compliance with the FWPCA.

157. The Commonwealth of Kentucky also borders on the Ohio River, into which the effluents from the proposed facility will be discharged, and in fact a substantial portion of the Ohio River is located within Kentucky territory. The parties appear to agree that the Kentucky border along the Ohio River is located at the low-water mark on the Indiana side of the river as it existed on June 1, 1792. (*Indiana v Kentucky*, 136 US 479 (1890); *Handly's Lessee v. Anthony*, 18 US 374 (1820).) However, there is considerable argument about where that border is located. The record is insufficient to determine whether or not any portion of the discharge structure is located in Kentucky's territorial waters. The Board assumes for purposes of this legal analysis that the discharge *plume* will be present in waters of the Ohio River which are within Kentucky's jurisdiction.

158. An adjoining state whose waters may be affected by the discharge from a nuclear generating plant does have the opportunity both under the FWPCA and our proceedings to assure compliance with Federally approved state applicable requirements. (Section 401(a)(2) of the FWPCA; *Philadelphia Electric Co., et al.* (Peach Bottom Atomic Power Station, Units 2 and 3), CLI-74-32, 8 AEC 217 (1974).) Like the adjoining State of Maryland in the Peach Bottom case, *supra*, Kentucky did not invoke the procedures of §401(a)(2) of the FWPCA, to request a hearing on any determination by it that a discharge will violate any approved water quality requirements. However, the Commission held in Peach Bottom, *supra*, that Maryland's Federally approved standards could be con-

sidered in our licensing proceedings although the state had not explicitly invoked §401(a)(2) of the FWPCA. Therefore, the citation to the Appeal Board decision to the contrary on this point by the Applicant's memorandum is incorrect ("Applicant's Memorandum of Law Concerning the Effect of the (FWPCA)" dated May 27, 1977).

159. Kentucky is not aided by the Commission's *Peach Bottom* decision, however. Like Maryland, Kentucky is not an inactive bystander since it successfully sought participation as a state under 10 CFR §2.715(c). However, unlike Maryland, Kentucky has never argued that the proposed facility will violate any Federally approved Kentucky standard, or indeed that any further control of the cooling water discharge is necessary for any purpose (*Cf. Peach Bottom, supra*, p. 218). In fact, counsel for Kentucky has stated that Kentucky does not issue §401 certification under the FWPCA in any event (Tr. 5274-75). Therefore, Kentucky cannot argue that the Applicant's must obtain a §401 certification from it. Rather, the nub of Kentucky's argument is that Applicants are also required to obtain certain other unspecified Kentucky permits relating to water quality and/or effluent discharges. This may be so. And the dispute as to whether any physical portion of the discharge structure is located within the borders of Kentucky may or may not be relevant to this argument. However, Kentucky permits are not a prerequisite to the Commission's issuance of a Limited Work Authorization (LWA) or Construction Permits (CP's) for the proposed facility (*see Wisconsin Electric Power Co., et al. (Koshkonong Nuclear Plant)*, CLI-74-45, 8 AEC 928, 930 (1975); *Southern California Edison Co. (San Onofre Nuclear Generating Station)*, ALAB-171, 7 AEC 37, 39 (1974)). Enforcement of Kentucky laws in this regard may be sought in an appropriate state forum.

160. STV/SMH argue that the State of Indiana should have granted an adequate public hearing prior to issuance of the §401 certification (Tr. 5277). STV/SMH concede that public notice as required under §401(a)(1) was given by the State of Indiana (*see also* "Motion to Reopen Record" dated June 13, 1977). Section 401 (a)(1) of the FWPCA permits states to establish procedures for public hearings "to the extent [the State] deems appropriate." In this circumstance, where the §401(a)(1) requirement of public notice has been met, this Board is not empowered to review the adequacy of any certification under §401. See §511(c)(2)(A) of the FWPCA. The State of Indiana's exercise of its discretion in declining to hold a public hearing with respect to its §401 certification cannot serve as grounds for reopening of the record of this proceeding "to allow cross-examination and all other proper relief" as requested by STV/SMH ("Motion to Reopen Record," p. 5).

161. Pursuant to §401(d) of the FWPCA, effluent limitations, monitoring requirements, and "any other appropriate requirement of State law" contained in a §401 certification are required to be made conditions of the LWA and any

CP's which may be subsequently issued. The §401 certification issued by the State of Indiana contains seven (7) numbered conditions (post Tr. 5403, pp. 2 and 3). Condition six (6) purports to require that:

The discharge must comply with the Proposed Standards specified in 40 CFR 190.10 and 40 CFR 190.11 of the May 29, 1975, Federal Register. When Final Standards are promulgated, or at such time as the Nuclear Regulatory Commission establishes limitations acceptable in lieu of 40 CFR 190, or at such time as the Indiana Stream Pollution Board adopts radiological discharge limitations, this Agency reserves the right to impose different radiological limits as promulgated.

162. Applicant and Staff argue that this condition is not an "appropriate requirement of State law." The Board agrees with the positions of Applicants and Staff, and so finds. The state may not impose any conditions on radiological releases from the proposed facility, as the exclusive authority for the regulation of radiological releases has been preempted by the Federal government. (*Northern States Power Co. v. Minnesota*, 447 F.2d 1143 (8th Cir. 1971), *aff'd.*, 405 US 1035 (1972).) In addition, it may be noted that while the U.S. EPA does have certain regulatory responsibilities in the field of radiation standards, the NRC retains exclusive jurisdiction over limitations applicable to discharges of radioactive effluents from particular sources such as the proposed nuclear facility. (*Train v. Colorado, PIRG*, 426 US 1 (1976).) Accordingly, the proposed Condition 6 quoted above shall not be incorporated in a LWA or in any CP's which may be subsequently issued for the Marble Hill facility.

163. The Board finds that Applicants have complied with the FWPCA.

E. SITE SUITABILITY FROM THE STANDPOINT OF RADIOLOGICAL HEALTH AND SAFETY

1. Contention 14, Tornadoes

City of Madison

The plant is not adequately designed to withstand a tornado such as that which actually occurred within the City of Madison during the spring of 1974.

City of Louisville and Jefferson County, Kentucky

Inadequate assessment of the effects and chances of tornado damage to Marble Hill was carried out.

164. The safety-related structures of the proposed facility will be designed to criteria for the design basis tornado for Region I as described in Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants." The proposed site

is located in Region I (NRC Staff, "Site Suitability Report," post Tr. 1296, p. 6; Staff Test., post Tr. 1471).

165. Values for the design basis tornado parameters are conservative upper-bounds because the probabilities of strike were calculated from data that tended to overestimate the frequency of occurrence of tornadoes, and the classification scheme which was used to infer maximum wind speed estimates from structural damage tends to overestimate maximum wind speeds (Site Suitability Report, p. 6; Tr. 1499). The probability of exceeding the design basis tornado is calculated to be on the order of 10^{-7} (one chance in ten-million) (Tr. 1477-78).

166. Testimony indicated that there are no known tornadoes in worldwide records that have exceeded the design basis tornado parameters (Tr. 1427; 1474; 2181-3).

167. None of the tornadoes which occurred during the spring of 1974, including the tornado which occurred at Madison, Indiana, exceeded the design basis tornado characteristics (Site Suitability Report, p. 6; Staff Test., post Tr. 1471; Applicant Test., post Tr. 1333, p. 2; Tr. 2181-3).

168. Nuclear power plants of a size and type similar to that of the proposed Marble Hill facility have been designed and built to meet the Region I design basis tornado criteria (Site Suitability Report, p. 6; Staff Test., post Tr. 1471).

169. On the basis of the uncontradicted testimony presented by Applicants and Staff, the Board finds that it is feasible to design safety-related structures of the proposed facility to withstand the design basis tornado set forth in the criteria for Region I, in Regulatory Guide 1.76, and that such criteria are acceptably conservative. The Board further finds that the design basis tornado is less probable and more severe than the spring 1974 tornadoes which occurred in Region I of the United States, including the one which occurred in the Madison, Indiana, area. Accordingly, the Board finds that there are no characteristics with respect to tornadoes that would preclude acceptability of the site for nuclear reactors of the general type and size proposed.

2. Contention 15, Ground Water Contamination

City of Madison

The plant is not adequately designed to prevent contamination of the City water supply, which is obtained from deep wells, as a result of either seepage during normal operation, storage of radioactive waste on site, or accidents required to be analyzed in the PSAR.

170. The major ground water aquifer in the site region is the alluvial-glaciofluvial aquifer of the Ohio River Valley. The Madison, Indiana, water supply is drawn from pumping centers located in this aquifer, approximately ten miles upstream from the proposed site (Staff Test., post Tr. 1578).

171. The approach of both the Applicants and the Staff in assessing the effect of a postulated accidental release of radioactive liquids from the proposed Marble Hill station is a highly conservative one. The analyses assume that there is a nonmechanistic instantaneous catastrophic failure of the tank that is postulated to have the highest concentration and activity of liquid radioactive waste. This assumption is coupled with the further conservatively inconsistent assumption that all of this liquid rad-waste somehow (nonmechanistically) gets into both the ground water and into the Ohio River, for purposes of analysis of each pathway. In addition, for accident analysis purposes, the radioactivity level assigned to the release assumes no holdup in the tanks and arbitrarily multiplies the activity by a factor of eight (Staff Test., post Tr. 1578; Tr. 1547-88; 1579-81; 1586-88; 1590). The Board agrees with the Staff that these assumptions are not realistic expectations and are therefore highly conservative (Tr. 1580-81; 1590-93).

172. There is testimony that the sand and gravel alluvial-glaciofluvial aquifer is not continuous between the proposed site and the wells used by the City of Madison (Applicant Test., post Tr. 1505, p. 3). The hydraulic gradient within the aquifer is from north to south, corresponding to the hydraulic gradient of the Ohio River. The City of Madison water wells lie upgradient from the proposed site, any postulated liquid radioactive releases into the ground water will be carried in the direction away from the Madison water wells (Staff Test., post Tr. 1578; Applicant Test., post Tr. 1505, p. 2). Accordingly, the Board finds that there is no credible potential for ground water movements from the proposed site to the upstream Madison, Indiana, wells.

173. In addition, no unacceptable effects to other pumping centers will result. The postulated release of radioactive liquids from the proposed facility will have no unacceptable effects on either the closest down gradient ground water pumping center (Oldham Water District, located approximately 12 miles downstream) or on the nearest downstream surface water user (the Louisville Water Company, located about 30 miles downstream) (Errata to Staff Site Suitability Report, post Tr. 1296). The calculated radionuclide concentrations for these water users are small fractions of the limits of 10 CFR Part 20 for unrestricted areas, and are therefore acceptable (*Id.*, p. 2). The Board finds that there are no pathways for postulated accidental releases of liquid radioactive effluents which preclude acceptability of the site for reactors of the general size and type proposed.

3. Uncontested Site Suitability Matters

174. Applicants, by letters dated June 25, 1976 (Applicant Exh. 3), and February 28, 1977 (Applicant Exh. 4), have requested a Limited Work Authorization pursuant to 10 CFR §50.10(e)(1) ("LWA-1")(Tr. 1281-4). Applicant Exhibit 4 is an amended request for a LWA and contains the complete scope of

the work for which authorization is requested under an LWA-1 (Tr. 1287). None of the work requested is safety-related (Tr. 1282-4; 1299-1330). The Board finds that all of the proposed work is within the scope of the activities permitted under 10 CFR §50.10(e)(1).

175. In accordance with 10 CFR §50.10(e)(2), the Board has reviewed the site proposed for the Marble Hill Nuclear Generating Station, Units 1 and 2, to determine whether, based upon available information and review to date, there is reasonable assurance that the proposed site is a suitable location for nuclear power reactors of the general size and type proposed from the standpoint of radiological health and safety considerations under the Atomic Energy Act and rules and regulations promulgated by the Commission pursuant to this Act.

176. The proposed facility will consist of two identical pressurized water reactors of a size, type and design similar to that reviewed and approved for other nuclear power plants now in operation or under construction. The Marble Hill Nuclear Generating Station replicates Commonwealth Edison Company's Byron Nuclear Generating Station, Docket Nos. STN 50-454 and STN 50-455. Each of the Marble Hill units will have a Westinghouse nuclear steam supply system designed for operation at 3411 thermal megawatts, with a net electrical output of approximately 1130 megawatts (NRC Staff "Site Suitability Report" post Tr. 1296, p. 1).

177. The Board's review included consideration of those reactor siting criteria established by the Commission's regulations (10 CFR Part 100) concerning site suitability as related to the radiological health and safety of the public. The factors considered are the population distribution and density; use characteristics of the site environs including whether there are nearby industrial, transportation or military facilities that could influence the acceptability of the site; and the physical characteristics of the site including meteorology, hydrology, geology, seismology, and foundation engineering. The Staff evaluated information provided by the Applicants, made visits to the proposed site, and performed independent studies and calculations (*Id.*, p. 1).

178. Applicants have selected a low population zone ("LPZ") of two miles' radius. The population of the LPZ in 1974 was 288. A population of 432 is projected for the LPZ by the year 2020. No unusual characteristics have been identified with respect to the LPZ which would preclude development of adequate emergency measures, including evacuation plans, to protect the public therein (*Id.*, p. 2).

179. The nearest population center which could grow to 25,000 residents within the lifetime of the facility is the City of Madison, Indiana. Madison, which had a 1970 census population of 13,081 is located about 11 miles north-northeast of the site. The distance to this potential population center is well in excess of the minimum distance of one-and-one-third times the LPZ radius distance of two miles, as required by 10 CFR Part 100 (*Id.*, p. 2).

180. The exclusion area consists of the land surrounding the plant structures out to a minimum distance from the center line of each reactor to the exclusion area boundary of 2,200 feet (670 meters). The Applicants own all of the land within the exclusion area with the exception of local county roads. The Jefferson County Board of County Commissioners has issued an order providing for the vacation of those public roads which presently lie within the exclusion area. Vacation of those roads will take effect as soon as authorization is received to begin work (*Id.*, pp. 2-4). The Board finds that Applicants have authority to determine activities within the exclusion area as required by 10 CFR Part 100.

181. Analysis of the offsite radiological consequences of postulated design basis accidents to demonstrate acceptability of the Marble Hill site in accordance with 10 CFR Part 100 exposure guidelines will be performed for a core ultimate thermal power level of 3565 megawatts. Since the specified minimum exclusion distance of 2200 feet and the LPZ distance of two miles are comparable in size with the values for previously approved comparable facilities (*Id.*, p. 4), the Board concludes that there is reasonable assurance that adequate engineered safety features can be provided to satisfy the radiation exposure guideline values of 10 CFR Part 100 for reactors of the general type and size proposed.

182. There are no industries, pipelines, petroleum tank farms, military facilities, railroads, or significant airports within five miles of the proposed site. The nearest major road is Indiana State Route 62 which passes about four miles west of the site, and the nearest main line railroad is over ten miles away. The nearest boundary of the Jefferson Proving Grounds is 14.5 miles north of the site and the Indiana Army Ammunition Plant is 16 miles to the southwest (*Id.*, p. 4). In view of the distance from these activities, the Board finds that none of them would pose a threat to the site. Based on evaluation of the usage of airports and airways near the site (*Id.*, p. 4), the Board finds the risk to the proposed facility is sufficiently remote so that specific design considerations to protect the plant against aircraft impact need not be considered.

183. The Ohio River is the major transportation route near the site on which significant quantities of materials are shipped in commerce. The lateral and vertical separation from the river reduces the probability of toxic materials entering the control room air intakes, and provides sufficient protection against fires on the river resulting from accidents involving flammable material. The maximum postulated explosion, which is detonation of any empty gasoline barge containing explosive vapors, would not produce explosive overpressures at the nearest safety-related structure of sufficient magnitude to prevent its functioning if needed (*Id.*, p. 5). Therefore, the Board finds that special design considerations are not necessary with respect to potential accidents occurring on the Ohio River.

184. On the basis of the review of the industrial, transportation, and military activities in the vicinity of the proposed Marble Hill site, the Board finds

that there are no nearby activities which would preclude acceptability of the site for nuclear reactors of the general type and size proposed.

185. The proposed site is located on a high bluff on the west bank of the Ohio River. The grade of the facility is to be about 775 feet above mean sea level (about 350 feet above the 420-foot mean sea level normal pool elevation). In comparison, the Ohio River design basis flood at the site is about 510 feet above mean sea level. Therefore, maximum flood levels on the Ohio River and tributaries near the site, resulting from rainfall, dam failures, or combinations of both are well below the grade of the proposed facility (*Id.*, pp. 6-7).

186. Runoff from local intense precipitation will be controlled by site grading and storm drains to convey the water away from safety-related buildings. Safety-related buildings will have the floors set one foot above the grade of the facility. The river screenhouse will be the only facility structure possibly affected by floods on the Ohio River. However, this structure is not required for the safe shutdown and cooldown of the facility. A 30-day supply of water for this purpose will be provided by the seismic category I essential service water basin and mechanical-draft cooling towers (*Id.*, p. 7).

187. Based on the above analysis, and on our findings with respect to Contention 15, the Board finds that there are no hydrological conditions which would preclude acceptability of the site for nuclear reactors of the general type and size proposed.

188. The proposed site is located on rolling uplands adjacent to and on the west side of the Ohio River. These uplands consist of near flat-lying limestone and dolomite bedrock. The river has eroded a channel some 250 feet into these rocks leaving rather steep cliffs overlooking a narrow alluvial flood plain. The carbonate bedrock, exposed in the river cliffs, is normally covered by residual soils or Pleistocene till on the uplands. This cover ranges from absent to depths approaching 50 feet in the site area. Minor faults and scattered solution cavities were encountered during subsurface explorations conducted by Applicants. The small faults were found to be localized, noncapable features and dated as geologically ancient by stratigraphic relationships. The solutioning was found to be confined to the upper member of the Laurel dolomite. The Laurel varies in thickness from about 19 to 60 feet and comprises the erosional bedrock surface over most of the site. A two-to-three foot shale marker bed occurs about eight feet from the base of the Laurel and separates the upper and lower members. The solutioning was found to occur along vertical joints in the upper member and to decrease in width and with depth, becoming extinct or nearly so at the shale marker bed. This condition appears to preclude any solution cavities below the shale marker bed which could create potential subsidence hazards. Any solution cavities remaining subsequent to foundation excavation can be detected and treated effectively by standard construction procedures (*Id.*, pp. 8-9).

189. The historical earthquake activity nearest the site occurred about 30

miles southwest, near the town of New Albany, Indiana, where nine earthquakes have been reported ranging in intensity up to Modified Mercalli VI. No capable faults or other geological conditions, which would tend to cause earthquake activity to be localized in the site vicinity, have been identified. Following the tectonic province approach described in Appendix A to 10 CFR Part 100, it is concluded that the site is in the Central Stable Region tectonic province. The intensity of the largest earthquake not demonstrated to be reasonably associated with structure which has occurred in this province is VII-VIII Modified Mercalli. This intensity is assumed to occur at the site in establishing the safe shutdown earthquake (*Id.*, p. 9).

190. Based on Staff's testimony and the geologic and seismic information presented by Applicants, it is found that an earthquake like the largest in the New Madrid series of 1811-1812 should be assumed to occur in the Wabash Valley area about 110 miles from the Marble Hill site in establishing the safe shutdown earthquake. Intensity attenuation relationships indicate an intensity near IX Modified Mercalli could be experienced at an epicentral distance of 110 miles from the largest earthquake in the New Madrid series. While this earthquake is expected to produce peak accelerations less than those for a nearby earthquake of intensity VII-VIII Modified Mercalli, its effects need to be considered because of the sustained vibratory motion and increased spectral response at longer periods from such an earthquake. In summary, the vibratory motion used by the Applicants in designing the Marble Hill facility must adequately represent the effects of:

- (1) an intensity VII-VIII Modified Mercalli earthquake occurring near the site, and
- (2) an intensity XI-XII Modified Mercalli-New Madrid type earthquake occurring 110 miles from the site (*Id.*, pp. 9-10).

191. The trend of the means of peak accelerations corresponding to the postulated earthquake of intensity VII-VIII Modified Mercalli is 0.2g. The Applicants will use an acceleration for the safe shutdown earthquake of 0.2g at the foundation for the design of the Marble Hill station. The Applicants also provided an analysis which demonstrates that the spectra to be used in the seismic design adequately represents expected ground motions at longer periods for an earthquake like a New Madrid event occurring 110 miles from the site. Other nuclear reactors of a similar size and type have been designed to these seismic design criteria (*Id.*, p. 10).

192. Based on the analyses of the Staff and the Applicants, the Board finds that there are no known geologic, seismologic, or foundation engineering conditions which would preclude acceptability of the site for nuclear reactors of the general type and size proposed.

193. On the basis of our above findings on site suitability and on Conten-

tions 14 and 15, the Board finds that there is reasonable assurance that the proposed Marble Hill site is a suitable location for two nuclear reactors and associated facilities of the type and size proposed from the standpoint of radiological health and safety considerations under the Atomic Energy Act of 1954, as amended, and the rules and regulations promulgated by the Nuclear Regulatory Commission in conformance with this Act.

F. CONCLUSIONS OF LAW

194. The Board has given careful consideration to all of the documentary and oral evidence presented by the parties. Based upon our review of the entire record in this proceeding and the foregoing findings and in accordance with 10 CFR §50.10(e) and 10 CFR Part 51 of the Commission's regulations, the Board has concluded as follows:

- (1) The application and the proceeding to date comply with the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's rules and regulations. The Board, in issuing this Partial Initial Decision, has limited itself to those issues covered by the Limited Work Authorization regulation, 10 CFR §50.10(c). The record will be reopened later for the submission of additional evidence on radiological health and safety matters, after which the Board will render its initial decision on the ultimate issues designated in the Commission's Notice of Hearing issued in this proceeding.
- (2) The environmental review conducted by the Staff pursuant to the National Environmental Policy Act of 1969, as presented in the Final Environmental Statement (Staff Exhibit 1) and the Staff's supplemental written and oral testimony in this proceeding, has been adequate.
- (3) The requirements of Sections 102(2)(A)(C)(E) of the National Environmental Policy Act of 1969 and 10 CFR Part 51 of the Commission's regulations have been complied with in this proceeding.
- (4) The Board has weighed the environmental, economic and other costs of the proposed facility and has independently considered the final balance among conflicting factors contained in the record of this proceeding, and having considered available alternatives in accordance with 10 CFR Part 51, the Board determines that the appropriate action to be taken (if, after hearing further evidence in the radiological health and safety phase of the proceeding, the Board should then make affirmative findings on issues (1)-(3) and a negative finding on issue (4) as those issues are set forth in the Commission's Notice of Hearing) is issuance of construction permits for the proposed Marble Hill Nuclear Generating Station, Units 1 and 2, subject to the conditions for the protection of the environment recommended by the NRC Staff as follows:
 - (a) The Applicants shall take the necessary mitigating actions, including

those summarized in Section 4.5 of the Final Environmental Statement, during construction of the station and associated transmission lines to avoid unnecessary adverse environmental impacts from construction activities.

- (b) In addition to the preoperational monitoring program described in Section 6.1 of the Environmental Report, with amendments, the Staff recommendations in Section 6.1 of the Final Environmental Statement shall be followed.
 - (c) Responsible Applicants' staff shall be assigned to promote car pooling and to provide essential information points or other feasible means to assist construction workers in forming car pools. Such Applicants' staff shall be responsible for the ongoing management of Applicants' car pooling efforts. Responsible Applicants' staff shall also undertake an investigation of the potential demand for bus service between the construction site and the Louisville, Kentucky, metropolitan area, and shall assist in promoting and in arranging in such service if there is sufficient demand. Investigation of the demand for bus service shall be commenced by the Applicants when onsite construction labor reaches several hundred; reevaluation of potential demand shall occur every six months thereafter, until the close of construction. Finally, records of Applicants' evaluations of demand for bus service and any arrangement for providing such service shall be maintained in a manner which is consistent with Condition (d) below (Tr. 1180-81).
 - (d) The Applicants shall establish a control program which shall include written procedures and instructions to control all construction activities as prescribed herein and shall provide for periodic management audits to determine the adequacy of implementation of environmental conditions. The Applicants shall maintain sufficient records to furnish evidence of compliance with all the environmental conditions.
 - (e) Before engaging in a construction activity not evaluated by the Commission, the Applicants will prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not evaluated, or that is significantly greater than that evaluated in the Final Environmental Statement, the Applicants shall provide a written evaluation of such activities and obtain prior approval of the Director of Nuclear Reactor Regulation for the activities.
 - (f) If unexpected harmful effects or evidence of irreversible damage are detected during facility construction, the Applicants shall provide to the Staff an acceptable analysis of the problem and a plan of action to eliminate or significantly reduce the harmful effects or damage.
- (5) The certification from the State of Indiana issued to the Applicants on

January 30, 1976, ("Section 401 Certification") (following Tr. 5403) meets with the requirement of Section 401(a)(1) of the Federal Water Pollution Control Act Amendment of 1972 (FWPCA).

- (6) Conditions (1)-(5) and (7) imposed by the State of Indiana in the Section 401 FWPCA Certification must be incorporated as conditions in the Limited Work Authorization and any construction permits which may be subsequently issued. Condition (6) imposed by the State of Indiana in the 401 Certification should not be incorporated because that condition is not an "appropriate requirement of State Law" under Section 401(d) of the FWPCA.
- (7) Based upon the available information and review to date, there is reasonable assurance that the proposed site is a suitable site for reactors of the general size and type proposed from the standpoint of radiological health and safety considerations under the Atomic Energy Act of 1954, as amended, and rules and regulations promulgated by the Commission pursuant thereto.
- (8) This Board has thus made all the findings required by 10 CFR §50.10(e)(2) with the result that the Director of Nuclear Reactor Regulation may authorize the Applicants in this proceeding to engage in limited construction activities for the Marble Hill Nuclear Generating Station, Units 1 and 2, in accordance with the aforementioned conditions and all other applicable Commission rules and regulations.

G. ORDER

199. Based upon the Board's Findings and Conclusions,

IT IS ORDERED THAT: This Partial Initial Decision shall constitute a portion of the Initial Decision to be issued upon completion of the radiological health and safety phase of this proceeding.

IT IS FURTHER ORDERED THAT: In accordance with Sections 2.754, 2.755, 2.760, 2.762, 2.763, and 2.764(a) of the Commission's Rules of Practice, 10 CFR Part 2, this Partial Initial Decision shall be effective immediately and shall constitute the final action of the Commission thirty (30) days after the date of issuance hereof, subject to any review pursuant to the Rules of Practice. Exceptions to this Partial Initial Decision may be filed by any party within seven (7) days after service of this Partial Initial Decision. A brief in support of the exceptions shall be filed within fifteen (15) days thereafter, twenty (20) days in the case of the Staff. Within fifteen (15) days after service of the brief of appellant (twenty (20) days in the case of the Staff), any other party may file a brief in support of, or in opposition to, the exceptions.

IT IS SO ORDERED.

**THE ATOMIC SAFETY
AND LICENSING BOARD**

Quentin J. Stober, Member

Marvin M. Mann, Member

Elizabeth S. Bowers, Chairman

**Dated at Bethesda, Maryland,
this 22nd day of August 1977.**

NOTE: Dr. Mann participated in forming portions of the initial draft but was not able to review the final language of the Partial Initial Decision; however, Dr. Mann concurs in the resulting conclusion.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Edward Luton, Chairman
Lester Kornblith, Jr.
George C. Anderson

In the Matter of

Docket No. 50-485

ROCHESTER GAS AND ELECTRIC
CORPORATION

(Sterling Power Project,
Nuclear Unit No. 1)

August 26, 1977

Licensing Board issues an Initial Decision, making numerous factual and legal conclusions, and authorizing issuance of a construction permit subject to certain conditions.

TECHNICAL ISSUES DISCUSSED: Effect on agricultural enterprises of accidental releases of radioactivity, simple and cumulative effects of thermal discharges, bioaccumulation of radioactive isotopes in aquatic organisms, deposition of radioactive materials in sediment.

INITIAL DECISION

Appearances

Lex K. Larson, Esq., Edward L. Cohen, Esq., of LeBoeuf, Lamb, Leiby & MacRae, on behalf of the Applicants

Mrs. Sue Reinert and Dr. Helen Daly, on behalf of the Intervenor

Auburn L. Mitchell, Esq., O. Gregory Lewis, Esq., Stephen M. Sohinki, Esq., Lawrence Brenner, Esq., on behalf of the Nuclear Regulatory Commission

I. PRELIMINARY STATEMENT

1. This proceeding is on the construction permit application of the Rochester Gas and Electric Corporation (RG&E), Central Hudson Gas & Electric Corporation (CH), Orange and Rockland Utilities, Incorporated (OR), and Niagara-Mohawk Power Corporation (NMPC) ("Applicants").¹ The application seeks authorization to construct a pressurized water reactor designed for initial operation at rated reactor power levels of 3425 megawatts thermal and electrical output of approximately 1150 megawatts (net). The facility would be known as Sterling Power Project, Nuclear Unit No. 1 ("Sterling Nuclear"), and would be located in the town of Sterling in Cayuga County, New York. The four (4) participating utilities will share in the ownership, financial support, and electrical output of Sterling Nuclear as follows: Rochester Gas & Electric Corporation—28%; Central Hudson Gas & Electric Corporation—17%; Orange and Rockland Utilities, Inc.—33%; and Niagara-Mohawk Power Corporation—22%. RG&E retains full responsibility for the construction, operation and licensing of the facility.²

2. Sterling Nuclear is one of five (5) nuclear power plants comprising the Standardized Nuclear Unit Power Plant System ("SNUPPS"). The design of the Sterling Nuclear power block is the same as the design in other applications submitted to the U.S. Nuclear Regulatory Commission by other SNUPPS participants, namely, Northern States Power Company, Union Electric, Kansas Gas & Electric and Kansas City Power & Light Company.³

3. In response to a Notice of Hearing published in the *Federal Register* on August 30, 1974, Ecology Action of Oswego and Sharon Morey ("Intervenors") timely petitioned to intervene in opposition to the application. By orders dated November 15, 1974, and January 2, 1975, the Atomic Safety and Licensing Board ("Board") granted those interventions.⁴ This is, therefore, a "contested proceeding" within the meaning of §2.4(n) of the Commission's Rules of Practice. The New York State Atomic Energy Council ("State") participated in this

¹Initially, Rochester Gas & Electric was the sole Applicant. However, in September 1975, Amendment No. 23 to the application was filed, adding Central Hudson Gas & Electric Corporation, Orange and Rockland Utilities, Inc. and Niagara-Mohawk Power Corporation as co-participants in the project. By Amendment No. 36, these participating utilities became co-applicants.

²Applications for licenses, Amendment No. 23 at 4, Amendment No. 36 at 2, and Exhibit E.

³Applicants' Exhibit 1, p. 2; Safety Evaluation Report related to construction of Sterling Power Project, Nuclear Unit No. 1, September 1975 ("SER") (follows Tr. 228), p. 1-1.

⁴Order permitting intervention, November 15, 1974, Order Accepting Supplement to Petition to Intervene by Ecology Action and Sharon Morey Subject to Specifications After Prehearing Conference, January 2, 1975.

proceeding as an interested State pursuant to 10 CFR §2.715(c).⁵ By Memorandum and Order of May 17, 1976, the Board granted the Regulatory Staff's motion for the issuance of an amended notice of hearing providing an opportunity to intervene to persons whose interests might be affected by the addition of Central Hudson, Orange and Rockland and Niagara-Mohawk Power Corporation as joint owners of Sterling Nuclear. No petitions for leave to intervene were filed in response to the amended notice of hearing.

4. Prehearing Conferences were held on November 25, 1975, and June 22, 1976.⁶ Evidentiary hearings were held in Oswego, New York on the following dates: July 20-23, July 26-30, August 30-31, September 1-3, November 3-5 and November 15-19, 1976. Following these hearing sessions, the Atomic Safety and Licensing Appeal Board and the Commission issued decisions in *Public Service Company of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-366, 5 NRC 39 (1977); affirmed as modified and remanded, CLI-77-8, 5 NRC 303 (1977). These decisions held that the then existing uncertainty over whether a proposed once-through cooling system would ultimately be approved by the U.S. Environmental Protection Agency pursuant to the Federal Water Pollution Control Act (FWPCA) in that case meant that the Commission could not license the plant for construction without examining the implications of utilization of a closed-cycle cooling system there. Since the Applicants' request for an exemption pursuant to Section 316(a) of the FWPCA was still pending before the New York State Board on Electric Generation Siting and the Environment⁷ and a final resolution of that matter was not then imminent, the Applicants and the Staff recognized the need for the record in the *Sterling* case to be supplemented as to (1) the suitability of the Sterling site, assuming utilization of closed-cycle cooling, and (2) a review of alternate sites in light of the assumption of closed-cycle cooling at the site. The Applicants and the Staff submitted substantial documentation on each of these subjects. After examination of these documents, Intervenor entered into agreements with Applicants and the Staff providing that if satisfactory written answers were received by Intervenor to certain written questions directed to Applicants and Staff, further evidentiary hearings would not be requested by Intervenor on the subjects of cooling towers and

⁵ Order permitting participation of New York State Atomic Energy Council, November 15, 1974.

⁶ A petition to intervene of Citizens Concerned About Sterling and Richard L. Oot was submitted at the June 22, 1976, conference. The Board denied the petition orally at that prehearing conference (Tr. 113) and confirmed this action by its "Order Following Prehearing Conference" dated June 30, 1976, upon the basis that the petition failed to meet the requirements of 10 CFR §2.714 in that it did not set forth a single particularized contention with supporting basis.

⁷ On May 19, 1977, an Examiners' decision was issued in that proceeding recommending that the Applicants' proposal be certified utilizing once-through cooling, Rochester Gas and Electric Corporation, Sterling Power Project, Nuclear Unit No. 1, Case No. 80005. Transmitted to Board and parties by letter from Applicants' counsel dated April 25, 1977.

alternate sites. Such answers were received and, the Board having determined that it had no need for examination of the parties on these matters, the documents provided by the Applicants and Staff were incorporated into the record. See Section V, *infra*.

5. On January 25, 1977, the Atomic Safety and Licensing Appeal Board issued a partial decision in the *Hartsville* proceeding suggesting that the record in that proceeding would have been more complete if it had treated the health effects of the fuel cycle associated with the alternative of a coal-burning electric generating plant. *Tennessee Valley Authority* (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-367, 5 NRC 92 (1977). Prompted by that decision, the NRC Staff on May 23, 1977, chose to submit supplemental testimony for the *Sterling* record on the subject of the relative health impacts of the coal and nuclear fuel cycles. Intervenor requested additional hearing time for cross-examination of the Staff's witness. Pursuant to notice, 42 *Fed. Reg.* 34394 (1977), an evidentiary session was held in Oswego, New York, on July 16, 1977, for that purpose.

6. In the findings of fact which follow, we deal in Sections II, III and IV with the material in the record as of the close of the 1976 evidentiary hearings. In Section V we make findings on the additional documentary material incorporated into the record during the July 16, 1977, session and on the oral testimony taken during that session. These findings supplement, and in a few instances modify, the findings set forth in the previous three sections.

7. The record of this proceeding consists of the testimony of witnesses for the parties, and exhibits offered by them and received in evidence. A list of the exhibits received in evidence is appended to this Initial Decision as Attachment A.

8. The Board, in accordance with the Notice of Hearing, has decided the matters in controversy among the parties, the issues pursuant to the Atomic Energy Act of 1954, as amended, and the issues pursuant to the National Environmental Policy Act of 1969, as amended, and 10 CFR Part 51.

II. RADIOLOGICAL HEALTH AND SAFETY ISSUES (UNCONTESTED)

A. The Application and Its Review

9. On June 21, 1974, the Commission docketed for formal review the application by Rochester Gas and Electric Company for licenses to construct and operate the Sterling Power Project, Nuclear Unit No. 1, on a site in Cayuga County, New York. SER⁸ at 1-1. Subsequent to the submittal of the applica-

⁸ Safety Evaluation Report, NUREG-75/082, September 1975, following Tr. 228 (hereinafter "SER").

tion, RG&E entered into an agreement to share ownership of the proposed Sterling facility with OR, NMPC and CH. While OR, NMPC and CH were then listed as Applicants, RG&E retained full responsibility for the construction, operation and licensing of the facility.⁹ SER Supp. 1¹⁰ at 1-1. The application is one of four concurrently filed applications submitted under the Commission's standardization policy by five utilities which have formed for that purpose the Standardized Nuclear Unit Power Plant System. These applications were filed pursuant to the Commission's "Duplicate Plant" concept,¹¹ whereby one or more utilities may submit individual construction permit applications which reference, for the technical information pertaining to design specified in 10 CFR §50.34, a single document describing the design of the reactors which are to be constructed and operated at the various sites. This concept permits the simultaneous review of the safety-related parameters of the duplicate plants. The other SNUPPS applications were filed by: (1) Northern States Power Company for the Tyrone Energy Park in Dunn County, Wisconsin (Docket No. STN 50-484); (2) Kansas Gas and Electric Company and Kansas City Power and Light Company for the Wolf Creek Generating Station, Unit No. 1, in Coffey County, Kansas (Docket No. STN 50-482); and (3) Union Electric Company for the Callaway Plant, Units 1 and 2, in Callaway County, Missouri (Docket Nos. STN 50-483 and 50-486).¹²

10. The Sterling application includes a SNUPPS Preliminary Safety Analysis Report which describes those portions of the Sterling Power Project, Nuclear Unit No. 1, that are standard to the SNUPPS plants,¹³ and a Sterling Power Project, Nuclear Unit No. 1, Addendum to the SNUPPS PSAR¹⁴ (Applicants' Exhibit 1), which sets forth the specific site and related design information, and the applicant-related information for the plant. The application contains a description of the site and the basis for its suitability, a detailed description of the proposed facility, including those reactor systems and features which are essential to safety, an analysis of the safety features provided for in the facility

⁹ Since RG&E retained these responsibilities, the only area of the Staff's safety review and the Board's safety finding dealing with the other three Applicants is the area of financial qualifications.

¹⁰ Safety Evaluation Report Supplement No. 1, NUREG-76/0052, April 1976, following Tr. 228 (hereinafter "SER Supp. 1").

¹¹ See Subpart D of 10 CFR Part 2 and Appendix N to 10 CFR Part 50.

¹² Construction permits were issued to Union Electric Company for the Callaway Plant on April 16, 1976. See 41 *Fed. Reg.* 17436 (April 26, 1976). A Construction Permit was issued for the Wolf Creek facility on May 17, 1977. See 42 *Fed. Reg.* 27071 (May 26, 1977).

¹³ Portions of the Westinghouse Reference Safety Analysis Report (RESAR-3 Consolidated Version as amended through Amendment 6) are incorporated into the SNUPPS PSAR as specified in Section 1.6 thereof.

¹⁴ Hereinafter "SNUPPS PSAR" and "PSAR Site Addendum," respectively.

design, an evaluation of various postulated accidents and hazards involved in the operation of such a facility and a description of the engineered safety features provided to limit their effects. It also includes a description of the financial qualifications of Applicants, a description of the technical qualifications of Applicant Rochester Gas and Electric Company, including its contractors, to design and construct the facility, a description of Applicants' quality assurance program and plans for the conduct of operation, and information relevant to the common defense and security of the United States. The Licensing Board finds that the application adequately describes the proposed facility in accordance with the Commission's regulations.

11. The Staff reviewed the information provided by Applicants and performed its own analyses and investigations evaluating the radiological health and safety aspects of the Sterling facility. The results of the Staff's technical evaluation of the proposed plant design and the scope of the technical matters considered by the Staff in that evaluation are set forth in the Safety Evaluation Report. SER, SER Supp. 1, and SER Supp. 2,¹⁵ *passim*.

12. The Advisory Committee on Reactor Safeguards (ACRS) has also reviewed the radiological health and safety aspects of the application. In a letter of October 16, 1975, to the Chairman of the Commission, the ACRS concluded that if due consideration is given to certain matters which the ACRS believes can be resolved during construction, the Sterling Power Project, Nuclear Unit No. 1, can be constructed with reasonable assurance that it can be operated without undue risk to the health and safety of the public.¹⁶ The matters referred to include fuel design, ECCS evaluation, fire hazards, protection against sabotage, and previously identified generic problems. The Staff has responded to the ACRS comments and recommendations. SER Supp. 1 at 18-1, 18-2.

13. The Staff concluded, as a result of its review of the application, that the application satisfies the requirements of §50.35(a) of 10 CFR Part 50. SER at 21-1; SER Supp. 1 at 21-1; SER Supp. 2 at 21-1. The Board has considered the application, the SNUPPS PSAR and PSAR Site Addendum, and the SER and supplements thereto, and finds that the Staff's technical review and safety evaluation has been adequate and comprehensive.

B. The Site

14. The Licensing Board has evaluated the proposed site for the Sterling Power Project, Nuclear Unit No. 1, to determine whether, considering the particular design proposed for the facility and the site criteria contained in 10 CFR

¹⁵ Safety Evaluation Report Supplement 2, NUREG-0052, December 1976 (hereinafter "SER Supp. 2"). Staff Exhibit 4.

¹⁶ The ACRS letter is reprinted at Appendix B of Supplement No. 1 of the SER.

Part 100, the proposed facility can be constructed and operated at the proposed location without undue risk to the health and safety of the public. The record before the Board includes the Applicants' description of the site, PSAR Site Addendum at §2, and the Staff's description and evaluation. SER at §2. The site evaluation has addressed the population distribution and density, the use characteristics of the site environs, and the physical characteristics of the site, including meteorology, hydrology, geology, and seismology, to determine that these characteristics have been adequately described, that they have been given appropriate consideration in the design of the Sterling plant, and that they conform to the Commission's reactor site criteria, 10 CFR Part 100, taking into consideration the facility design and proposed engineered safety features.

15. Sterling will be located on a site of approximately 2800 acres on the southeastern shore of Lake Ontario in northern Cayuga County, New York, approximately 50 miles east of Rochester, 30 miles northwest of Syracuse and 7 miles southwest of Oswego. PSAR Site Addendum at §2.1.1; SER at §2.1.1. The minimum exclusion area boundary distance is 3900 feet, measured from the center of the reactor building. Part of the exclusion area extends into Lake Ontario. The Applicants own all of the land portion of the exclusion area, including the mineral rights, with the exception of three acres of the lakeshore property located in the northeastern corner of the exclusion area. If Applicants' present efforts to obtain these three acres are unsuccessful, the minimum exclusion area boundary distance will be reduced to 3100 feet (the minimum distance to the property in question) at the operating license stage. The Staff's calculations indicate that Applicants would be able to meet the siting dose guidelines at this distance without addition of engineered safety features. SER at §2.1.2. The area within 5 to 10 miles of the site is predominantly rural with low population. The nearest community to the site is Fair Haven Village, located 3.8 miles south-southwest, which had a 1970 population of 859. Two other small communities, each with less than 1000 residents, and the city of Oswego, which had a 1970 population of 23,844, are the only other incorporated areas within 10 miles of the site. Applicants have specified a low population zone with an outer boundary of 2.5 miles. The 1970 resident population within this zone was determined by the Applicants to be 399 people, based on a detailed field survey. There is some seasonal transient population in the low population zone located primarily in approximately 60 summer cottages and mobile homes on the lake shore just northeast of the site. Fair Haven Beach State Park is located southwest of the site on Lake Ontario. The nearest boundary of the park is 2.4 miles from the center of the reactor building. The nearest population center, as defined by 10 CFR Part 100, is Oswego. The nearest city boundary of Oswego is 6.8 miles northeast of the site, well in excess of the minimum population center distance of 1 and 1/3 times the low population zone distance. SER at §2.1.3. The Staff concluded, SER at §2.1.4, and the Board concurs that the exclusion area, low

population zone and population center distances comply with requirements of 10 CFR Part 100.

16. We have examined the record for the numerous other factors considered by the Staff in determining suitability of the Sterling site. These include the use characteristics of the site environs, meteorology, hydrology, geology and seismology. The record supports the suitability of the site for the Sterling facility. In addition, the plant as designed adequately takes into account the meteorological, hydrological and geological conditions, including the possibility of floods, tornadoes and earthquakes. Therefore, the Board finds that the site proposed is such that the Sterling facility can be constructed and operated without causing undue risk to the public health and safety.

C. Design of the Facility

17. The Staff has reviewed the Sterling plant design, fabrication, construction, and testing criteria, and the expected performance characteristics of the structures, systems and components important to safety, to determine that they are in accord with the Commission's General Design Criteria, Quality Assurance Criteria, applicable Regulatory Guides, and other appropriate codes and standards, and that any departure from these criteria, codes and standards has been identified and justified. SER at § 1.5.

18. The Sterling plant will utilize a four-loop pressurized water reactor nuclear steam supply system having a core power level of 3411' MWt. The reactor core will be composed of uranium dioxide pellets enclosed in Zircaloy tubes with welded end plugs. The fuel tubes will be grouped and supported in assemblies with a 17 x 17 fuel rod array. SER at §§ 1.2.1, 4.1. The reactor coolant system will include a reactor vessel and four coolant loops connected in parallel to the vessel. Water will serve as both the moderator and the coolant and will be circulated through the reactor vessel and core by four coolant pumps. The heated water will flow through four steam generators where heat will be transferred to the secondary (steam) system. An electrically heated pressurizer will establish and maintain the reactor coolant pressure, and will provide a surge chamber and a water reserve to accommodate reactor coolant volume changes during operation. The reactor will be controlled by control rod movement and regulation of the boric acid concentration in the reactor coolant. The control elements, whose drive shafts will penetrate the top head of the reactor vessel, will be moved vertically within the core by individual control rod drives. A reactor protection system will be provided that automatically initiates appropriate action whenever a condition monitored by the system approaches preestablished limits. This reactor protection system will act to shut down the reactor, close isolation valves, and initiate operation of the engineered safety features should any or all of these actions be required. SER at §§ 1.2.1, 4.0, 5.0. Excess heat in the secondary system will be removed by a circulating water system taking coolant from and discharging into Lake Ontario. SER at § 10.4.

19. The nuclear steam supply system will be housed in a containment structure. An auxiliary building, to be located adjacent to the containment structure, will house components of engineered safety features, and various related auxiliary systems. The fuel handling building, also to be located adjacent to the containment structure, will house a spent fuel pool and new fuel storage facility. The rad-waste building, which will be separate from the other structures, will house the radioactive waste treatment systems. SER at §1.2.1.

20. Plant structures, systems and components important to safety, that are required to be designed to withstand the effects of a safe shutdown earthquake and remain functional, have been properly classified as seismic Category I items. SER §3.2.1. Category I structures included in the standardized design will be designed to withstand the effects of forces imposed by a safe shutdown earthquake with ground acceleration value of 0.2g. Category I structures which are not part of the standard design will be designed to withstand a safe shutdown earthquake of 0.15g. SER at §§2.5.3, 3.2.1, 3.7-3.10; SNUPPS PSAR and PSAR Site Addendum at §3. All seismic Category I structures that will be exposed to wind and tornado forces will be designed to withstand the effects of forces imposed by the design wind (velocity of 100 miles per hour based upon a recurrence interval of 100 years) and by the design basis tornado (tangential wind velocity of 290 miles per hour and translational velocity of 70 miles per hour) specified for the site. SER at §3.3; SNUPPS PSAR at §3. Likewise, seismic Category I structures will be adequately protected during the design flood or the highest groundwater level specified for the plant. SER at §3.4; SNUPPS PSAR and PSAR Site Addendum at §3. The plant will be designed so that postulated missiles generated from internal sources and from outside of containment do not cause or increase the severity of an accident. SER at §3.5; SNUPPS PSAR at §3. The Staff has concluded, SER at §3.1, and the Licensing Board finds, that the proposed facility can be designed, constructed and operated to meet the requirements of the General Design Criteria.

21. The Sterling station will have engineered safety feature systems, the purpose of which is to provide a complete and consistent means of assuring that the plant personnel and the public will be protected from excessive exposure to radioactive materials in the event of a major accident. These engineered safety systems and components will be designed to assure safe shutdown of the reactor under the adverse conditions of various postulated design basis accidents. Designed as seismic Category I, these engineered safety systems and components must function even with complete loss of offsite power and will be provided in sufficient redundancy so that a single failure of any component or system will not result in the loss of the capability to achieve safe shutdown of the reactor. SER at §6.1. The ultimate heat sink will be Lake Ontario. SER at §9.3.3.

22. One of the engineered safety features of the plant is a steel-lined, pre-stressed, post-tensioned concrete containment structure and associated systems. The containment structure, including its penetrations, is designed to safely con-

fine, within the leakage limit of the containment, the radioactive material that could be released in the event of an accident. A containment spray system will provide borated water containing sodium hydroxide to remove heat and radioactive iodine in the event of an accidental coolant release. The containment cooling system, consisting of four equal capacity fan cooling units, will be used during normal plant operation. During accident conditions, these fan coolers are capable of maintaining the containment pressure below design levels even in the event of a single active failure in either the spray system or the fan cooling system. SER at §§ 1.2.1, 6.2.

23. Another engineered safety feature is the emergency core cooling system, which is designed to provide emergency core cooling during those postulated accident conditions where it is assumed that mechanical failures occur in the reactor coolant system piping, resulting in loss of coolant from the reactor vessel greater than the available coolant makeup capacity using normal operating equipment. This system, together with the containment, containment cooling system and auxiliary feedwater system, will also be designed to protect against steamline break consequences. During the course of the hearing, the Staff advised the Board that it had requested additional information regarding the ECCS from the Applicants. Tr. 1787. We were subsequently informed that the matter related to the upper reactor vessel head temperature and that the Staff's analysis would be provided in a supplement to the SER. Tr. 3304-3305. Such an analysis was subsequently provided in Supplement No. 2 to the SER, dated December 1976. The unopposed motion of the Staff of December 22, 1976, for incorporation of this supplement into the record was granted by our order of January 26, 1977. Based on the results of its new analysis, the Staff concluded that the emergency core cooling system conforms to the acceptance criteria of 10 CFR § 50.46 and reaffirmed its conclusion that the design of the system complies with the Final Acceptance Criteria. SER Supp. 2 at p. 6-2.

24. Sterling will have radioactive waste management systems and an offsite radiological monitoring program. The radioactive waste management systems will be designed to provide for controlled handling and treatment of liquid, gaseous, and solid wastes.¹⁷ On September 2, 1975, the Commission announced¹⁸ the availability of an optional method for complying with its guidelines on the releases of radioactive materials in the nuclear power plant effluents (Appendix I to 10 CFR Part 50). That option permits a determination of compliance with Appendix I without making a cost-benefit analysis if the radioactive waste management systems meet the guidelines of the proposed Appendix I used

¹⁷ The radioactive waste management systems are described in SNUPPS PSAR, § 11. The offsite radiological monitoring program and the estimated doses due to the anticipated releases of gaseous and liquid radioactive effluents are described in PSAR Site Addendum, § 11.

¹⁸ 40 Fed. Reg. 40816 (September 4, 1975).

by the Staff before the final Appendix I became effective. Applicants have chosen to select this option of not performing a cost-benefit analysis. SER Supp. 1 at §11.1.

25. The Staff has evaluated the design of the systems provided for the control of the radioactive effluents from the Sterling plant and has determined that these systems can control the release of radioactive wastes within the limits of the Commission's standards for protection against radiation, 10 CFR Part 20, and that the equipment to be provided will be capable of being operated by Applicants in such a manner as to reduce radioactive releases to levels that are "as low as is reasonably achievable," as prescribed by the criteria in Appendix I to 10 CFR Part 50. FES at §3.5; SER at §11; SER Supp. 1 at §11 and Appendix C. The Board concurs in the conclusions of the Staff that the proposed liquid and gaseous radioactive waste management systems for the Sterling facility will satisfy the requirements of Appendix I. Therefore, the Board finds that the design of these features is acceptable.

26. The Staff has also evaluated Applicants' radiation protection program. SNUPPS PSAR and PSAR Site Addendum at §12. The review covered Applicants' radiation protection design features, including shielding and the layout of the facility, the area monitoring program, which details radiological and airborne radioactivity monitoring features, the ventilation systems which will be designed to provide a suitable radiological environment, and the health physics program. This review has shown that occupational radiation exposures can be controlled to meet the requirements of 10 CFR Parts 20 and 50. SER at §12.

27. The Staff has concluded, SER at §3.1, and the Board finds, that the proposed Sterling plant can be designed, constructed and operated to meet the requirements of the General Design Criteria of Appendix A to 10 CFR Part 50.

D. Research and Development

28. The principal features of the design of the Sterling plant are similar to those features that have been evaluated and approved previously for other nuclear power plants. The nuclear steam supply system is similar to the systems for other large pressurized water reactors now being designed and built by the Westinghouse Electric Corporation for plants being constructed under Commission construction permits. SER at §1.3. The Applicants, the ACRS,¹⁹ and the Staff have identified certain ongoing investigations to confirm and finalize the design of certain of the plant systems, including generic design features. SER at §1.7; SNUPPS PSAR at §1.5. Westinghouse is also conducting an integrated test program to confirm the design margins associated with the 17 x 17 fuel assembly design. The review of the additional information on the design and nuclear

¹⁹ See Paragraph 12, *supra*.

characteristics of this fuel is being conducted in connection with a number of pending operating license applications and will be completed well before an operating license application is submitted for the Sterling Power Project, Nuclear Unit No. 1. SER at §4.1.

29. The Staff has concluded, SER at §1.7, and the Board finds, that Applicants have identified and will perform development tests necessary for verification of the design and safe operation of the Sterling Power Project, Unit 1, on a timely schedule, and that if the results of such tests are not successful, appropriate alternative actions, or restrictions on operation, can be imposed to protect the health and safety of the public.

E. Technical Qualifications

30. Applicant Rochester Gas and Electric Company will be responsible for the design, construction and operation of the Sterling facility. It has had extensive experience in the design, construction and operation of large power plants including its R. E. Ginna Nuclear Power Plant. PSAR Site Addendum at §13.1.1. RG&E has joined with the other SNUPPS utilities to form a SNUPPS Project Organization, with technical representatives from each utility, to manage the design and procurement of the standard portions of the SNUPPS plants. The SNUPPS Project Organization, acting on behalf of the SNUPPS utilities, has retained the Bechtel Power Corporation to provide architect-engineer services, including procurement, for the standard portions of the SNUPPS plants. The Westinghouse Electric Corporation has been retained to design, manufacture and deliver to the appropriate site the nuclear steam supply system and the initial core for each of the five SNUPPS units. RG&E has established a project organization reporting to the Vice President, Engineering and Construction, to direct and control the design and construction activities for the plant and has retained Bechtel Professional Associates Corporation as an architect-engineer to provide engineering and technical services for those portions of the project not included in the SNUPPS standard plant. It has also retained other consultants for particular portions of the project. SNUPPS PSAR at §1.4; PSAR Site Addendum at §§1.4.1, 1.4.6, 1.4.7, 13.1.1; SER at §§1.4, 13.1, 17.1. Based on the entire record, the Board finds that RG&E is technically qualified to design and construct the proposed facility.

F. Quality Assurance

31. The evidence presented by the Staff and Applicants covered the quality assurance responsibilities and programs of the SNUPPS Project Organization and Bechtel and Westinghouse as well as that of RG&E.

32. The SNUPPS Quality Assurance (QA) Committee, consisting of one QA

representative from each SNUPPS utility, develops the QA manual of procedures, reviews and approves Bechtel and Westinghouse QA programs and verifies their adequacy for the project, provides formal audits of the SNUPPS Project Organization, and evaluates the effectiveness of the QA program implementation. The SNUPPS Executive Director is responsible for the implementation of the QA program of the SNUPPS Project Organization through the QA Manager. The organizational level of the QA Manager provides him with adequate independence and he reports to a sufficiently high management level to accomplish his objectives. The QA Manager and each member of the QA Committee can initiate stop work action through the SNUPPS Executive Director for the activities managed by the SNUPPS Project Organization. A system of planned and documented audits will be used by the SNUPPS Project Organization to verify compliance with the requirements of the QA program and to assess its effectiveness. Audit results will be reviewed and corrective action taken by responsible management. SER at §17.2; SNUPPS PSAR at §17. The Staff has concluded that the SNUPPS Project Organization QA program for the standard portion of the SNUPPS plants includes an acceptable QA organization, with adequate policies, procedures and instructions to satisfy the requirements of Appendix B to 10 CFR Part 50. SER at §17.2. The Staff has also evaluated the QA programs of Bechtel Power Corporation (architect-engineer for the standard plant) and Westinghouse Electric Corporation (supplier of the nuclear steam supply system), and has found those programs to be in compliance with Appendix B to 10 CFR Part 50. SER at §§17.3, 17.4.

33. Applicant RG&E is organized to control the activities of SNUPPS and its principal contractors through membership in the SNUPPS Quality Assurance Committee. RG&E directly handles control of the activities at the site. Applicant's quality assurance program provides that the Executive Vice President, through the Vice President—Engineering and Construction and through the Vice President—Electric and Steam Production, is responsible for the quality assurance, engineering, construction and operation of Sterling. SER at §17.5.1; Tr. 3211-3223. The Staff conducted a thorough review of RG&E QA organization and program. SER at §17.5. It concluded that RG&E's QA organization is (1) sufficiently independent of the organization whose work it verifies; (2) has clearly defined authorities and responsibilities; (3) has adequately defined qualification and training requirements for its staff; (4) is so organized that it can identify quality problems in other organizations performing quality related work; (5) can initiate, recommend or provide solutions; and (6) can verify implementation of solutions. SER at p. 17-12. Although RG&E has not yet contracted with constructor or construction manager, it will require that the selected constructor have a QA program that meets regulatory requirements. The Staff will require that the constructor's QA Manual and Implementation Procedures be submitted to the Staff at least six months prior to the start of

construction of any safety-related structures. *Id.* at p. 17-13. RG&E has agreed to comply with this requirement. Tr. 3204-3208. On the basis of its review, the Staff concluded that the Applicants QA program includes an acceptable QA organization with adequate policies, procedures and instructions to implement a program that will satisfy the requirements of Appendix B to 10 CFR Part 50. SER at p. 17-14.

34. At the Board's request, both Applicants and Staff presented additional witnesses on QA. The Applicants' witness was the RG&E Vice President, Engineering and Construction. He was questioned regarding the views of the upper levels of RG&E management on QA and the extent of their participation in the program. Tr. 3211-3230. He testified that not only is he intensively involved, but the Executive Vice President, to whom he reports, and also the Chairman of the Board are involved. Tr. 3222-3223. The Board's request of the Staff covered two areas—the inspection experience to date of the Sterling project and any inspection experience at the Ginna plant would reflect RG&E's ability to design and construct a plant that could be operated safely. Three witnesses from the Office of Inspection and Enforcement were offered, one who had been involved in the former area and two in the latter. Heishman Testimony;²⁰ Tr. 3279-3285, 3287-3302. The witness with regard to Sterling testified that the inspection program included not only inspections of RG&E, but also inspections of the QA programs of Bechtel, Westinghouse, and component manufacturers. Heishman Testimony at pp. 1-3. He stated that the deficiencies found were of a nature to be expected with a developing program and that, once identified, they were resolved in a timely and satisfactory manner. Tr. 3281. He stated that there was currently no substantive unresolved issues. Heishman Testimony at p. 4. The other two witnesses, both of whom had been actively involved in recent inspections at Ginna, testified that they had reviewed the inspection history, with emphasis on two areas: quality assurance for operations, and design changes and modifications. They concluded that RG&E's performance in these areas did not negatively reflect on its ability to participate in the design and construction of a nuclear power plant. Tr. 3287. The witnesses testified that the adequacy and timeliness with which RG&E corrected deficiencies was commensurate with that of other utilities they had inspected and that "Ginna management is very interested in doing a good job and doing it quickly." Tr. 3291-3293. One of the witnesses pointed out that the people who were deeply involved in the planning and construction of Ginna are now in upper management positions and that it is his opinion that their experience on Ginna is being factored into what they are doing in the Sterling facility. Tr. 3296-3297.

35. Based on the above testimony and the entire record, the Board finds

²⁰Supplemental Testimony of Robert F. Heishman, following Tr. 3278 (hereinafter "Heishman Testimony").

that the Sterling QA organization and programs comply with Appendix B to 10 CFR Part 50, and that they are adequate for the design, procurement, and construction of the Sterling plant.

G. Conduct of Operations

36. The initial test programs for the plant will be conducted by Applicant RG&E with technical support from the nuclear steam supply system vendor, the architect-engineer, the construction contractor and other vendors. SNUPPS PSAR and PSAR Site Addendum at § 14. In general, preoperational testing will be completed prior to fuel loading. As the construction of individual systems is completed, preoperational tests are performed to verify, as nearly as possible, the performance of the system under actual operating conditions. Fuel loading begins when all prerequisite system tests and operations are satisfactorily completed. While RG&E will provide additional details of its testing program at the operating license stage, the Staff has concluded that an acceptable test and startup program will be implemented by RG&E. SER at § 14.

37. The proposed station organization will consist of a staff of approximately 136 persons. The shift crew will consist of 7 persons, one of whom will be a licensed senior operator and 2 of whom will be licensed operators. The requirements for each job category used at the plant will meet the minimum requirements set forth in American National Standards Institute Standard, ANSI N18.1 (1972), "Standard for Selection and Training of Personnel for Nuclear Power Plants." Technical support for the plant staff will be provided generally by the Engineering Department of RG&E. SER at p. 13-1.

38. A training program will be established to provide plant personnel with sufficient knowledge and operating experience to start up, operate, and maintain the plant in a safe and efficient manner. SER at p. 13-2. The Staff has concluded that Applicant RG&E has established an acceptable organization to implement its responsibilities for the design and construction of the Sterling facility, that the proposed plant organization, the proposed qualifications of personnel, and the proposed plans for offsite technical support are sufficient to provide acceptable staff and technical support for the operation of the plant, and that the proposed training program is acceptable. SER at § 13.1, 13.2. The Board finds that RG&E's preliminary plans for the conduct of operations are adequate for this stage of the Sterling project.

39. Applicants' preliminary plans for coping with emergencies are addressed in the Licensing Board's findings on Contention 9B(2).

H. Common Defense and Security

40. The activities to be conducted under the permits and licenses applied for

will be within the jurisdiction of the United States. All officers of the utilities participating at Sterling are citizens of the United States. Except for one director of RG&E, all directors of the participating utilities are citizens of the United States. The director who is not a citizen of the United States is a citizen of Great Britain. The participating utilities are not owned, controlled or dominated by an alien, a foreign corporation or a foreign government. SER Supp. 1 at p. 19-1. The activities to be conducted do not involve any restricted data, but RG&E has agreed to safeguard any such data that might become involved in accordance with the requirements of 10 CFR Part 50. SER at p. 19-1. Fuel will be obtained from sources of supply available for civilian purposes so that no diversion of special nuclear material for military purposes is involved. The Staff has concluded, SER at p. 19-1; SER Supp. 1 at p. 19-1, and the Board finds, that the activities to be performed will not be inimical to the common defense and security.

I. Financial Qualifications

41. The Staff analyzed the ability of the Applicants to obtain the necessary funds to design and construct Sterling. SER Supp. 1 at p. 20-2. The Staff reviewed the Applicants' projected sources of funds statements for the 1976 to 1984 period, with underlying assumptions, demonstrating how their overall construction programs might be financed. The Staff concluded that the sources of funds projections and underlying assumptions are reasonable. SER Supp. 1 at pp. 20-3, 20-9, 20-12.

42. The total estimated amount to be raised by the Applicants to pay for Sterling, including nuclear production plant costs, transmission and distribution costs and nuclear fuel inventory costs for the first core, is \$1.212 billion. SER Supp. 1 at p. 20-1. The Staff reviewed Applicants' estimate of costs by comparing it with the CONCEPT costing model, which projected a lower cost for the nuclear production plant than that indicated by Applicants. *Ibid.* However, in the interest of conservatism, the Staff used in its analysis the Applicants' higher estimate as a cost of the nuclear production plant. *Ibid.* The Staff concluded that the Applicants are financially qualified to carry out the activities for which this permit is sought. This conclusion is based upon the Staff's analyses included in the SER Supplement No. 1 and the basic assumptions of rational regulatory policies and relatively stable capital market conditions. These assumptions are necessary because of the lengthy future period involved and the expected heavy dependence on external financing. SER Supp. 1 at p. 20-2. The Board, in addition to questioning the Staff witness on the Applicants' financial qualifications, examined a panel of witnesses from each utility with respect to trends in financial status, debt-equity ratio, bond ratings, and the need and potential for rate increases. Tr. 302-324, 333-335. The Board concludes from the information and

analysis in Chapter 20 to SER Supplement No. 1 and from the evidence provided at the hearing by Staff and Applicants' witnesses that there is reasonable assurance that the Applicants can obtain the funds necessary to design and construct Sterling, including related fuel cycle costs. Accordingly, the Board finds that the Applicants are financially qualified to design and construct Sterling.

III. COMPLIANCE WITH NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 AND FEDERAL WATER POLLUTION CONTROL ACT

A. Environmental Report and Final Environmental Statement

43. Pursuant to 10 CFR §51.20, Applicants submitted an Environmental Report (hereinafter "ER") (Applicants' Exhibit 2), which contains a description of the proposed action, a statement of its purposes, and a description of the environmental effects. Notice of the availability of Applicants' Environmental Report was published on January 3, 1975. 40 *Fed. Reg.* 821. Based on the information submitted by Applicants and on its own independent review and analysis, the Staff prepared a Final Environmental Statement (hereinafter "FES") (Staff Exhibit 1). Notice of the availability of the Final Environmental Statement was published on June 28, 1976. 40 *Fed. Reg.* 26624. The FES contains a detailed description of the site and the plant and a discussion of the status of compliance of the facility with applicable Federal, state, regional, and local environmental requirements. The FES includes an evaluation of the probable environmental impact of plant construction and operation. It contains an assessment of Applicants' effluent and environmental measurement and monitoring programs and an assessment of the environmental effects of postulated accidents. In the FES, the Staff analyzed the need for the power to be generated by the facility and assessed alternatives to the plant, its site, and design. In addition, the FES includes an evaluation of the adverse environmental effects which cannot be avoided and the irreversible and irretrievable commitments of resources. Finally, the FES contains a cost-benefit analysis which considers and balances the environmental effects of the facility and the alternatives available for reducing or avoiding adverse environmental effects, as well as the environmental, economic, technical, and other benefits of the facility.

44. The Board finds that the Staff review has appropriately considered the information supplied by the Applicants in the ER and that the Staff review set forth in the FES, as supplemented, has been adequate and that the requirements of the National Environmental Policy Act (NEPA) and 10 CFR Part 51 have been complied with in this proceeding. The Board accepts the facts set forth in

the FES and concurs in the conclusions by the Staff with the exception of certain factors set forth herein.

B. Impacts of Construction

45. Approximately 201 acres of the 2,800-acre site will be affected by site preparation and clearing. Hess Testimony²¹ at p. 3; FES, Table 4.1 at p. 4-4. About 80 permanent residents and 70 temporary residents will be displaced. FES at §4.4.1.4. The plant will require the construction of transmission line facilities, access roads, and possibly a rail spur line. The impact of population growth and construction workers income on community services has been assessed and found to be acceptable. FES at pp. 4-10, 4-11. The impact on health services, local traffic, and recreation has been discussed in Contentions 2 and 4.

46. Approximately 0.4 acres of benthic habitat would be disturbed, of which 0.3 acres will be permanently lost as a result of placement of the intake structure. Construction of the barge docking facility and the discharge canal will disturb 3.5 acres and eliminate 1.0 acres of lake bottom. FES at p. 4-7. However, the Staff expects no long-term adverse impacts resulting from the construction of these facilities. FES at p. 4-8. The Staff concluded that the adverse effects of site preparation and construction on aquatic ecosystems on or near the site area will be minimal, and, in most cases, temporary if all Staff requirements and Applicants' commitments are fulfilled. FES at p. 4-8.

47. Applicants have made a number of commitments to reduce or limit the adverse environmental effects of construction of the facility. A summary of Applicants' commitments appears on pages 4-11, 4-12 and 4-13 of the FES. The Staff has evaluated these measures and has concluded that, if combined with additional Staff recommendations, they are adequate to assure that adverse environmental impact from the construction of Sterling will be at the minimum practicable level. FES at §4.5.2. The Staff has further recommended that both the Applicants' proposed commitments and the Staff's recommendations be included as conditions of the construction permit for Sterling. FES at p. iv, Condition 7(a).

48. The Board finds that the adverse environmental impacts relating to construction of the Sterling plant have been adequately described and evaluated. To minimize these impacts, the Board has adopted the conditions set forth later in this decision.

C. Impacts of Operation

49. Sterling is designed to operate with a once-through cooling system. The

²¹Testimony of Michael J. Hess on Intervenor's Contention 12D, following Tr. 935 (hereinafter "Hess Testimony").

heat dissipation system will require a maximum circulating flow of 1860 cfs. Water will be withdrawn from Lake Ontario through a submerged intake structure and piped to separate circulating water and service water screen wall-pump-house structures on shore. The circulating and service water will be returned to Lake Ontario through a common shoreline surface discharge canal. ER at p. 4.1; FES at p. 4-8.

50. The principal impacts associated with the once-through cooling system are impingement of fish and entrainment effects on plankton, fish eggs and larvae. Of the species of fish in Lake Ontario, the alewives will sustain the greatest impact as a result of impingement. FES at pp. 5-37-5-39. The Staff concluded that the effect of the addition of Sterling to the present alewife population would result in a 0.06 and 0.57% increase in the cropping of the populations, assuming standing crops of 10^{10} and 10^9 fish respectively. FES at p. 5-39. The Staff indicated that the regional and lakewide impacts resulting from the impingement of fish at Sterling are acceptable but that some reduction in local standing crops and recruitment rates is possible. *Ibid.* The impacts of thermal discharges are discussed in Contentions 4 and 6.

51. The Applicant originally proposed an intake velocity of 1.5 fps or higher on the theory that high velocities generate turbulence that warns fish of danger. FES at p. 5-41. However, the Staff did not feel that the turbulence would be sufficient to alert fish to danger or that the fish, once alerted, could overcome the intake current. The Applicant, therefore, modified its intake to provide for a maximum intake velocity of 0.8 fps which the Staff finds acceptable. Two other mitigative measures, installation of a Ristroph Travelling Screen System and return of impinged fish to the discharge canal at a point close to the lake, will reduce impacts on the resident fish population near the site. *Id.* at p. 5-42.

52. Water entering the intake structure will inevitably entrain aquatic organisms. Large numbers of phytoplankton and zooplankton organisms, immature fish, and on occasion, smaller numbers of benthic organisms will pass through the 3/8-inch mesh travelling screens and onto the condensers, where they will experience thermal, mechanical and chemical shocks. *Ibid.* Although no quantitative assessment of entrainment mortality at Sterling can be made on the basis of data from other plants, the Staff believes a large fraction of phytoplankton and zooplankton will survive passage through the circulating water system during the cooler months. *Id.* at p. 5-43. During the hotter summer months and during chlorination, mortality may approach 100% for some species. The Staff concludes that any decreases in plankton abundance or shifts in species composition as a result of entrainment will be seasonal, highly localized and of no consequence to Lake Ontario as a whole. *Ibid.*

53. The Staff, based on a conservative analysis, concluded that a potential loss of 6.5×10^5 two-year-olds per year as a result of entrainment of larvae was possible, but it would not significantly affect the standing crops or recruitment

rates of resident fish populations at the site. *Id.* at p. 5-45. The Staff concluded that, since these estimates are conservative and because there is little evidence that the inshore waters of the Sterling site are superior as a nursery to most other relatively undisturbed inshore areas of Lake Ontario, losses of this magnitude will not result in a substantial impact on the fisheries in Lake Ontario. *Id.* at pp. 5-43, 5-45.

54. Normal plant operation results in certain chemicals being discharged into Lake Ontario. These chemicals include chlorine, copper, nickel and sodium sulfate. ER at §5.4.3; FES at §5.5.2.2. To prevent biological fouling of the circulating and service water systems, Applicants propose to chlorinate during three 20-minute periods each day. The concentration of free available chlorine in the discharge during periods of chlorination will average 0.2 ppm with a maximum of 0.5 ppm. ER, vol. 2 at §5.4.2. Chlorination will not occur when ambient temperatures are below 50°F, unless necessary. Tr. 3867. The Applicant is continuing its studies to determine the efficacy of further decreasing chlorination. In any event, Applicant's planned releases comply with applicable EPA regulations. 40 CFR Part 423 (1976).

55. Plant operation will have only minor impacts on the terrestrial ecosystem of the area. Approximately 2600 acres of the 2800 Sterling site will not be altered by construction. Approximately 1600 acres outside the exclusion boundary will be kept in present land use, and about 270 acres within the exclusion area will be removed from agriculture. FES at §5.1.

56. The radiation doses to man have been estimated at and beyond the site boundary via the most significant pathways, utilizing conservative assumptions on the dilution of effluent gases, the dilution of radionuclides in the liquid discharge, and the use by man of the plant surroundings. FES at §§5.4.1.2, 5.4.1.3. The estimated maximum doses to individuals and the upper bound doses to the population from normal operation of the plant will be an extremely minor contribution to the dose that persons in the area normally receive from natural background radiation, and represent no measurable radiological impact. *Ibid.* The contributions toward the environmental costs of this plant of the effects of the transportation of fuel and waste to and from the plant are summarized in the Staff's FES at Table 5.11. No detectable radiological impact is expected on the aquatic biota or terrestrial animals as a result of the quantity of radionuclides to be released by the plant. *Id.* at §5.4.2.4.

57. The Staff has included in its evaluation of environmental costs of the plant, in Table 5.15 of the FES, the effects of the uranium fuel cycle based on Table S-3 of 10 CFR §51.20 in effect at the time of its evaluation. On March 14, 1977, the Commission published revised Table S-3 on the basis of modified reprocessing and waste management values.²² The values in revised Table S-3 are

²²42 Fed. Reg. 13803, 13806.

not substantially different from those in the original table. The Board has considered the revised values in its cost-benefit analysis and rejects Intervenor's Proposed Finding on this issue²³ as a challenge, impermissible under 10 CFR §2.758, to the adequacy of the Commission's assessment of the impacts of reprocessing and waste management.

The Board has considered the evaluation by the Staff of the environmental impacts of plant operation, including radiation doses to man and other organisms. The Board concludes that the effects of operation will be environmentally acceptable and that the release of radioactive materials will be as low as practicable.

D. Monitoring Programs

59. The Staff has reviewed Applicants' proposed preoperational and operational environmental measurement and monitoring programs for the monitoring of chemical, thermal and radiological effluents and for aquatic, terrestrial and radiological effects. FES at §6; ER at §6. In response to questions by the Board, the Staff indicated that Applicants' preoperational monitoring program of ichthyoplankton should include nighttime sampling and weekly sampling at selected transects during the peak of the spawning period. Tr. 3902-3904. Applicants agreed that there was a need for further work to respond to the Staff's concerns and that it was Applicants' intention to develop a program which indeed would respond to the concerns. Tr. 3914. However, Applicants objected to a detailed modification of its sampling program some 7 or 8 years prior to its use. Tr. 3914-3915. The Board agrees with the necessity for the additional sampling as recommended by the Staff and directs that the Applicants' preoperational program be modified accordingly. Subject to the conditions set forth below, the Board finds that the preoperational monitoring programs are adequate. The operational monitoring program for measuring releases of routine radiation is addressed by the Board in its discussion of Contention 17, *infra*.

E. Environmental Effects of Postulated Accidents

60. The probability of occurrence of accidents and the spectrum of their consequences to be considered from an environmental effects standpoint have been analyzed using best estimates of probabilities and realistic fission product release and transport assumptions. The impact of postulated accidents has been assessed by Applicants in response to Commission guidance issued on September 1, 1971,²⁴ requiring the consideration of a spectrum of accidents with assump-

²³ Letter from Ecology Action of Oswego to the Board dated March 30, 1977.

²⁴ 36 Fed. Reg. 18071 (September 9, 1971).

tions as realistic as the state of knowledge permits. The Staff has evaluated Applicants' assessment using the standard accident assumptions and guidance issued by the Commission as a proposed amendment to 10 CFR Part 50.²⁵ FES at §7.1.

61. When considered with the probability of occurrence, the annual potential radiation exposure of the population from all the postulated accidents is smaller than exposure from natural background radiation and is well within variations in the natural background. On the basis of these results, the Staff concludes, FES at §7.1, and the Board agrees, that the environmental risks due to postulated radiological accidents are exceedingly small. The environmental effects of accidents during the transportation of radioactive materials to and from the plant are summarized in the Staff's Final Environmental Statement at Table 7.3.

F. Need for Power

62. The Board has considered the need for power to be generated by the proposed Sterling facility. This subject is addressed in the discussion under Contention 1, where it is found that the Sterling plant will be needed in 1984.

G. Alternatives

63. Alternatives to the plant which do not require the creation of a new generating facility, alternative energy sources and alternative sites and design features have been considered. All of these alternatives except for alternative design features, have been considered in the discussions under Contentions 1, 10, 11 and 12.

64. The Board also considered hydroelectric power as an alternative. Intervenor brought to the attention of the Board a draft report dated March 1974, prepared by NMPC on the subject of hydroelectric potential in certain portions of its service territory. The report was received in evidence as Board Exhibit 1. Tr. 3986. The Applicants produced witnesses on the subject of the present consideration being given by NMPC to the development of a hydroelectric capacity for its future generating needs and its implications as a possible alternative to the proposed action. The witnesses indicated that NMPC is seriously considering the possibility of developing up to 260 megawatts of new hydroelectric capacity. Tr. 3991-3992. However, the engineering, economic and regulatory aspects of this possible development are still under review and no proposal for development has been approved by NMPC management. NMPC's interest in this subject has only recently revived because, prior to the Arab oil embargo, devel-

²⁵ 36 *Fed. Reg.* 22851 (December 1, 1971).

opment of new hydroelectric potential was generally uneconomic due to relatively high capital cost of hydroelectric development and the relative inexpensiveness of alternate fuels. Tr. 3991.

65. Because of the time required for study of such alternatives, preparation of applications, regulatory review, and other considerations, it would be impracticable to plan on having a significant amount of additional hydroelectric capability available and on line by 1984. Tr. 3992-3993, 4005-4006, 4027. Accordingly, this potential does not appear to be a realistic alternative to Sterling. ER at §9.2.1.4; FES at p. 9-4; Tr. 3993.

66. The principal alternative plant design considered by the Staff in the FES was of various alternative cooling systems including wet natural-draft cooling towers, wet-dry mechanical-draft cooling towers, wet mechanical-draft cooling towers, dry cooling towers, spray canals and a cooling pond. FES at §9.2.1. Additionally, alternative intake systems and discharge systems were considered. FES at §9.2.2, 9.2.3. Information on these matters was also supplied by the Applicants. ER at §10.1, 10.2, 10.3.

H. Cost-Benefit Balance

67. The Board has weighed the environmental, economic, technical and other benefits of construction of the proposed plant against environmental and other costs upon the basis of the evidence of record. This weighing has included consideration of the impacts associated with the uranium fuel cycle as set forth in revised Table S-3, 10 CFR §51.20(e). The principal environmental and other costs identified are those which have been described by the Board in its findings herein and are as follows:

- a. Construction-related activities on the primary site will disturb about 201 acres.
- b. Approximately 99 acres of land will be required for the offsite transmission line right-of-way, and a railroad spur may affect an additional 36 acres offsite, if developed.
- c. Eighty permanent and 70 summer or temporary residents will be displaced from the site property. Traffic on local roads will increase due to construction and commuting activities. The influx of construction workers and their families will have minimal impacts on housing, community and health services, and recreation.
- d. The heat dissipation system will require a maximum circulating flow of 1860 cfs. Any alterations in plankton productivity or shifts in species composition resulting from entrainment or thermal alteration of the discharge area will be highly localized and seasonal and will have no large-scale impact. The loss of fish due to thermal shock, cold shock, gas supersaturation and overcrowding resulting from their residence in

the discharge plume will be minimal and no impact on the local fish species is expected.

- e. Most fishes entrained in the circulating water system will be killed as a result of mechanical, chemical and thermal shocks or impingement on the traveling screens. Some reduction in the local abundance and recruitment of alewives due to impingement may occur, but no regional or lakewide impacts are expected. Losses of larval fish due to entrainment may result in a loss of approximately 6.5×10^5 two-year-olds but should not result in long-term adverse effects on fish population in the lake.
- f. No measurable impacts on man or other biota is expected from normal operational release of radioactive material.
- g. Exposure of plant personnel to 450 man-rem/s per year of radiation.
- h. The capital and operating costs of the plant.

68. The principal benefit of the plant is the production of electrical energy to satisfy the needs of the Applicants' customers. Based on a 70% capacity factor, which the Board in paragraph 150, *infra*, finds to be the approximate capacity factor to be expected, the generation of electricity will be approximately 7 billion kilowatt hours per year.

69. The Board finds that, based upon the entire record regarding need for power and the available alternatives to the plant, construction of Sterling for operation on the schedule proposed by the Applicants is required to meet the need for electrical power and that the plant, as designed and selected from available alternatives, represents the optimum selection based on overall economic and environmental considerations. The Board further finds that the environmental and economic benefits from the construction and operation of the plant are greater than the environmental and economic costs which will necessarily be incurred. Therefore, the Board finds that the balance between the benefits and costs involved favors the issuance of a construction permit for the Sterling facility.

I. Federal Water Pollution Control Act

70. Applicants offered "Order Granting Certification Under Section 401 of the Federal Water Pollution Control Act Amendments of 1972," issued July 21, 1976, by the State of New York Board on Electric Generation Siting and the Environment, as Applicants' Exhibit No. 5. Tr. 1575. A conflict existed at the state level as to which agency was authorized to issue the Section 401 certification. The Order granting the 401 certification resolves this matter. However, since the state proceeding considering the appropriate cooling alternative for the Sterling facility is not complete, the certification leaves open the manner in

which the Applicants will comply with the pertinent provisions of the FWPCA. The certificate provides:

We find and determine that Rochester will comply with all applicable Federal and state environmental and water quality laws, rules and regulations, effluent standards and limitations, and water quality standards and, therefore, we certify that the construction and operation of Sterling Power Project, Nuclear Unit No. 1, will comply with all applicable provisions of Sections 301, 302, 306 and 307 of the FWPCA, provided that the Applicant complies with all Section 402 permit conditions (including any effluent limitations finally established for this facility) and all applicable provisions of state law, rules and regulations. Such conditions and provisions will apply to this certification and, when issued, shall be attached to and become part of this certification, which is issued solely for the purposes of Section 401 of the FWPCA. . . . (P. 3.)

71. The Board finds that the proffered Section 401 certificate is adequate for satisfying certification requirements under Section 401 as well as the Commission's regulations requiring such a certificate before issuance of a license, 10 CFR §51.20(c). The certificate, requiring compliance with all Section 402 permit conditions and all applicable state requirements, appears to be adequate either for the once-through cooling system or for the situation if the Siting Board (or EPA) should determine that some means of cooling other than the one contained in the instant application is appropriate for use at Sterling.

IV. CONTESTED ISSUES

A. Contention 1

Applicant has failed to demonstrate that the four participants need the power at the percentages allotted to them since the projections of total energy use and peak demand on which this showing rests are wrong. Applicant's projections are erroneous because:

- (1) Applicants' total energy use and peak demand projections fail to adequately consider:
 - (a) impact of electricity conservation efforts;
 - (b) effect of possible changes in rate structure now under consideration by the New York State Public Service Commission;
 - (c) customer use of small scale solar and wind power units and resulting reduction in demand;
 - (d) the possibility that the New York State Public Service Commission will, based on a study it is requiring by utilities pursuant to Article

VIII, Section 149(b) of the Public Service Law of New York, lower reserve requirements for members of the New York Power Pool.

- (2) Applicants' load growth predictions contain no support for its extrapolations of historical load factors.
- (3) The forecast methodologies used by the participants are unproven and rely too heavily on judgment in assessing rate of load growth.
- (4) Applicants' projections are based on an incomplete data base. Principal deficiencies are a lack of data on: appliance saturation, contribution to peak load by different customer classes, electricity conservation potential by different customer classes, and quantification of past and present conservation efforts.

72. Prior to our discussion of this contention, we will consider in a larger context the question of need for power, as required for the environmental determinations we must make. The four coparticipants in the Sterling plant provide electric service in about 66 percent of the total area of New York State to about 34 percent of its population and to about 33 percent of its total electric customers. Major load centers in this area include the cities of Rochester, Buffalo-Niagara Falls, Syracuse, Albany-Schenectady-Troy, Utica, the cities of Poughkeepsie, Newburgh, and Kingston, the southern Catskill area, and the area north of New York City. This region encompasses a broad mix of urban, suburban and rural areas. ER at §1.1.2; FES at §8.1. The four utilities, along with three other private utilities and the Power Authority of the State of New York, are members of the New York Power Pool ("NYPP"). The members of the NYPP plan and operate their interconnected systems on an integrated basis. ER at §1.1.6.1; FES at §8.1.2. As member companies of the NYPP, the four participating utilities are committed to maintain a reserve margin of at least 18 percent of their respective annual peak loads. This, as a consequence of load diversity, results in an NYPP reserve of 20 percent, the amount determined by the pool to be necessary to meet its loss of load criterion of one day in ten years. Studies indicate that a margin of this magnitude is required to comply with reliability criteria adopted by the NYPP and based on reliability standards recommended by the Northeast Power Coordinating Council. ER at §§1.1.6.1, 1.1.8, 1.1.9; FES at §8.4.2.

73. Applicants' estimates of energy and peak load requirements were set forth initially in Section 1 of the ER and updated by witnesses during the hearing. Laniak Testimony.²⁶ In addition to the estimates by the participating companies, Applicants provided a study of projected load by their consultants. ER at Appendices 1E and 1F. The methods used by the four applicants in

²⁶ Testimony of David K. Laniak on Intervenors' Contentions 1, 9B(5), 10C, D, following Tr. 472 (hereinafter "Laniak Testimony").

preparing their individual forecasts differ only slightly. They each treat the three principal load classes—residential, commercial, and industrial—separately and then sum the results. Basically, they start with the historic energy usage records and make adjustments for factors such as anticipated changes in population, income, energy prices and availability, etc. (NMPC uses a somewhat more econometrically oriented approach.) They then total the results for the several consumer classes to produce year-by-year energy forecasts. Separate forecasts are made for summer and winter peaks. The reserve requirements are added to the demand forecasts and the results compared to the available capacity. (OR forecasts peak demand directly from the basic data, rather than predicting load factor. Laniak Testimony at p. 12.) Based on 1974 experience, which involved several factors that sharply perturbed the previous trends, the Applicants revised their forecasts downwards substantially. ER at §1.1.4; FES at §8.2.

74. The updated forecasts for the four utilities for the 1975-1987 time period indicate average annual peak demand growth rates of 5.7% in summer and 6.6% in winter for RG&E, 6.8% and 6.4% for OR, 7.1% and 7.3% for CH, and 3.5% and 3.6% for NMPC. Laniak Testimony at p. 2. The forecasted average annual energy growth rates during the same period are 6.0% for RG&E, 7.0% for OR, 6.9% for CH, and 3.7% for NMPC. *Ibid.* The comparisons of predicted peak demands (including required reserves) with available capacity for the four utilities combined shows a deficiency in capacity of 205 MW and 570 MW in the summer and winter, respectively, of 1984 without the Sterling plant. Each of the four companies is deficient to some extent. The corresponding figures for 1985 are 806 MW and 1173 MW and for 1986 are 1363 MW and 1764 MW. *Id.* at Table 6. These data are the same as those reported to the New York Public Service Commission in the so-called 1976 Section 149-b Report.²⁷ Tr. 474.

75. The Applicants' consultant's forecast, which is an econometric-based forecast, Tr. 549, forecasts ranges of average energy sales growth rates over the period of 1974-1985. These forecasts are: RG&E, 5.8-6.6%; OR, 7.2-8.5%; CH 7.0-7.7%; and NMPC 3.2-4.2%. The individual companies estimates for the same period are 5.7%, 6.5%, 6.1%, and 3.2%, respectively. Laniak Testimony at 7. (The differences between these utility predictions and those in the previous paragraph result from the different time period.) The forecasts by the individual utilities are seen to be at the lower end of, or slightly below, the consultant's ranges.

76. The Staff, in addition to examining the Applicants' forecasting techniques, prepared independent estimates, both for the four utilities separately and for the four aggregated. These forecasts were based on "regionalizing" national demand forecasts prepared by the Federal Energy Agency. SER at §§8.5.1, 11.1.4. These showed reserves in the summer of 1984 without Sterling of 28.5%

²⁷ Joint Applicant-Intervenor Exhibit 1.

for CH, 11.4% for OR, -3.8% for RG&E and 16.7% for NMPC. FES at Table 11.6, as revised during oral testimony at Tr. 764. Summing these data for the combined Applicants shows a reserve of 13.9% or a deficiency of 447 MW from the desired reserves. This can be compared to the similar deficiency of 205 MW predicted by Applicants and set forth above. The Staff's 1984 winter prediction of a 923 MW deficit compares to the Applicants' prediction of a 570 MW deficit.

77. The Board has reviewed the parties' estimates and the testimony supporting them and finds them reasonable and consistent. The Board further finds that the Sterling Plant will be needed in 1984.

78. In Contention 1, Intervenor's first assert that Applicants' projections are erroneous because they fail to adequately consider four factors—conservation, rate structure changes, use of small solar and wind power units, and possible reductions in required reserves. We will take these up one at a time.

79. The effects of electricity conservation efforts are very difficult to separate from the other variables that affect the consumption of electric energy. To the extent possible, Applicants have attempted to do so. Laniak Testimony at pp. 8-9; Tr. 577, 725-727, 729; Applicants' Exhibit 1 at 43, 45, 194, 227, 255; FES at §11.1.1. It is one of the elements influencing the reduction in Applicants' present 1984 forecast from the earlier forecasts. Laniak Testimony at pp. 8-9. The Staff's witness agrees that estimation of the impact of conservation is difficult. Spore Testimony²⁸ at p. 1. He pointed out that the effect is likely to be small. For example, the FEA has estimated that a \$250 billion commitment in conservation investments in all energy markets will only result in a 0.5% reduction in growth rate of electric utility output. *Ibid.* Absent a comprehensive government commitment to energy conservation, including incentives, mandates and legislation, the impact of conservation on electrical use and demand will likely be considerably less than the maximum technical potential. *Id.* at p. 2. In the light of these difficulties in predicting and measuring the impact of conservation, the Board finds that the Applicants and Staff have considered conservation as best they could and that this effort was adequate.

80. Applicants have not factored possible future rate structure changes into their projections. They assert that although this is a subject of New York Public Service Commission consideration, it is premature to predict the results of the proceeding. They point out that peak-load pricing, while it may reduce need for peaking capacity, would not necessarily reduce the need for baseload plants such as Sterling. Laniak Testimony at pp. 9-10. The Staff witness pointed out that the principal motivation for rate restructuring was to make prices more accurately reflect costs. Spore Testimony at p. 5. He agreed with the Applicants' witness that although it might reduce peaking capacity needs, it would not reduce the need for baseload plants. Even the reduction in peaking capacity needs would

²⁸Supplemental Testimony of Robert L. Spore on Contention 1 (except for Part 1(1)(c)) and Contention 10C, D and E, following Tr. 763 (hereinafter "Spore Testimony").

not necessarily occur, since there is a possibility that a needle peak would occur. He further pointed out that rate structure changes that improved load factor could result in overall cost savings and reduced energy costs to consumers, with a consequent increase in consumption and thus increased need for baseload plant. *Id.* at p. 6. The Board finds that, although rate restructuring may be beneficial, it will not substantially affect the need for the Sterling plant.

81. With respect to small-scale solar and wind power units, the Applicants have not made any specific allowance in their forecasts because they believe their cost will limit the number of such units prior to 1984 and even installation of a substantial number of units would not significantly reduce demand (as opposed to energy) requirements. Laniak Testimony at p. 10. The Staff witnesses agree with this, Testimony of Robert L. Spore and Howard A. McLain on Contention 1(1)(c) following Tr. 809. The Board shares this view and finds that these sources will not materially affect the need for the Sterling plant.

82. Regarding reserve requirements, the Staff witness testified that a lowering of reserve requirements reduces need for peaking capacity rather than for baseload capacity. Spore Testimony at p. 8. The Applicants' witness testified that the study of New York Power Pool reserve requirements undertaken at the direction of the Public Service Commission concluded that a pool reserve of 22% was needed, slightly higher than the margin currently used. This margin is consistent with that used by other reliability councils. Laniak Testimony at p. 11. We are advised by the Applicants that following the close of the hearing the Public Service Commission issued an order which, *inter alia*, questioned the sufficiency of the economic justification for retention of the existing reserve margins, but did not order a reduction.²⁹ The Board does not believe that a 2% change in reserve requirements, if it was to be ordered, would substantially affect our findings on need for power.

83. The next portion of Contention 1 asserts that Applicants' projections are erroneous because their extrapolation of historical load factors is unsupported. The Applicants' witness testified that the load factors have historically been very stable and that, although they could foresee factors tending to both raise and lower the load factor, there is no reason to expect a significant change in the foreseeable future. Laniak Testimony at pp. 11-12. The Staff's witness testified that the Applicants' evaluation was reasonable and that the Staff's prediction ranged from a one-half percent decrease to a one percent increase by 1985, based on FEA projections. Spore Testimony at pp. 9-10. The Board finds that the record adequately supports the load factors used.

84. The third part of the contention is that the forecast methodologies of the Applicants are unproven and rely too heavily on judgment. As we have previously recited, the Applicants have made forecasts based on historical trends judgmentally adjusted and have provided an econometric-based forecast by their

²⁹ Applicants' Proposed Findings, December 30, 1976, at p. 40.

consultants based in part on judgment. The Staff forecast is based on the judgment of experts in a government agency with responsibility in this area on how a model should be formulated. The Board knows of no methodologies currently being used for load forecasting that do not involve, in some respect, exercise of judgement by the forecasters. Nor for that matter can we conceive of such a methodology except in a situation where there are no changing circumstances. The Intervenor would be the first to agree that such is not the case here. The question then is whether or not the judgment is proper and properly applied. The Board has examined the record, most important aspects of which are set out above, and can find no indication that judgment was poorly applied. With respect to the "unproven" portion of the contention, it is obvious that methodologies can be proven only after the fact. The generally good record of utility predictions in the past tends to "prove" their methodologies, although it of course is not conclusive with respect to current predictions. The general agreement of the various estimates set forth above, however, is considered by the Board to adequately demonstrate these forecasts are as good as can be produced by the present state of the art.

85. The final part of the contention asserts that the data base is inadequate. The Staff points out that the FEA model is based on the most complete and up-to-date data available. Spore Testimony at p. 15. Exhibit 7 in Applicants' Exhibit 4 sets forth the data bases used by the Applicants. Laniak Testimony at p. 12. The Board finds that, while the data bases do not include all of the detailed data desired by Intervenor, the data base is adequate for the forecasts needed here.

86. One additional subject must be addressed. Contention 1 is, in part, addressed to allocation of Sterling among the four participations. Although the Intervenor did not pursue this point to any substantial extent, the Board has considered it, although we have made our findings, for the most part, on the basis of the combined needs of the participants. Although it appears to us from revised Table 11.6 following Tr. 764, that CH may have adequate reserves without Sterling in 1984 and the reserve margins of the four participants, with Sterling, are not identical, we believe that the precise division of ownership is a matter of business considerations and judgment by the owners rather than a matter for us to decide. To the extent that governmental oversight of this is necessary, it is the proper function of the Public Service Commission, not of this agency.

87. In summary, the Board finds that the Sterling plant will be needed in 1984 and that the deficiencies asserted by Intervenor are either unsupported by the record or are insubstantial.

B. Contention 2

A. The Applicant has not adequately considered impacts on existing health

facilities and services (hospitals and doctors) from the increased work force and their families during the construction phase to small communities within 50 miles of the site where such facilities and services are presently inadequate, particularly Fair Haven, Sterling, and Oswego.

- B. The Applicant has inadequately assessed the adverse impacts of the construction work force and their families on the police, fire, and transportation services in the area.

88. Applicants and the Staff have assessed the impact on existing health services and facilities of movement into the area of workers and their families for the Sterling Project. At its peak, the work force is anticipated to reach approximately 1370 workers. (Hess Contention 2 Testimony³⁰ at p. 1.) The existence of large urban areas in close proximity to Sterling makes it very unlikely that any but a small percentage of the work force will relocate to small communities within 50 miles of the Sterling site. *Ibid.*; Mattingly Testimony³¹ at p. 1; Tr. 3540-41. The Applicants project the relocation of about 120 workers and concede that such a relocation could aggravate an unfavorable ratio of patients to doctors in certain local areas. Hess Contention 2 Testimony at p. 1. However, hospitals and ambulances within 50 miles of the Sterling site are adequate for major medical emergencies. *Id.* at pp. 1-2.

89. The Staff's assessment of impacts was based on 120 in-moving construction workers. Each worker was assumed to have a family of three for a total influx of 480 people. Mattingly Testimony at p. 2. The Staff witness also examined the effect on health services (available hospital beds) of an additional 1,000 people per county near the site and found that this increase in population would have a very small effect on the availability of health services. Tr. 3554-3555. This assumed addition of 1,000 people equates quite well with the maximum number of in-moving workers, 22% of the work force, suggested as possible. Tr. 3556-3557.

90. The Board finds that the Staff and Applicants have adequately assessed the impact on local health services and facilities caused by the movement into the area of a portion of the anticipated Sterling construction force. The relatively small influx of additional workers coupled with the presence of two metropolitan areas with available and adequate health facilities within 50 miles of the plant supports a finding that the impacts on existing health facilities and services in the area by the construction of Sterling Nuclear Plant are acceptable. ER at 8.2.2.6; FES at 4.4.4.

³⁰ Testimony of Michael J. Hess on Intervenor's Contention 2, following Tr. 3121 (hereinafter "Hess Contention 2 Testimony").

³¹ Testimony of Thomas J. Mattingly, Jr. on Contention 2, following Tr. 3527 (hereinafter "Mattingly Testimony").

91. There is no evidence that the small number of movers will appreciably burden fire services in the area. Mattingly Testimony at p. 2. However, the full construction work force may pose traffic control problems in the immediate plant area. *Ibid.*; FES at p. 4-10. Applicants have proposed a traffic mitigation program to local traffic officials which should materially reduce this impact. *Ibid.*

C. Contention 4

The Applicant has inaccurately assessed the amount of recreation within a ten-mile area of the site, and failed to evaluate the impact of a nuclear facility on the present and future recreation industry. Present and future recreation includes: fishing (including salmon fishing), swimming, boating (sail, motor, row, canoe), picnicking, camping, hiking, snowmobiles, cross-country skiing, watching a sunset or sunrise, horseback riding, and other sports commonly known as recreational sports. The principal concerns in this area are adverse impacts the location of the plant will have on utilization of the nearby Fair Haven Beach State Park and on salmon fishing which will be extremely popular on Lake Ontario near the site by the time the plant is in operation.

92. The Staff and Applicants have assessed the impacts of the proposed Sterling facility on recreation within a 10-mile radius of the site, including use of Fair Haven Beach State Park.³² The primary impact of the facility on Fair Haven Beach State Park will be visual. Mattingly-Loar Testimony at p. 2. Even here the impact will be small because the plant will be visible mainly from off shore since forests surround the plant on all but the lake side. *Ibid.* Construction of the proposed facility is unlikely to cause a decline in the use of nearby recreational facilities. *Id.* at p. 3.

93. In assessing the potential impact of Sterling upon use of Fair Haven Beach State Park, the Staff considered a similar situation involving the construction of a large nuclear facility in Massachusetts in proximity to a popular local recreational facility. That experience showed that no discernible decrease in utilization of the facility occurred as a result of construction activities. Tr. 3570.

94. The Staff provided a specific analysis of the impacts of the Sterling facility on salmon fishing. Mattingly-Loar Testimony at pp. 4-5. This analysis relies upon information presented as part of Contention 6. The Staff's aquatic ecologist indicated that excellent fishing can be expected near the discharge areas of power plants from late fall to early spring when the fish are attracted to

³² Testimony of Michael J. Hess on Intervenor's Contention 4, following Tr. 3137 (hereinafter "Hess Contention 4 Testimony"). Testimony of Thomas J. Mattingly, Jr., and James M. Loar on Contention 4, following Tr. 3559 (hereinafter "Mattingly-Loar Testimony").

the warmer waters at the discharge sites. Peak salmon fishing periods will probably occur in the fall and again in the spring. Since the plume or the area within the 3°F excess temperature isotherm is predicted to range from 217 to 573 acres in October and November and from 298 to 653 acres in April and May, the discharge from the Sterling facility may enhance the salmon fishing potential on the southeastern shore at these times of the year. No adverse impacts on Lake Ontario tributary fishing near the site are expected. Fishermen will have access to tributaries in the vicinity of the site and no potentially good salmon streams are located within the exclusion zone of the plant. Mattingly-Loar Testimony at p. 4. However, a viable salmon sport fishery is dependent not only on the accessibility of the resource to fishermen, but also an abundance of that resource. Therefore, the Staff also considered the potential for adverse impacts on the salmonid populations as a result of their residence in the thermal discharge from the Sterling facility. *Ibid.* No unacceptable adverse impact was shown from exposure of the salmonid population to elevated temperatures (heat shock), abrupt drops in temperature due to unscheduled shutdowns (cold shock), gas supersaturation, overcrowding and chemical discharges as a result of their residence in the plume. *Id.* at p. 5; Tr. 3893.

95. The Board finds that the Applicants and the Staff have adequately assessed the impacts of construction and operation on recreation within a 10-mile radius of the site, including an analysis of the effect on utilization of Fair Haven Beach State Park and impacts on salmon fishing near the site. These impacts are expected to be minimal.

D. Contention 5

The Applicant has inadequately assessed current and projected agricultural use in the surrounding area by failing to estimate accurately the amount of livestock and cropland. Applicant has failed to measure the impact on farmers in the surrounding area of economic losses due to accidental radiation releases.

96. The Staff and Applicant have assessed the current and projected utilization of land in the vicinity of the Sterling site for agricultural purposes and have specifically reviewed the amount of cropland and livestock in the area. The evidence shows that agricultural use of the land in the vicinity of the proposed site has declined considerably from its historical peak. Hess Contention 5 Testimony³³ at p. 1. In the three counties surrounding the Sterling site the percentage of land in agricultural use was at its highest between 1880 and 1900. Sub-

³³ Testimony of Michael J. Hess on Intervenor's Contention 5 following Tr. 1370 (hereinafter "Hess 5 Testimony").

sequently, these areas have experienced a long-term decline in farmland. This trend is expected to continue through the period of construction and operation of the Sterling facility. Salk Testimony³⁴ at pp. 1-3.

97. About 1200 acres (44%) of the total 2800 acres for the Sterling site are currently used for agriculture. About 340 acres of these 1200 acres will be lost to production due to construction and operation of the plant. This is a very small percentage of the land in the three-county area currently used for agriculture and an even smaller percent of the total land which has been farmed in the past. *Id.* at pp. 1-2.

98. The Applicant and the Staff evaluated the possibility of economic losses resulting from postulated accidents at the Sterling nuclear facility and concluded that the potential for economic impact was very low.

99. The Staff considered a range of postulated accident conditions which could be associated with operation of the Sterling facility. This range was categorized into three major groups: (1) events of moderate frequency leading to no significant radioactive releases, (2) events of small probability with the potential for small radioactive releases and (3) very low probability but potentially severe accidents postulated to establish the performance requirements of engineered safety features and used in the evaluation of reactor site acceptability.³⁵ The results of this analysis appear in the Staff's Final Environmental Statement and show that the consequences of the postulated accidents would not be expected to have a significant impact on the public. Thus, the design of the Sterling facility meets the Staff's criteria with respect to postulated range of accident conditions. FES at §7.1. All events identified as having a moderate frequency of occurrence must be covered by design considerations to protect against their occurrence or against their ability to produce significant radiological consequences. Soffer Testimony at 2. For the second and third groups of accidents, under accident conditions, engineered safety features must be provided which will function effectively to eliminate (or reduce to an insignificant level) the potential for radioactive release to the environment. *Id.* at pp. 2-3.

100. The Applicants examined the effects of two postulated Class 8 accidents which their calculations showed could result in certain doses in excess of Part 20 limits. Mecredy Testimony³⁶ at p. 2. Even if one of these unlikely accidents occurred during the grazing or growing season, a number of remedial measures are available to eliminate or minimize economic loss. These include

³⁴Supplemental Testimony of Martha S. Salk on Contention 5 following Tr. 1387 (hereinafter "Salk Testimony").

³⁵Supplemental testimony of Leonard Soffer on Contentions 5 and 9B1, following Tr. 2962 (hereinafter "Soffer Testimony") at pp. 1-2.

³⁶Testimony of Dr. Robert C. Mecredy on Intervenor's Contention 5, following Tr. 3000 (hereinafter "Mecredy Testimony").

withdrawal of livestock from pasture and withholding of milk, beef, and crops from market to allow sufficient radioactive decay to levels established in NRC regulations. Also perishable items could be processed and stored until radioactive decay produced acceptable levels. *Ibid.*

101. The Board finds that the projected agricultural use of land surrounding the Sterling site has been adequately assessed. Furthermore, the Board finds that the potential economic risk to farmers from Sterling Plant accidents is very low. Intervenor's Proposed Finding 12, alleging the lack of a valid basis for assessing the impact of an accident on farmers is hereby rejected.

E. Contention 6

- A. Applicant has underestimated the temperature increase of the southeastern shore region of Lake Ontario which will result from plant operation if it uses once-through cooling. Extrapolation of Ginna thermal discharge data to Sterling is questionable because of greatly different size of discharge and difference in lake bed slope. The Ginna model is also inadequate because it deals only with heated water within the discharge zone and does not consider the increase in heat content of lake waters in the far-field region. The model is not realistic in that it does not consider physical parameters such as wind, height of lake, air temperature, ambient lake turbulence and lake currents.
- B. The cumulative effect of heat discharges from Sterling into the southeastern shore region of Lake Ontario in combination with other heat discharges from Ginna, the Oswego steam station, and Nine Mile Point has not been adequately considered as to its effects on the ecology of this lake region.
- C. The Applicant has underestimated the adverse effect that discharge of heated water from the plant will have on the ecology of the near-shore region of southeastern Lake Ontario, including fish, benthic organisms, plankton and algae. We contend that the increased heat content will increase eutrophication in this region of the lake.

102. Both Staff and Applicants presented evidence to predict the effect of the thermal effluent and its impacts as a result of the proposed once-through cooling system of Sterling.³⁷ Intervenor's also presented a direct case on this contention.³⁸

³⁷Testimony of Donald D. Gray and James M. Loar on Contention 6 following Tr. 1510 (hereinafter "Gray-Loar Testimony"); testimony of Terrence R. Weiss on Intervenor's Contention 6 following Tr. 3753 (hereinafter "Weis Testimony"); testimony of Samuel J. Markello on Intervenor's Contention 6 following Tr. 3801 (hereinafter "Markello Testimony").

³⁸Prepared testimony of Richard L. Reinert, Tr. 3922-3941.

103. At design conditions, about 1860 cfs will be withdrawn from Lake Ontario, heated 19.3°F above ambient conditions, and returned to the lake. FES at §3.3. Discharge will be through a 180-foot straight open channel ending at the shoreline. The open channel has a trapezoidal cross section with approximately a 53-foot base and one-to-one sides. For design flow and the average annual lake level, the discharge velocity will be 3.7 fps.³⁹ FES at §3.4.3.

a. Thermal Models

104. The Applicant constructed empirical models using triaxial data from the Ginna facility. ER at Appendix 5A; FES at §§5.3.1.1.1, 5.3.1.1.3; Weis Testimony at pp. 1-2 and attachment. The first model, the Acres American Study, extrapolated the results of eight plume analyses from the Ginna monitoring program to predict the Sterling plume. Two additional models were formulated to refine their prediction, the NUS I model and finally the NUS II model which is a more complete and systematic work. The NUS II data base consists of 43 monthly plume surveys taken between 1970-75 and includes plumes in all months except January, February, and March.

105. Both Intervenor and Staff had a number of reservations about the Applicants' models. For example, Applicants' initial model, the Acres American study, had a small and unrepresentative data base and was unable to account for plume variations in response to ambient conditions. FES at §5.3.1.1.1. Applicants' second model, NUS I, was constructed to indicate how variations in ambient conditions would affect the predictions of the Acres American study. However, uncertainties in this model such as the validity at the 3° isotherm together with the uncertainties of the Acres American study led the Staff to conclude that it, too, might not be reliable. FES at §5.3.1.1.2. Applicants' third model, NUS II, uses observations of the Ginna plume to construct an empirical model of the Sterling plume. In this respect, it is similar to the Acres American study, but NUS II is a more complete and systematic work. FES at §5.3.1.1.3.

106. Applicants' models extrapolate the findings at Ginna to Sterling. The validity of this extrapolation depends on the existence of dynamical similarities

³⁹The Board notes that in New York State proceeding regarding the issuance of a Section 402 permit, the New York State Public Service Commission and the New York State Department of Environmental Conservation have recommended that the discharge velocity be modified to not less than 6.7 fps at the normal lake elevation of 240 feet USGS, except during periods of recirculation or pump outages for emergency repairs or required maintenance. The Applicants have not objected to this recommendation. While it appears probable that either velocity would be acceptable, a detailed analysis of impacts associated with the higher velocity has not been performed. Tr. 3756-3757. See Additional Testimony of Terrence R. Weis and Samuel J. Markello on Intervenor's Contention 6, following Tr. 3753; Tr. 3843-3844.

between the Ginna and Sterling discharge. Gray-Loar Testimony at p. 2; Tr. 1515-1519. Among the factors which might influence the extent of the thermal plume are discharge geometry, lake bottom geometry, and shoreline geometry.

107. Similarity of discharge geometry has been considered by Applicants in terms of channel side slope, aspect ratio (channel bottom width divided by depth), and dimensionless lake level. Both channels have the same side slope. The velocity and depth of the Sterling discharge were made approximately equal to those at Ginna. Since the Sterling flow rate is double that at Ginna, the channel was made wider to maintain the same velocity. This widening of the channel introduced the uncertainty of extrapolation into the analysis. Gray-Loar testimony at p. 2; FES at p. 5-7. It was at first believed that the lake waters in the area of the Sterling discharge were shallower than those at Ginna and that this and the wider channel would cause less of the plume surface to be subject to mixing with the lake waters. FES at pp. 5-7, 5-8. However, based on lake bottom contours examined at the hearing, it was determined that the lake slope at both Ginna and Sterling was approximately the same out to a depth of approximately 18 feet. Tr. 1511-1512. Since this is the most important region for dilution, the amount of dilution available at Sterling would be increased, thereby increasing the validity of extrapolation of Ginna data to Sterling. Tr. 1521-1522.

108. Several other physical parameters at Ginna are the same as those at Sterling. The current at both sites is predominantly alongshore (from west to east at Ginna and from south-southwest to north-northeast at Sterling) and has a magnitude of approximately 0.1 to 0.3 fps. Currents exceed 0.5 fps less than five percent of the time. Wind speeds at both sites are generally less than 10 mph predominately from the west to southwest. Twenty mph winds occur less than five percent of the time. Lake turbulence which is predominately wind induced is the same at both sites. Generally, both sites are subject to the same meteorological events. Wind, air temperature and humidity are consistent at the two sites. Weis Testimony at p. 4; FES at §5.3.1.4.

109. The contention states that Applicants' model is not realistic in that it does not consider physical parameters such as wind, lake level, air temperature, ambient lake turbulence and lake currents. The Acres American model and the NUS II model are both based on actual field triaxial data from the Ginna site. Therefore, physical parameters such as wind, air temperature, ambient lake turbulence and lake currents are inherently considered in the Sterling Nuclear models. Weis Testimony at pp. 3-4. With regard to lake levels, the NUS II model specifically considers that parameter. *Id.* at pp. 4-6.

110. The Staff indicated two additional concerns with the Applicants' thermal analysis. The NUS II and the Acres American studies had neglected the 90° bend in the Ginna canal 30 feet upstream of the discharge. This bend probably creates significant large-scale turbulence and results in higher dilutions than if the canal were straight as at Sterling. FES at p. 5-8. The Staff also

disagreed with the Applicants' assertion that the shielding effect of Smoky Point is quite significant and results in conservative predictions of the Sterling plume. Loar-Gray Testimony at p. 3; FES at p. 5-9.

111. The Staff's thermal analysis of the Sterling plume is not dependent on the extrapolation of Ginna data and thus is not subject to the concerns expressed by the contention. The model used by the Staff is a semi-empirical model by Pritchard. FES at p. 5-11. The model has little theoretical justification but has often been found to yield more accurate predictions than more sophisticated treatments. *Ibid.* In order to verify its application at Sterling, the predictions of Pritchard's model were compared with field measurements of the Ginna thermal plume to see whether conditions in southeastern Lake Ontario lie within the range of validity of the Pritchard model. FES at Appendix E. This comparison shows that the model may be high or low, usually within a factor of 3, but on the average the agreement is much better. Satisfied that Pritchard's model is a reasonable approximation for Sterling, the Staff calculated plumes for a number of cases. FES at p. 5-12.

112. The Staff's cases indicated that the thermal plume at the 3°F isotherm would be higher in the winter than the summer with acreages ranging for January from 459 acres to 910 acres, depending on conditions. By contrast, the thermal plume acreage in June would be a minimum of 137 acres ranging to a high of 188 acres. The annual average acreage at the 3° isotherm was 400 acres minimum and a maximum of 648 acres. FES, Table 5.2 at p. 5-13. The Staff's witness indicated that the Staff's model gives the best values for the most likely case. Tr. 1573. However, he indicated that Applicants' models were valid at the 3 degree isotherm level but they became less so at the 1 degree isotherm. Tr. 1561. Applicants' projections tend to overlap those of the Staff for most cases and differ, at most, by a factor of 2. Agreement was better for summer plumes. FES at p. 5-12. For this type of analysis, the agreement is reasonable. Tr. 1513.

113. The Staff asserts, Tr. 1542, 1545, and the Board concurs, that the Staff's analysis using the Pritchard model has produced acceptable results in this case. The Board finds that the Staff's analysis and the reasonably comparable results produced by those of the Applicants' have provided an adequate analysis of the thermal plume expected at Sterling with once-through cooling.

b. Cumulative Effect of Thermal Discharges

114. The Staff's assessment as to possible interaction of the Sterling thermal plume with that from other generating stations in the area was that a merger of the thermal fields at a detectable level could possibly occur when the current at the Sterling site was from the east moving the plumes from the Oswego, Nine Mile Point area down to the Sterling site. Tr. 1572, 1564. In this circumstance, Staff's witness indicated that he was uncertain as to what degree of interaction

might occur but indicated that this could possibly be at the 3° isotherm level. Tr. 1573. However, the converse situation, the Sterling plume moving to Oswego is not likely to occur. Tr. 1565. Staff's witness stated that he was certain that when the current was from the west, a 3° rise at Oswego would not be experienced because of Sterling and he was fairly sure that a 1°F rise would not result. Tr. 1569. No interaction of Sterling with Ginna or Ginna with Sterling would be expected due to the large distance. Tr. 1563.

115. The evidence presented indicates that the principal concern of Intervenor, that the Sterling plume would move to the Oswego area and provide a significant heat input to that area, is unlikely to occur. A possibility does exist that when the current is from the east, thermal plumes from the Oswego area will move down to the Sterling site. However, the likelihood that this will occur is difficult to assess. Tr. 1566. To the extent that the Oswego plumes would be carried to the Sterling area by wind driven currents, we note that according to the Intervenor the prevailing winds are from the west. Tr. 3933; 3962. Applicant has also asserted in the opinion of its expert witnesses that interaction of the Oswego plume and the Sterling plume would be unlikely to occur and in any event that significant environmental impacts would not be expected. Tr. 3804.

116. The Board finds that there is likely to be little or no interaction between the Sterling plume and the Oswego plumes when the current is from the west. While a rigorous examination of the dynamics of physical interaction among the various plumes has not been performed and may be beyond the state-of-the-art of modeling, the Board finds that the possibility that the Oswego plume may at times move to the Sterling area does not indicate impacts substantially different from those assessed based on the Sterling plume itself.

c. Ecological Impact on the Lake

117. Large quantities of heat will be discharged to Lake Ontario during operation of Sterling. During the hottest month and period of maximum lake level, the Staff's thermal analysis predicts discharge temperatures as high as 94.3°F, compared with an intake temperature of 75°F. Under these conditions, the 15°F isotherm would encompass about 2.3 acres of lake surface; the 10°F isotherm, 11.6 acres; and the 3°F isotherm, 763 acres. FES at p. 5-28.

118. Most fish will avoid areas of the thermal plume warmer than their preferred range; a few fish may encounter these areas by accident. Studies at the Ginna plant have shown white perch, pumpkin seed, and small mouth bass are attracted to the thermal plume in the warmest period of the year. Smelt also should be found near the Sterling discharge in the early spring and alewives should be abundant in the nearshore area and within the plume during June and July. Various salmonids might also be present near the discharge due to the change in distribution of their principal prey, the alewife and smelt. In short, the

seasonal changes in abundance and species composition of fish in a thermal plume exhibit patterns directly related to their reproductive cycle. FES at p. 5-29. However, because of the short residence time within the warmest part of the discharge or because the temperature of the plume seldom exceeds the preferred temperature of the species under consideration, no mortality from thermal shock is expected from those species residing in the thermal plume during the warmest times of the year. However, temperatures preferred by given species are not necessarily the optimum temperatures for growth, reproduction and resistance to disease. Yellow perch are present in the thermal discharges in Lake Michigan, which indicates that the fish will select temperatures known to significantly impair reproduction. The Staff evaluated the potential impact of the Sterling discharge on yellow perch population in the vicinity of the site and concluded that since yellow perch comprised less than 2% of the fish taken in gill nets in a given period, their densities are not such that a significant impact would result. The Staff also considered the effects of cold shock, gas supersaturation, and impact on the shoreline migrations in its analysis and concluded that these would not lead to an adverse impact on the fish population of the area. FES at pp. 5-31, 5-32. The effect on salmon, discussed *supra*, indicated no substantial impact.

119. The Staff considered the impact of thermal changes on the plankton and concluded that, except in the immediate area of the discharge outfall, temperatures in the plume are not likely to exceed the lethal levels for most algal species for which temperature information is available. Further, the residence time of phytoplankters entrained in the plume will be too short for temperature to cause any significant shifts in species composition. FES at p. 5-33. Similarly, except for the immediate area of the discharge outfall, the Staff anticipates no direct thermal effects on benthic invertebrates when ambient temperatures exceed 39°F because a plume will float on the surface of the lake. Below 39°F, the plume will sink after cooling sufficiently and benthic invertebrates and bottom fish, such as sculpins, in the path of the sunken plume will experience increases in temperatures as high as 12°F.

120. Enhancement of local eutrophication in the onshore area is expected to be minimal. Under certain conditions, an increase in temperature may enhance eutrophication, a term broadly defined as nutrient or organic matter enrichment, or both, that results in higher productivity. Gray-Loar testimony at p. 9. Since the plant will provide a negligible amount of nutrients to the lake ecosystem, neither an increase in productivity nor a shift in species composition towards a community dominated by blue-green algae species is expected. The Staff concluded that there may be some stimulation of phytoplankton productivity during the colder portions of the year, in particular the winter months, December through March. However, the stimulation of productivity is not expected to be of such a magnitude that it results in any adverse impact. Tr. 3879.

The Board concurs with the Staff and the Applicants that, while the thermal plume at Sterling will produce some impacts on the lake, they will be within acceptable limits.

121. Intervenors' Proposed Findings criticize Applicants' analysis of the thermal plume on the basis of extrapolation of results from Ginna to Sterling and on the adequacy of the Ginna data. Based upon the Staff's analysis, which circumvents these objections yet substantially validates the Applicants' analysis, the Board rejects Intervenors' Proposed Finding 17. Intervenors also allege that the Sterling plume will interact with plumes from Nine Mile 1, Fitzpatrick, and Oswego but that the resulting environmental impacts have not been assessed. We have discussed these concerns above and have concluded that, although some interaction may occur, the environmental impacts will be acceptable. Thus, Proposed Finding 18 is also rejected.

F. Contention 8

The Applicant should be required to have an adequate supervision program for protection of the environment during the construction phase.

122. Applicants have prepared a draft environmental management and construction plan which sets forth procedures to satisfy Federal and state regulatory requirements. DeSeyn Testimony.⁴⁰ The Board ruled that the scope of the contention was limited to the adequacy of the management structure to carry out its functions rather than to the details of the environmental programs. Accordingly, Applicants' witness testified as to the administrative and supervisory controls which would be provided to assure compliance with any conditions or requirements for protection of the environment during construction which might emerge from licensing proceedings. *Ibid.* Staff's witness agreed that the plan would provide a supervision program adequate for the protection of the environment. Supplemental Testimony of Dino Scaletti on Contention 8, following Tr. 3746.

123. The principal management structure consists of two committees. One has the general function of reviewing and resolving onsite problems resulting from construction of the plant. DeSeyn Testimony at p. 3. The second is a review board which will periodically examine the overall activities of the program. Tr. 3690-3691. The review board will have two environmental consultants in addition to six employees of RG&E.

124. The program will be headed on a day-to-day basis by a Program Administrator. Tr. 3708. The Program Administrator cannot himself issue stop-

⁴⁰Testimony of Robert J. DeSeyn on Intervenors' Contention 8, following Tr. 3148 (hereinafter "DeSeyn Testimony").

work directives. However, he will be informed of events onsite by inspectors reporting to him in his capacity as Program Administrator. He will take the matter up with the Project Construction Engineer who has stop-work authority, Tr. 3702, and if it is not resolved to the Program Administrator's satisfaction, then he may proceed through his own chain of command to the Vice President for Engineering and Construction, Tr. 3703, 3709-3710.

125. The Board finds that the plan including management structure when finalized will be suitable for ensuring that conditions and commitments relating to protection of the environment during construction will be met.

G. Contention 9

A. Electricity produced by the proposed plant will be more costly than that from two 600 MW coal units at Sterling or Ginna. Applicant's cost calculation is erroneous because of the following incorrect assumptions that:

- (1) The cost of decommissioning the plant will be \$40 million and no basis is specified for this estimate.
- (2) Fuel and operating costs for the lifetime of a nuclear plant are as low as projected.
- (3) Nuclear fuel will be available for the lifetime of the plant.
- (4) The capacity factors for both fossil and nuclear plants will be 75 percent. In addition, Applicant has failed to consider the cost of replacement power to supply the required power at varying capacity factors for both nuclear and coal.
- (5) Escalation of capital costs will be the same for both fossil and nuclear plants, and that escalation will be at the rate of 7 percent annually.
- (6) Uranium enrichment and fuel reprocessing facilities will be available for the lifetime of the plant.

B. Applicant has failed to analyze the following costs which should be included in the ultimate cost-benefit determination. These costs are:

- (1) The economic cost to the surrounding population of the adverse effects on health due to routine and accidental radiation release from the plant.
- (2) The social (psychological impact) and economic cost to the surrounding population of preparation for fulfilling their role in the emergency plan as regards required facilities (Coast Guard, hospitals, schools) and services (local and state police, fire, civil defense, ambulance).
- (3) Decreased land values around the site (therefore diminished tax base), county road maintenance, social (questions of whether people will live near the plant) and ecological effect from radiation on the Sterling area of a decommissioned plant, and has failed to make

comparisons among the three different types of decommissioning procedures.

* * * * *

- (5) The increased cost to participants' ratepayers if the plant is built prematurely or if it is built despite not being needed at all. A comparative analysis similar to that shown in Chapter One of the ER for the costs to the participants of scheduled commercial operation delays to 1985, 1986, and 1987 should be required.
- C. The claim of RG&E, Niagara Mohawk, Central Hudson and Orange and Rockland that the Sterling site is best for them from an economic standpoint is based on the following incorrect assumptions:
- a. Fuel and operating costs for the lifetime of a nuclear plant are lower than for alternate fuel sources.
 - b. Nuclear fuel will be available for the lifetime of the plant.
 - c. The proposed 765kV transmission line will be approved, that it will go through Sterling, and that transmission costs would be 2.0-2.5 or 2.7-3.2 mils per kWh.
 - d. That the capacity factors for both fossil and nuclear plants will be 75 percent.
 - e. That escalation of capital costs will be the same for both fossil and nuclear plants, and that escalation will be at the rate of 7 percent annually.
 - f. That uranium enrichment and fuel reprocessing facilities will be available for the lifetime of the plant.

In addition, the Applicant has failed to consider the cost of replacement power in evaluating the cost of the Sterling plant versus alternative methods of producing power needed by each of the four utilities participating in the Sterling project.

126. Contention 9 is divided into three basic parts. The first has to do with the cost of power produced by the proposed Sterling plant as compared to the costs if produced by a coal-fired plant consisting of two 600 MW units. intervenors assert that Applicants' calculations are erroneous for several reasons. We will deal with these individually below. The second part of the contention asserts that Applicants have failed to analyze certain costs in the cost-benefit determination. We will deal with each of these individually. The last part of the contention asserts that Applicants' conclusion that the Sterling site is the best site for this plant from an economic standpoint is based on six incorrect assumptions. Five of the six asserted incorrect assumptions are essentially the same as assumptions discussed in the first part of the contention. The remaining assumption, relating to transmission costs, will be discussed and will be followed by our finding on the economic cost comparison.

Contention 9A(1) Decommissioning

127. Both Applicants and Staff have described and estimated costs for three available types of decommissioning. McCoy Testimony⁴¹ at pp. 1-5; Scaletti 9A Testimony;⁴² FES at §10.2.4; ER at §5.9. The three types are mothballing, in-place entombment and complete dismantling. Combinations are also possible. Scaletti 9A Testimony at pp. 2-3. Applicants' estimates of capitalized costs for the various methods range from \$6 million to \$110 million. For estimating power costs they have used a value of \$55 million (5% of capital costs). McCoy Testimony at pp. 3-5. The Staff has estimated an upper limit cost of \$70 million and has used that value in its evaluations. Scaletti 9A Testimony at p. 4.

Contention 9A(2) Fuel and Operating Costs

128. Applicants and Staff have each estimated fuel and operating costs for both nuclear fuel and coal. In addition, Applicants' consultant performed an independent estimate of nuclear fuel costs. Applicants' own estimate of levelized fuel costs over the life of the plant is 60 cents per million Btu (MBtu) in 1984 dollars. This estimate was based on a U_3O_8 cost of \$35/lb. in 1984 dollars and other cost assumptions set forth in the prepared testimony. Fuierer Testimony⁴³ at pp. 16-18.

129. Applicants' fuel consultant presented a more detailed estimate which developed a range of fuel cycle costs levelized over the first ten years of operation of 73 cents to 113 cents/MBtu. Geller Testimony⁴⁴ at p. 14. This predicted range was based on models aimed at projecting the price of all goods and services used in the nuclear fuel cycle, including uranium, conversion, enrichment, fabrication, reprocessing, and salvage values. The models are primarily based on a cost of production plus rate of return analysis. Two cases are calculated. The nominal cost case considers that the pricing for a service is averaged over all of the facilities providing such a service. The high cost case considers that the pricing for the service reflects a cost appropriate to the highest cost facility that might be providing that service at any point in time. The cost projections also took account of market price information when available. *Id.* at pp. 7-8.

130. With respect to U_3O_8 the model projected 1984 costs of \$40 and

⁴¹ Testimony of William L. McCoy on Intervenors' Contention 9, following Tr. 236 (hereinafter "McCoy Testimony").

⁴² Supplemental Testimony of Dino C. Scaletti on Contention 9A(1) and 9B(3), following Tr. 377 (hereinafter "Scaletti 9A Testimony"). Staff Counsel notes (Tr. 3796) that his transcript did not include this testimony. It is incorporated again at that point.

⁴³ Testimony of Anton A. Fuierer on Intervenors' Contentions 9(A)(2)(3)(6), 9C(a)(b)(f), following Tr. 1641 (hereinafter "Fuierer Testimony").

⁴⁴ Testimony of Leonard Geller on Portions of Intervenors' Contentions 9(A) and 9(C), following Tr. 1579 (hereinafter "Geller Testimony").

\$46/lb. (1984 dollars) for the nominal and high cases, respectively. Tr. 1608-1609. For conversion of U_3O_8 to uranium hexafluoride nominal and high costs of \$5.10 and \$7.80/kg were developed. Tr. 1609. Enrichment costs were developed on the basis of privately owned enrichment plants and used a centrifuge plant for the nominal case and a gaseous diffusion plant for the high case. Costs were \$135 and \$160 per separative work unit, respectively. The estimated cost if ERDA continued to supply enrichment service was \$86 per separative work unit. This value was not used in the fuel cycle cost estimates. Geller Testimony at pp. 10-12; Tr. 1613-1614. Fuel fabrication costs were estimated at \$148 and \$184 per kilogram for the two cases. Reprocessing costs were included in the estimates based on the witness' assumption that reprocessing and recycle would be permitted. These costs were based on estimated Barnwell plant charges. A surcharge for mixed oxide fuel fabrication of 250% of the uranium dioxide fuel fabrication cost was included. Geller Testimony at pp. 12-13; Tr. 1614-1617. A cost for waste storage was also included. Geller Testimony at p. 13; Tr. 1617-1618. Finally, the witness made two different estimates for inflation. For the nominal case, he used 4.2% per year from 1976 to 1980 and 3.5% per year beyond. For the high inflation case, he used 5.4% per year for 1976-1980 and 6.0% after 1980.

131. Taking into account all of the costs outlined above, the witness predicted a levelized fuel cycle cost for the first ten years of operation of 73 cents/MBtu for the case of nominal costs and inflation, 88 cents/MBtu for nominal costs and high inflation, 92 cents/MBtu for high base costs and nominal inflation, and 113 cents/MBtu for the high cost and high inflation case.⁴⁵ Geller Testimony at p. 14. In addition, he estimated that if reprocessing was not carried out and a throw-away cycle was used, the costs would be increased by 7 cents/MBtu. *Id.* at p. 19.

132. The Staff's independent fuel cycle cost estimate yielded a 30-year levelized cost of 13.7 mills per kilowatt-hour. This estimate was prepared by considering the cost of each of the constituent elements of the fuel cycle in a manner generally similar to that used by Applicants' consultant. The 1984 U_3O_8 cost used was \$44 per pound based on an estimate of supplier costs and profits and an additional increase of 25% to take into account the possible market conditions. Other cost element estimates were based on discussions with ERDA officials. Tr. 2331; Nash Testimony⁴⁶ at pp. 6-10. The witness estimated that a throw-away cycle would add about 8.8% to the price. *Id.* at p. 11.

⁴⁵For an approximate conversion to cents per kilowatt-hour, 100 cents/MBtu is equivalent to one cent or 10 mills per kilowatt-hour, based on an approximate heat rate of 10,000 Btu/kWh.

⁴⁶Supplemental Testimony of Darrel A. Nash on Contention 9B(1) (in part), 9A(2), 9A(3) (in part), 9A(4) (in part), 9A(5), 9A(6), 9B(5), 9Ca, 9Cb, 9Cc (in part), 9Cd, 9Ce and 9Cf, following Tr. 2198 (hereinafter "Nash Testimony").

133. Applicants' initial estimate of coal costs was \$3.15 per MBtu (1984 dollars) for eastern coal having a 1% sulfur content. ER at 9.3-1a and 9.3-2. This did not include the cost of scrubbers, which would be required and which add 33 to 40 cents. Tr. 1844. The basis for these costs included the costs of opening new mines since Applicants could not find any existing eastern mines having sufficient uncommitted coal available. Tr. 1801A, 2170-2172, 2188-2189. Applicants' witness was also cross-examined regarding delivered costs for western coal and estimated this cost to be \$3.38 per MBtu for coal that would not require use of scrubbers. Tr. 1843. Estimates for both eastern and western coal were based on actual negotiations with potential suppliers. Tr. 1797-1798. The Staff estimated the costs for eastern coal at \$1.90 per MBtu based on actual 1975 delivered prices as reported to the FPC escalated at 5% per year. Nash Testimony at p. 6. This results in a 1984 cost of 18.8 mills per kWh and a 30-year leveled cost of 31.5 mills per kWh. *Ibid.*

134. Operating and maintenance costs were estimated by the Staff to be 3.9, 3.2, and 2.8 mills per kWh for 50, 60, and 70% capacity factors, respectively, for the nuclear plant and 8.0, 6.2, and 5.7 mills per kWh for the coal-fired plant at the same capacity factors. Tr. 2309-2310. These were based on escalation of 1973 data published by the FPC and, in the case of coal costs, do not include operation of scrubbers. Nash Testimony at p. 10. Applicants' estimate was \$12 per kilowatt per year for either coal or nuclear. ER, Table 9.3-2. Converting this to mills per kWh at the capacity factors used by the Staff the Board obtains costs of 2.7, 2.3 and 2.0 respectively.

135. The Board finds the differential between the combined operating and maintenance and fuel costs for nuclear and coal plants in this case is about 21 to 22 mills per kilowatt-hour. It is notable that although calculated on substantially different bases and with substantially different absolute costs, the differential costs from the Applicant's estimates and from the Staff's estimates are essentially identical. In arriving at this conclusion the Board used the midpoint of the Applicants' consultants' range for nuclear fuel costs (93 cents/MBtu) and assumed a 10% lower heat rate for coal than for nuclear. The differentials are relatively insensitive to changes in capacity factor. Moreover, varying nuclear fuel costs over the entire range of the Applicants' estimates (from 60 to 113 cents/MBtu) would only increase the differential costs by about 3 mills per kilowatt-hour or reduce them by about 2 mills. The assumption of no recycle would reduce the differential calculated from both the Staff's and Applicants' estimates by about one mill.

Contention 9A(3) Availability of Nuclear Fuel

136. This contention asserts that Applicants have erroneously assumed that nuclear fuel will be available for the lifetime of the plant. Extensive testimony

was provided by both the Staff and Applicants and was subject to protracted cross-examination. The principal witness for the Staff was John A. Patterson, a representative of the Division of Nuclear Fuel Cycle and Production of ERDA. Patterson Testimony.⁴⁷ The question of the adequacy of the uranium supply is, of course, a dual question—the availability of uranium and the demand for it. Although the preponderance of Mr. Patterson's testimony was directed to the first part of the question, he briefly addressed the demand side of the equation. Patterson Testimony at p. 9. Cross-examination on the latter led the Staff to provide two additional witnesses, one on the efficiency of use of uranium, Wood Testimony,⁴⁸ and one on the past and projected light-water reactor fuel performance. Houston Testimony.⁴⁹ Applicants' testimony on uranium availability was presented both by the RG&E witness, Fuierer Testimony at pp. 1-9, and their consultant. Geller Testimony at pp. 1-6. Applicants also presented testimony on the utilization of fuel and fuel performance. Additional Geller Testimony.⁵⁰ In addition, the Board requested that Applicants supply additional data on RG&E's actual fuel utilization experience at its operating Ginna plant. This was supplied. Fuierer Affidavit.⁵¹ Intervenor presented no direct evidence.

137. The Staff's witness presented a comprehensive analysis of uranium availability in the United States. His analysis was based on continuing studies carried out by ERDA and its predecessor, AEC, since the late 1940's. Since he has given essentially identical testimony in a number of other proceedings, the testimony will not be described in detail here.⁵² The witness testified that at a cut-off cost of \$30 per pound of U_3O_8 the reserves amount to 640,000 tons plus an additional 140,000 tons as a byproduct of phosphate and copper production. Probable potential resources, at the same cut-off cost, are 1,060,000 tons, possible potential resources are 1,270,000 tons and speculative potential resources and 590,000 tons. Patterson Testimony, Figure 2. Potential sources of

⁴⁷Supplemental Testimony of John A. Patterson on Contention 9AB and 9Cc, following Tr. 1195 (hereinafter "Patterson Testimony").

⁴⁸Supplemental Testimony from the NRC Staff by P. M. Wood on Contention 9A(3) and 9Cb, following Tr. 3386 (hereinafter "Wood Testimony").

⁴⁹Testimony Regarding Light-Water Reactor Fuel Performance Prepared by D. Houston, following Tr. 3331 (hereinafter "Houston Testimony").

⁵⁰Testimony of Leonard Geller on Fuel Management and Fuel Performance following Tr. 3306 (hereinafter "Additional Geller Testimony").

⁵¹Affidavit of Anton A. Fuierer Responding to Board Inquiry Regarding Fuel Burnup, following Tr. 3256 (hereinafter "Fuierer Affidavit").

⁵²For a complete summary of Mr. Patterson's testimony in another proceeding, including both availability and requirements, and additional background information, see Partial Initial Decision Authorizing Limited Work Authorization, *Kansas Gas and Electric Company and Kansas City Power & Light Company* (Wolf Creek Generating Station, Unit No. 1), 5 NRC 301 (1977), paragraphs 38-54, in which two of the present Board members participated.

additional amounts, in addition to new discoveries, include foreign uranium and higher cost domestic ore. *Id.* at pp. 15-22. The current domestic mining and milling industry has a production capacity of about 16,000 tons per year of U_3O_8 and has plans to expand this to 24,000 tons per year by 1978. ERDA considers it reasonable to anticipate a capacity of about 60,000 tons per year by the early 1990's. This capacity would support about 260,000 MWe of generating capacity without uranium or plutonium recycle and with 0.3% tails assay. With 0.2% tails and recycle, about double this capacity could be supported. *Id.* at pp. 8-9 and Figure 7. Looked at another way, the cumulative lifetime requirements of the supportable 260,000 MWe would be about equal to the 1.8 million tons of U_3O_8 in the reserve and probable potential reserve categories and about half of the total \$30 domestic resources. *Id.* at p. 9.

138. The Staff also presented its estimate of uranium requirements based on its use and modification of a computer code, NUFUEL, developed by ERDA. Again assuming 0.3% tails assay, NUFUEL forecast, for the 236 reactors currently operating, under construction, or planned, a requirement of 1,494,000 tons for the no recycle case and 1,240,000 tons for uranium (but not plutonium) recycle. Wood Testimony at pp. 2-3 and Table 6. The Staff then modified this by making provisions for process losses not included in the code and for possible uncertainties in design calculations. The net result of this was to increase the requirements to 1,577,000 tons and 1,328,000 tons for the two cases, respectively, *Id.* at p. 4, pp. 15-16 and p. 18. This is still well within the 1,840,000 tons of reserves and probable resources. *Id.* at p. 19 and Table 6. Additional testimony by the Staff was directed to the experience with fuel performance to date and the reasons for premature failure. Houston Testimony at pp. 1-7. The witness testified that these causes, (hydriding, pellet/clad interaction, and fuel densification with cladding collapse) have been largely eliminated and the Staff believes burnups of 33,000 MWD/MTU for a PWR such as this one should be readily achievable. Houston Testimony at p. 7. This burnup is approximately the same as the value of 32,600 MWD/MTU used in the NUFUEL code. Wood Testimony at p. 3.

139. Applicants' witness based his conclusions about uranium supply on the same ERDA data. Fuierer Testimony at pp. 1-5. He also testified that, although the Applicants do not currently have a uranium supply for Sterling, they have an active program underway for obtaining such a supply. *Id.* at pp. 10-13; Tr. 1642. Applicants' consultant also testified to uranium availability based on the ERDA data. Geller Testimony at pp. 1-6. He also testified on fuel utilization. Additional Geller Testimony. This testimony essentially confirmed the testimony cited above of Staff witnesses Wood and Houston. Finally, the Applicants' witness provided the information requested by the Board relating to fuel performance at the Ginna plant. Fuierer Affidavit. His evidence indicated that the weighted design burnup for the fuel elements in the core currently or in the past

(excluding, at the Board's direction, the initial core) is 28,445 MWD/MTU and that the currently planned burnup of these elements is a weighted average of 27,382 MWD/MTU, a deficit of 3.8%. *Id.* at pp. 5-6.

140. Based on the testimony described above, the Board finds that nuclear fuel will be available for the life of the plant.

Contention 9A(4) Capacity Factors

141. The Staff and the Applicants differed in their approach on this subject and their conclusion as to the appropriate capacity factor (absolute performance level) to use for the evaluation. However, both agreed that the same capacity factor should be used in comparing nuclear and coal plants. The Staff is of the view that both coal and nuclear should be evaluated at an assumed capacity factor of 60%. Tr. 2200. Applicants, on the other hand, while agreeing that both energy sources should be evaluated at the same capacity factor, urge that the appropriate capacity for both is 75%. McCoy Testimony at p. 7. The Staff's analysis of nuclear plants is based primarily on a statistical evaluation of historical capacity factor data based on the assumption that "future performance, in particular performance of the future Sterling plant, will be consistent with past performance," Tr. 2206, without regard to the causes of poor performance in the past or the likelihood of changes in the future. The Applicants' analysis is based on a study of the causes of lost time, as a function of the time each plant has operated, and a projection of the trend of these causes throughout the life of the plant. The Board places more weight on this analysis because it believes that a study of causes of outage provides a sounder foundation than mere manipulation of numbers.

142. The Applicants point out that data published by the Edison Electric Institute covering 1965-1974 show an average availability factor of 73% and an average capacity factor of 58% for large fossil units (600 megawatts and over) and corresponding factors of 76% and 60% for nuclear units of all sizes. McCoy Testimony at p. 7. On this basis, they assert that the same capacity factor should be used for both types of plants. Their subsequent detailed analysis of nuclear plant history results in raising their estimate of predicted lifetime performance of nuclear plants and, although they do not specifically so assert, they apparently apply a similar increase to the future coal plant performance.

143. Applicants' basic nuclear analysis,⁵³ prepared by their consultants, is based on 18 of the 19⁵⁴ Westinghouse PWR's in commercial operation in the

⁵³ Report on Nuclear Plant Operating Statistics, attached to McCoy Testimony following Tr. 236 (hereinafter "Stoller Study").

⁵⁴ The 19th, Yankee Rowe, is omitted because it is about 14 years old and substantially different from current designs. It has a lifetime availability factor of 83% and capacity factor of 72%. Stoller Study at p. 19.

U.S. on March 31, 1976. For each year after start of commercial operation, an attempt was made to identify the cause of each increment of loss in capacity and assign it to one of 12 categories. About 10% of the lost capacity was not identifiable as to cause and was put into a thirteenth category. Stoller Study at pp. 8-15. A table was prepared showing, for the composite 18 plants, the percentage of capacity lost from each cause category, and the total percentage lost for the life history of the plant up to the end of each year of commercial operation (16 of the plants had operated for more than one full year, seven for more than three years, and 2 for eight years or more). These data were continued through the first 8 years of operation and the results were projected to the end of 20 and 40 years. *Id.*, Table 2. The basis for projection was, in general, the average performance in the fourth through eighth years. Tr. 1995. The total of the lost capacity in each category was then totalled to show the overall projection. The totals show that lost capacity averaged 40.3% during the first year of operation, 36.7% over the first two years, and 33.7, 30.6, 29.8, 31.9, 29.3 and 27.6% over the first three through eight years, respectively.⁵⁵ The projected average for the first 20 years is 25.5% and for the 40 years is 24.8%, leading to projected capacity factors of 74.5% and 75.2%, respectively.

144. The Stoller Study asserts that they expect future plants to avoid many of the problems that have occurred at existing plants, but, with respect to Sterling, focus on two—use of volatile water chemistry and use of a GE turbine. The study predicts that these two changes will eliminate capacity factor losses of 2.0% and 5%, respectively, resulting in an average lifetime capacity factor of about 81%. Stoller Study at pp. 15-17. The study also looks at the seven Westinghouse plants that have over three years of commercial operation and shows that if the capacity losses attributable to turbine blade problems at three plants and steam generator tube problems at two plants (attributed to use of phosphate water treatment) were not considered, the average capacity factor would have been 81.8%. *Id.* at pp. 18-19. The study also considers aging problems and shows that Yankee Rowe performance has been better in the last three years than the 14-1/2 year lifetime average, and that Connecticut Yankee and San Onofre, each of which had operated for 8-1/4 years had capacity factors of 85.8% and 84.9%, respectively, for 1974-1975 compared to lifetime capacity factors of 76.5% and 72.0%. From these data, the study concludes that high capacity factors should be maintained well beyond 10 years of operation. *Id.* at pp. 19-20. The study also considers effects of size and vintage, concluding that on the average larger plants (820-1100 MW) have performed more poorly than smaller (450-700 MW) plants early in life (about 8% during the first 3 years) and that although older large plants started out much worse than the smaller plants,

⁵⁵ Some of the numbers appearing in the table in the record are corrected at Tr. 2166-2167.

they are improving and approaching the smaller plants, while the two more recent large plants have a first-year average about equal to that of the smaller plants. *Id.* at pp. 21-25. The study concludes that the long-term performance of new larger Westinghouse plants should be comparable to that of the smaller Westinghouse plants and that the composite of all plants is the best available measure of the performance of both large and small plants. *Id.* at p. 26. On this basis, the Applicants' witness concludes that 75% is the appropriate capacity factor to use for Sterling. McCoy Testimony at p. 10.

145. The Staff's statistical analyses were done in two stages. First, a selected group of data was analyzed to determine the primary possible sources of variation, then a final analysis was made using "all the data available." Easterling Testimony⁵⁶ at pp. 6-7, 13. The data base, from NRC and FPC records, included coal-fired plants in which all units have a nameplate rating of at least 500 MW and nuclear units of 500 MW or larger. *Id.* at p. 6. The data bases for the initial analyses were subsets of these data, but all were included in the final analyses. For the nuclear plants, boiling water reactors and non-Westinghouse PWR's were included in the analyses, although some studies were made excluding certain of these plants. *Id.* at pp. 7-32. The technique used places equal weight on each year of operation. This strongly biases the results as a consequence of the predominance of early operating history information in the data base. As the Stoller Study has shown, these early years, on the average, give consistently lower capacity factors than subsequent years. In addition, the final results are simply indicators of past history and do not have the attribute that the Stoller Study results have of predicting future capability factors on the basis of changes that take place during the operating life of the plant. The results of the Staff analysis are predictions of a capacity factor for coal plants about $59 \pm 19\%$ and for nuclear plants of $57 \pm 14\%$ based on design ratings *Id.* at pp. 15 and 24; Tr. 2199-2200. The Staff statistical witness agreed that both numbers could reasonably be rounded to 60%, the value used in the Staff cost calculations. Tr. 2200. He also stated that there was no statistical basis to assume that the capacity factors of the nuclear and coal units would differ. Easterling Testimony at p. 5.

146. The contention also alleges that the cost calculation is erroneous because the cost of replacement power to supply the required power at varying capacity factors for both nuclear and coal is not considered. Whether this part of the contention should be interpreted to mean the case where the two capacity factors varied together or where one varied with respect to the other was disputed by the parties. Tr. 1938-1942, 1945, 2066-2074, 2080-2098, 2102-2115. The Board determined to hear testimony relating to both interpreta-

⁵⁶Supplemental Testimony of Robert G. Easterling on Contentions 9A(4) and 9Cd, following Tr. 2198 (hereinafter "Easterling Testimony").

tions. Tr. 2114-2115. With respect to the first case—where the capacity factors of both types of plants vary to the same extent—it is clear that, as the Staff witness testified, Tr. 2398, if replacement power had to be purchased (in equal quantities for either type of plant), the mills per kilowatt-hour cost differential between the two types would decrease. This process, however, could only reduce the difference; it could never change the situation from favoring one type to favoring the other.⁵⁷ With respect to the second case—where the capacity factor of the nuclear plant was less than anticipated but the capacity factor of the coal plant remained unchanged—the cost of replacement power, if included, would change the nuclear capacity factor at which the cost (mills/kWh) of power from the two plants would be equal (the “break-even point”). The Applicants’ witness testified that with the coal plant operating at a 75% capacity factor the break-even point for the nuclear plant would be a capacity factor of 40%. This, of course, did not include any cost for replacement power. Tr. 2073-2075. The witness also testified to the effect of including the cost of replacement power. He stated that the cost would range from 32 to 68 mills per kilowatt-hour. Tr. 2139. The lower figure is a system weighted average cost and the higher is a cost for power from gas turbines (both are 1984 costs). Tr. 2160. Using these costs for replacement power would change the break-even points to 30.6% and 56.4%, respectively. Tr. 2139-2140, 2160-2161.

147. The Intervenor argues that the Staff’s statistical witness’ conclusion that the capacity factor for nuclear plants above 800 MW in size will be the same as for an 800 MW plant is not supported by his data and that his choice of 800 MW as the limit to his power-capacity factor equation was arbitrary. The Staff testimony shows that extrapolating the decrease in capacity factor beyond 800 MW tends to underestimate the historic data (primarily from non-Westinghouse reactors) and that the only two Westinghouse plants tending to support the continued decrease were Zion 1 and Zion 2, which operated at about 45% during their first year. Easterling Testimony at pp. 4-5. The witness pointed out, however, that these two units were restricted by license to 84% of design power. *Id.* at p. 4. Correcting for this would increase the capacity factor to about 54%, consistent with the witness’ prediction. We believe, based on the record, that the Staff position is a reasonable one. Intervenor further argue, with respect to the Applicants’ consultants’ study, that the data base, as it relates to plants having over three years of operation is small. Applicants do not deny this. In fact, the witness stated that more data would be desirable. Tr. 1982. Nonetheless, Applicants used all of the available data and in the Board’s view they support the

⁵⁷Further, although not the subject of testimony, calculations by the Board demonstrate that the amount of reduction (in mills/kWh) is independent of the cost of the replacement power. For example, if the amount of replacement power is equal to the amount produced by the plant, whatever the cost of replacement power, the differential will be cut in half, whatever its size and direction.

Applicants' conclusions. An additional argument of Intervenor is that the Stoller Study used "Average Maximum Power" (AMP) for calculating capacity factors rather than design power, a difference on the average of 8.3%. The witness identified a licensing restriction on three plants as being responsible for 5.2 of this 8.3% difference, stating that this restriction was the result of their being first-of-a-kind plants and stated that he expected the limitations to be removed as soon as more operating experience has been gained.⁵⁸ Neither this difference nor the ones accounting for the remainder of the differential, Stoller Study at 29, are expected to apply to Sterling. The Board finds that use of AMP is appropriate in this case.

148. In Proposed Finding 2 Intervenor asserts that the conclusion by Applicants and Staff that nuclear and coal plants will have the same capacity factors is unreasonable. The Board has reviewed the record and finds that the proposition is adequately supported. The Board notes that Intervenor cites the Staff witness' affirmative response on cross-examination to a question as to whether it was possible that a coal plant at Sterling would perform at 75% and a nuclear plant at 45%, Tr. 2266,⁵⁹ without citing his affirmative response a few minutes later to a question on redirect of whether it was equally possible for the opposite situation to exist. Tr. 2275.

149. Intervenor's Proposed Findings 3, 4 and 5 deal with the replacement power cost aspect of the contention and are dealt with in our discussion above.

150. The Board cannot completely accept the 75% capacity factor set out in the contention. The Board finds that the Staff's estimate of 60% is low because of the biases set forth in our earlier discussion. On the other hand, the Board finds that the Applicants' estimate of 75%, based on their adjusted experience value of 80-81% reduced by 5-6% to account for possible effects that could not be taken into account quantitatively, is at the upper end of the probable range. Balancing all of the evidence in the record, the Board finds that the capacity factor is most likely to be in the range of 65% to 75%. We further find that, although the Applicants did not take account of cost of replacement power in their analysis, it is not a significant factor in the comparison of coal and nuclear costs.

Contention 9A(5) Capital Cost Escalation Rate

151. Applicants' witness has testified that the same escalation rate for coal and nuclear plants is appropriate because the mix of materials, equipment and field labor in the total plant cost is about the same for both types of plants. The

⁵⁸The Board takes notice of an amendment to the Zion licenses on June 25, 1976, removing the restriction. 41 *Fed. Reg.* 30220.

⁵⁹Incorrectly cited in Intervenor's Proposed Findings as Tr. 2246.

figure of 7% is based on their architect-engineer's judgment supported by monitoring of various cost indices. McCoy Testimony at pp. 5-6. The Staff witness testified that the Staff had examined escalation rates which have occurred in New York in 1961-1975 and found that site labor escalated at 7.5%, site materials at 5.3% for nuclear and 5.9% for fossil and purchased equipment at 6%. It expects that these long-term trends will resume, rather than the very high rates of recent years. Nash Testimony at p. 10. Thus the Staff believes, and the Board agrees, that 7% is a reasonable rate to use to forecast capital cost escalation.

Contention 9A(6) Availability of Enrichment and Reprocessing Facilities

152. The Applicants have a contract with ERDA for enrichment for the life of the plant. Fuierer Testimony at p. 13; Geller Testimony at p. 15. The supply of enrichment services under this contract is not dependent on new enrichment capacity. *Ibid.* This is not the situation as far as reprocessing facilities are concerned. No reprocessing facilities are presently in operation in the U.S. Although several have been built or are planned, the issue of whether plutonium recycle will be permitted, presently before the Commission, makes the timetable for their operation uncertain. *Id.* at pp. 17-18. In the meantime, Sterling will have onsite storage facilities adequate until 1990. *Id.* at p. 18. Applicants and Staff have taken the possibility of no reprocessing in the long term into account by examining the "throw-away" fuel cycle. As previously stated, Applicants estimate that this will add seven cents per million Btu to the fuel costs, Geller Testimony at p. 19, and the Staff estimates an increase of 8.8% in fuel costs. Nash Testimony at p. 11. These two values are about equivalent and in the view of the Board have a small effect on cost comparisons.

Contention 9B(1) Economic Costs of Routine and Accidental Radiation Releases

153. The Applicant and Staff have calculated radiation doses to the general public during normal operation of Sterling. ER at §5.3; FES at §5.4. The Staff calculated that the total body and thyroid doses to the population within 50 miles of the Sterling plant are 2.4 man-rem/year and 8.0 man-thyroid-rem/year, respectively. For the U.S. population, the respective values are 18 man-rem/year and 25 man-rem-thyroid-rem/year. By comparison, the population exposure due to Sterling operation is an extremely small fraction of the dose that the U. S. population normally receives as a result of natural background radiation. Congel Testimony.⁶⁰ The Staff converted these doses to dollar estimates for inclusion

⁶⁰ Testimony of Frank J. Congel on Contentions 9B(1), 13B, 17, following Tr. 3452 (hereinafter "Congel Testimony").

in the cost-benefit determination by using cost estimates of \$1000 per man-rem and \$1000 per man-thyroid developed in the NRC rulemaking proceeding concerning Appendix I. On this basis the cost associated with operation of Sterling is approximately \$10,000 per year to the population within 50 miles of the plant. *Id.* at p. 3. The same costs to the U. S. population were estimated to be approximately \$45,000 per year. *Ibid.* Thus, the increment in cost associated with operation of Sterling is negligible. Intervenor properly urge that the 450 man-rem per year dose to workers (Tr. 3465) should also be included in the cost-benefit analysis. The 450 man-rem at \$1000 per man-rem would add a total of \$450,000 calculated on the same basis as for doses to the population. Tr. 3483-84. However, this method of accounting for such doses in economic terms would be extremely conservative, more so than for the population at large, because workers are carefully controlled, monitored and selected. Tr. 3466-67. In any event, the Board includes this cost, as proposed in Intervenor's Proposed Finding 13, in its cost-benefit balance.

154. The Applicants and Staff have also estimated realistic radiation doses associated with postulated accidents. FES at §7.1; ER at §7.1; Mecredy Contention 9B Testimony⁶¹ at p. 1. Such accidents, when considered in conjunction with their low probability of occurrence are anticipated to increase costs to the surrounding population by only a small fraction in comparison to natural background radiation. FES at §7.1. A Staff witness estimated that, on the \$1000 per man-rem basis, the environmental costs of the accidents described in the FES would vary from less than \$100 to a maximum of \$520,000. Assuming that the probability of the latter accident (a major pipe break) is roughly 10^{-4} per year, the witness assessed the annual cost at \$52. Soffer⁶² Testimony at p. 4. Applicants made no similar cost estimate. Mecredy Contention 9B Testimony at p. 1. The Staff concluded that the risks associated with potential accidents are sufficiently low that they need not be considered as a significant factor in the cost-benefit determination for the Sterling project. Soffer Testimony at p. 4; Tr. 2994. The Applicants reached a similar conclusion. Mecredy Contention 9B Testimony at p. 2. The Intervenor argue (Proposed Findings 6 and 7) that the entire \$520,000 should be included in the cost-benefit analysis. The Board does not agree. The Intervenor also assert (Proposed Findings 10 and 11) that the Staff has not calculated exposure to workers during accidents postulated in the Environmental Report, implying that such exposures should be included in the cost-benefit determination. The Board, following the above line of reasoning, does not agree with the implication.

155. The Board finds that the economic costs of routine and accidental

⁶¹Testimony of Dr. Robert C. Mecredy on Intervenor's Contention 9B, following Tr. 366 (hereinafter "Mecredy Contention 9B Testimony").

⁶²See n. 35, *supra*.

releases of radiation from the Sterling plant have been adequately determined. The record shows that these economic costs are insignificant.

Contention 9B(2) Social and Economic Cost Emergency Planning

156. Applicants' evidence on the economic effects of emergency planning included a discussion of efforts of state and local agencies in this area. Mecredy Contention 9B Testimony at pp. 2-6. The principal state agency identified was the Bureau of Radiological Health of the New York State Department of Health and locally, the Cayuga County Office of Disaster Preparedness. *Id.* at p. 2. The Bureau of Radiological Health has prepared and issued a general radiation emergency plan which includes the activities that would be applicable to a radiation emergency at a nuclear facility. In addition to the plan, the Bureau prepares "specific operating procedures" for a specific operating nuclear facility. *Ibid.* In the Applicants' opinion, expenditures of the state would be minimal for development of emergency preparedness programs for new nuclear facilities since they would be developed within the existing framework of personnel now employed by the state. *Id.* at p. 3. Impacts on local civil and health forces including training and equipping firefighting, police, ambulance and medical personnel are considered minimal. *Id.* at p. 4. Other services were identified including the Coast Guard and hospital facilities. Applicants' witness also concluded that the socioeconomic cost associated with emergency planning would be extremely small although he was unable to place a meaningful figure on these costs. *Id.* at p. 6.

157. The basic thesis presented by the Staff witness in attempting to assess the economic costs associated with emergency planning was that this planning is supplemental to other planning that state and local agencies do to cope with natural or manmade disasters. He indicated, for example, that there is no special training required for traffic control simply because the emergency involves radiation instead of chlorine or other toxic chemical release—the fundamentals of traffic control are the same in either case. Collins Testimony⁶³ at p. 1. The only expenses that should be attributed to the development of radiological portions of an emergency plan in support of fixed nuclear facilities are those that are unique to radiological accidents, such as radiological assessment of accident consequences. *Ibid.* Economic costs for this radiological emergency response support by states and their local governments are not significant in view of the fact that a variety of emergency services agencies are already in place, and for most communities, these represent an existing sizeable investment in terms of personnel, planning and resources. Although some special planning and

⁶³ Supplemental Testimony of Harold Edward Collins, Contention 9B(2), following Tr. 2784 (hereinafter "Collins Testimony").

preparedness resources might be needed for some individual states or local governments involved, the question is not so much a matter of economic cost as it is of organizing existing personnel and resources into an effective emergency response posture. *Id.* at p. 2.

158. Although the contention does not directly involve the adequacy of emergency planning, the Staff reviewed the Applicants' emergency planning as part of its normal safety review. For convenience, we will cover the entire matter here. The SER sets forth RG&E's organizational structure for dealing with emergencies. It also identifies the outside organizations that would be involved in coping with emergencies and the communications systems provided for contact with them. In addition the Staff performed an analysis to confirm the practicability of taking protective measure, including evacuation of resident and transient population, within and beyond the site boundary during the expected lifetime of the plant, and appropriate criteria have been identified for the design of an acceptable emergency plan. The Staff concluded that RG&E's preliminary plans for coping with emergencies meet the requirements of Part II of Appendix E to 10 CFR Part 50 and are acceptable. SER at 13-3-13.4.

159. A key part in coping with emergencies would be played by the Cayuga County Office of Emergency Preparedness. The Staff's evaluation of the existing Cayuga County emergency planning and preparedness capability was based on an evaluation of its general emergency planning and preparedness capability as reported by the Federal Defense Civil Preparedness Agency, Region I, and the New York State Office of Disaster Preparedness Inspection, January 29, 1975. Collins Testimony at p. 7; Staff Exhibit 3. The Staff witness' opinion based on this report was that, although at the time of its preparation certain needed improvements in various areas were identified, Cayuga County's general emergency preparedness organization and resources can effectively become a part of the local government radiological emergency response plan in preparedness capability. Some additional radiological emergency planning training for involved personnel may be required and this can be provided by Cayuga County upon request. Collins Testimony at pp. 7-8. A similar analysis of adjoining counties, Oswego and Wayne, was also presented. *Id.* at pp. 8-9. All entities involved, the various counties and the state, will incur some cost in terms of manpower, time, energy, or perhaps money in preparing an emergency plan for the Sterling facility. Tr. 2797. For example, Cayuga County will need to prepare an emergency planning document and eliminate existing deficiencies in its communication system. Tr. 2867. The State of New York may also have to make changes in its emergency plan. None of these changes were identified as having significant cost attached to them. Tr. 2816, 2823, 2825. It would take very little money to develop a specific plan for the Sterling site but some time and manpower would be required for Civil defense authorities to develop an evacuation plan. Tr. 2826.

160. The Board finds that the Applicants have established adequate emergency planning programs for this stage of the Sterling project and that the social and economic costs of emergency planning to the community around Sterling (including state and local entities) will not be significant.

Contention 9B(3) Effects on Sterling Area of Decommissioned Plant

161. With respect to land values, a Staff witness testified that there is no evidence to suggest that land values around the site will decrease during the decommissioning period. The witness cited a recent report indicating that in the operating stage of two northeastern reactors, land values around the site have increased. Mattingly 9B(3) Testimony⁶⁴ at p. 1; Tr. 420. The Applicants' witness also testified that he had no reason to believe that land values would decrease. Mecredy Contention 9B Testimony at p. 6. He also testified that land values around the RG&E Ginna plant are increasing and that he thought the impact of a decommissioned plant would be less than that of an operating plant. Tr. 371, 373.

162. The Staff testified that after decommissioning it was unlikely that county roads would be heavily used in connection with the plant and that it was unlikely that excessive costs would accrue. Tr. 415-416; Mattingly 9B(3) Testimony at p. 2. The Staff also testified that there is no evidence to suggest that the decommissioning of a facility will cause persons living near the plant to relocate. *Ibid.* The Applicants' witness testified to the same effect. Mecredy Contention 9B Testimony at p. 7.

163. With respect to ecological effects of decommissioning, the Applicants' witness testified that radiation doses should be a very small fraction of those expected during operation and far below 10 CFR Part 20 standards and, thus, the plant would have a negligible ecological effect. *Ibid.*; Tr. 368-371. The Staff witness also testified that it was unlikely that there would be a significant radiological impact. Mattingly 9B(3) Testimony at p. 2.

164. Both Applicants and Staff have considered and compared the different types of decommissioning. McCoy Testimony at pp. 1-5; Scaletti 9A Testimony. One of the Staff witnesses testified that it was unlikely that any of the three procedures would have a significant impact. Mattingly 9B(3) Testimony at p. 2.

165. The Board finds that the Staff and Applicants have adequately considered the social and ecological effects of the various methods of decommissioning on the cost-benefit balance and that these effects are insignificant.

Contention 9B(5) Effects of Premature Construction

166. The Applicants' witness on load projections testified that the Appli-

⁶⁴Testimony of Thomas J. Mattingly, Jr. on Contention 9B(3), following Tr. 377 (hereinafter "Mattingly 9B(3) Testimony").

cants can experience a one and a half year slip in load growth and still show an economic advantage in installing Sterling in 1984. Laniak Testimony at p. 6. During subsequent oral testimony he expanded on this statement. He stated that if the plant was placed in service in 1984 and the load at that time was only the load predicted for 1982 and that the load continued to lag two years behind predicted values, the saving involved over the life of the plant would be \$262 million. Tr. 566-567. This estimate includes a charge to the system for capital costs of Sterling. Tr. 704-705, 711. The Staff made a different sort of calculation, calculating the single-year (1984) saving if Sterling was used instead of other power. This estimate was based on a 10 mill/kWh nuclear fuel cost, 35 mill/kWh replacement power cost and a 60% capacity factor. The Staff's estimated annual fuel saving was \$150 million. This estimate does not include capital cost for either nuclear or replacement power. Nash Testimony at p. 12. The Board finds some economic benefit would result from the addition of Sterling earlier than needed. However, because of our finding with respect to Contention 1 that the plant is needed, we have not found it necessary to rely upon this fact in making our other determinations.

Contention 9C

167. Contention 9C asserts that the claim of the Applicants that the Sterling site is best for them from an economic standpoint is based on six incorrect assumptions. Five of these have been discussed above in connection with Contention 9A(2) through 9A(6). The remaining assumption is discussed below. The contention also asserts that Applicants have failed to consider the cost of replacement power. That also has been discussed above in connection with Contention 9A(4).

168. Contention 9Cc asserts that the assumptions that the proposed 765 kV transmission line will be approved, that it will go through Sterling and that transmission costs will be 2.0-2.5 or 2.7-3.2 mills per kilowatt-hour are incorrect. Dealing first with the question of transmission costs, the Applicants have, since the preparation of the stipulated contentions, revised the costs originally appearing in the Environmental Report. The ER now estimates transmission to Central Hudson to cost 3.5-4.0 mills per kWh and estimates transmission to Orange and Rockland to cost 4.2-4.7 mills per kWh. ER at 9.2-17. During oral testimony, the Applicants' witness increased the latter cost for Orange and Rockland to 5-5.5 mills. Tr. 1141. The Staff estimated the costs based on escalated 1970 FPC data and concluded that they would be 2.6 and 4.1 mills per kWh for 765- and 345-kV transmission, respectively. Supplemental Testimony of Arvin S. Quist on Contention 9Cc, following Tr. 1296. The Staff's cost-benefit witness testified that these costs do not change the conclusion that a nuclear plant at Sterling has a lower cost than other alternatives. Nash Testimony at p. 13. With respect to location of the transmission line, cost changes for a few additional miles of line

if the line does not go through the Sterling site are trivial compared to the already calculated cost of transmitting power more than 200 miles to OR and CH. The difference for a 345 kV line in lieu of the 765 kV line has been discussed above. The Board finds that the several questions raised in this contention have no significant effect on our conclusions.

169. In summary, the Board has examined the portions of the record dealing with each of the assertions of Contention 9 and has found nothing to disturb the conclusion that a nuclear plant at Sterling is the economic choice.

H. Contention 10

The Applicant has inadequately considered the following alternatives:

- A. Large-scale wind machines on Lake Ontario for supply of power to RG&E and Niagara Mohawk and sited on the Atlantic Ocean for supply of power to Orange and Rockland and Central Hudson.
- B. Burning of garbage in conjunction with coal.
- C. Conservation of Energy. Conservation potential should be assessed to determine if the needed capacity could be supplied by a lowering of demand by the following means which are offered as examples. Estimates should be made of (1) a number of lower efficiency appliances which will be replaced by higher efficiency appliances by residential, industrial and commercial customers; (2) the effects of better insulation; (3) lower heating settings and higher air conditioning settings; and (4) use of thermal drapes and solid-state TV's.
- D. Reduction of peak loads by rate structure changes (time-of-day metering, inversion of rates, abolition of master metering), load shedding, informative appeals to consumers and interruptible supply contracts.
- E. Supplying power, if needed, by purchase of power from other utilities.

170. Intervenors have contended that the use of large-scale wind machines on Lake Ontario and on the Atlantic Ocean has not been adequately considered as an alternative to the proposed action. The alternative of wind power has been examined at length in the Environmental Report, the Final Environmental Statement, and in testimony by the witness of the Staff. ER at §9.2.1.9; FES at 9-5; McLain Testimony.⁶⁵ The Staff witness testified that, although wind power has long been utilized on a local scale to provide mechanical and electrical power, such systems are normally used to satisfy modest power requirements in remote areas and their cost is presently too high to be competitive with utility-supplied power in most situations. McLain Testimony at p. 1. Aside from cost considera-

⁶⁵ Supplemental Testimony of Howard A. McLain on Contention 10A, following Tr. 814 (hereinafter "McLain Testimony").

tions, there are technological and aesthetic considerations which must be addressed. Because of the intermittent nature of the wind, wind machines alone are not a reliable source of baseload power. *Id.* at p. 7. It is presently anticipated that wind energy conversion systems will have to be coupled with storage facilities in order to prove feasibility for baseload purposes. The use of such energy storage devices in conjunction with wind-powered generators is presently uncertain because of the high costs and relatively short lives of such devices. *Id.* at pp. 8-9. As to aesthetic limitations, the replacement of power equal to the rated capacity of the Sterling Unit 1 would require 770 wind machines of 1.5 MW rated size. Because of the size of such units approximately 400 square miles would have to be utilized solely to provide a site for these units. These units will have a visual impact and could interfere with shipping. *Id.* at pp. 9-10. Because of limitations on large-scale experience with wind-powered generating units and the current state of the cost and technology of such units, the Board finds that wind energy is not a viable alternative for the Sterling plant.

171. Testimony on burning of garbage in conjunction with coal is also provided in the ER and the FES and in the testimony of a Staff witness. ER at 9.2.1.10; FES at 9-5; Quist Testimony.⁶⁶ The evidence provided by both Staff and Applicants shows that, although burning of garbage in a coal-fired plant is technically feasible to the extent of replacing 10% to 20% of the fuel, the economics do not differ significantly from the coal-fired alternative. ER at §9.2.1.10; Tr. 840. In addition, the Staff witness identified several technological and environmental problems, as well as legal and political problems, that have come to light in connection with existing and proposed small-scale refuse burning facilities that would need to be resolved before large-scale facility (*i.e.*, a few hundred megawatts or larger) could reasonably be planned. Quist Testimony at pp. 3-4. In view of all the circumstances, the Board finds that burning of garbage has been adequately considered and is not a reasonable substitute for the proposed plant.

172. We have previously described the consideration given to energy conservation in our ruling on Contention 1. Paragraph 79, *supra*. Although the Applicants have not prepared detailed estimates on all of the examples proposed by Intervenor, Tr. 582-583, 586, 594-595, 725-738, they assert that the effects of conservation are reflected in the reduced estimates of the rate of growth of consumption per average customer. Tr. 595. Again the Board finds that adequate consideration has been given to this matter.

173. Reduction of peak loads by the means suggested in part D of the contention has also been discussed in our ruling on Contention 1, paragraph 80, *supra*, and need not be further discussed here.

174. The Applicants have set out their plans for purchased power totalling

⁶⁶Testimony of Arvin S. Quist on Contention 10B, following Tr. 833 (hereinafter "Quist Testimony").

approximately 2300 MW in 1984. Joint Applicants-Intervenor Exhibit 1, Volume 2 at 190-191. Essentially all of this will come from the Power Authority of the State of New York (PASNY). *Ibid.* Their investigations indicate that additional power is not available for purchase either in- or out-of-state. ER at §9.1.2. The Staff has also considered the possibility of additional purchase of power and has concluded that this would not be a practical alternative. FES at §9.1.1.1; Spore Testimony at p. 15. The Staff points out that although the New York Power Pool gross reserve margin in 1984 appears to be about 35%, this is a most optimistic and perhaps unrealistic viewpoint, FES at §8.5.2, and that further purchases within the pool would not appear to be practical. Spore Testimony at p. 16; Tr. 806-808. The Board finds that adequate consideration has been given to purchase of additional power.

I. Contention 11

The site selection process is inadequate and the discussion in Section 9 of the ER is not sufficiently complete for proper development of appropriate alternatives as required by National Environmental Policy Act of 1969. The deficiencies are as follows:

- A. The four companies have failed to consider sites in the NMPC, OR, and CH service territories for a jointly utilized nuclear plant of the same general size and type as that proposed for the Sterling site. Such alternate site candidates should be examined to determine if any one would be clearly preferable to the Sterling site for location of the proposed plant.
- B. The process of selecting environmentally suitable sites should exclude consideration of population density. Applicant contributed too much benefit to low population considerations in its site selection process.

a. Alternate Sites in NMPC, OR, and CH Service Territories

175. Applicants, rather than asserting that no clearly preferable alternative site existed in any of the co-owners' territories, relied on their ER analysis, which emphasized the business wisdom of OR, CH and NMPC joining the ongoing SNUPPS project initiated by RG&E. ER at §§9.2.2.1.2, 9.2.2.3 and 9.2.2.4. OR and CH's participation followed examination by each of the utilities individually of sites in its territory but for smaller nuclear or fossil units than Sterling. ER at §§9.2.2.1.1, 9.2.2.2.2. NMPC joined later as a part of further capacity ownership exchanges in both fossil and nuclear units. ER at §9.2.2.4. That these arrangements have economic as well as environmental benefits because of the reduction in capacity additions made possible by the participation agreements was also urged. ER at §9.2.2.4. Additionally, the delay and expense

attendant to moving the plant to a new site in another service territory was emphasized. DeSeyn Contentions 11 and 12 Testimony⁶⁷ at p. 4.

176. The Board has examined the Staff's siting analysis which considered possible sites in the other service territories. The Staff in considering whether sites identified by OR and CH within their service areas might be better than the Sterling site for a large nuclear power station, examined Phase I of the Nuclear Power Siting Program of the New York State Atomic & Space Development Authority. FES at §9.1.2.2. The purpose of this statewide survey by the state agency was to identify regions in which large (1000 MWe or greater) nuclear stations could be located. This report identified seven areas within which the most suitable sites existed for nuclear power stations. The area on the Hudson River north of Poughkeepsie was not indicated to be suitable for development thereby eliminating from consideration the three prime sites in that area previously identified by CH. Two preferred sites identified by OR, Lovett and Bowline Point, on the Hudson River below Poughkeepsie are in suitable areas as defined by the New York State Nuclear Power Siting Program. Supplemental Testimony of Arvin S. Quist and Dino C. Scaletti on Contention 11A, following Tr. 1296, at p. 2. However, the Section 149B Report indicates that the Bowline and Lovett sites are not situated within the areas of the Hudson River recommended for power stations with once-through cooling. Further, both sites would be inadequate in size to accommodate 1150 megawatts of additional capacity. *Id.* at pp. 111, 113; Tr. 1329-1330. The Staff also examined various sites in NMPC's territory and concluded that they would either require extensive transmission lines or possibly closed-cycle cooling. One possible site was downgraded because of the uncertainty of the SNUPPS design being able to accommodate a plant designed to the higher seismic values that probably would be associated with the site. FES at §9.1.2.2. The Board finds that the Staff's general survey of sites in NMPC, OR, and CH's territories meets NEPA requirements.

b. Consideration of population density

177. RG&E's site selection process, which commenced in 1969, considered 26 sites and rated them on the basis of a number of factors including proximity to RG&E load center, adequacy of cooling water supply, topography, proximity to highway, railroad and transmission systems, property and plant costs, population density, and area land and water uses. All sites were subsequently reevaluated in greater depth. DeSeyn Contentions 11 and 12 Testimony at p. 1; FES at Table 9.2. Population density was obviously a consideration since the Commissions' siting criteria set forth in 10 CFR Part 100 mandate that these considera-

⁶⁷ Testimony of Robert J. DeSeyn on Intervenor's Contentions 11 and 12B following Tr. 868 (hereinafter "DeSeyn Contentions 11 and 12 Testimony").

tions be taken into account. Tr. 1006-1011. However, there is no indication that undue weight was accorded this factor. Supplemental Testimony of Dino C. Scaletti on Contention 11B(2), following Tr. 1296. Further, it has been a long-standing policy of the Commission to encourage siting in areas of relatively low population density in consideration of the Commission's responsibility related to reactor safety. *Id.* at p. 2. In the Staff's opinion, Applicants' low population consideration in the site selection process was proper. *Ibid.* The Board concurs.

178. The record does not support Proposed Finding 14 by Intervenor in which it is alleged that Applicants' consultants intended to bias the study against alternate sites.

J. Contention 12

Applicant's assertion that the Sterling site should be preferred over the alternative posed, Ginna, is in error because:

- A. The claim of all four participants that the Sterling site is best for them from an economic standpoint is based on the incorrect assumptions that the proposed 765 kV transmission line will be approved, that it will go through Sterling, and that the transmission costs would range from 2.0 and 3.2 mills per kWh. The 765 kV transmission line hearings are currently in recess while common hearings to examine assertions of health and safety problems concerning 765 kV transmission lines are held by the Public Service Commission of New York. These common hearings are scheduled to begin Phase 2 (cross of witnesses) in January 1976. The final approved line may go far south of the site. It may become a 345 kV line, thus increasing the loss of power and the cost of transmitting the electricity. The Applicants' contention that the Sterling site is superior to the Ginna site because a segment of the bulk power grid will pass through the site is thus also false. The site selection process failed to include closeness to load centers to reduce transmission power losses and costs to the ratepayers.
- B. The analysis of possible sites in Rochester Gas and Electric Corporation's territory is invalid because it has decided to postpone indefinitely the construction of two coal-fired plants at Sterling. It is clear, upon a careful reading of Appendix 9A of the Environmental Report, that Rochester rejected some sites for the nuclear facility because they could not also adequately handle coal facilities.
- C. The Applicant has not presented sufficient evidence to support its view that the aesthetic impact of the plant would be greater at Ginna than at Sterling. In addition, it has not evaluated the impact at the two sites from the standpoint of a virgin site versus an already "spoiled" site.
- D. The Applicants' conclusion is incorrect that the Sterling is superior to

the Ginna site since it is based on incorrect and incomplete evidence with respect to terrestrial ecology. This is particularly true as to the amount of hardwoods which will be cleared since information on this subject has varied.

a. Transmission Line Considerations

179. The greatest difference between the Ginna site and the Sterling site identified by Applicants and the Staff may be in transmission system requirements. ER at §9.3.16; FES at pp. 9-10 and 9-11. This difference assertedly will occur because a proposed 765 kV line is to cross the Sterling site, thereby necessitating only one mile of 765 kV generator lead in order to connect Sterling with the bulk power grid. FES at §4.1.2. The incremental cost of additional transmission at Ginna would be in excess of \$21,000,000. ER at §§9.3.16, 9.3.17, Table 9.3-1; FES at p. 9-10. Applicants urge that it is reasonable at this stage to rely on the assumption that the transmission line will be approved at the 765 kV level on a route passing through the Sterling site. The Board is reluctant to rest its analysis on that basis since it is obviously possible that the Intervenor may be correct in their assertions in Contention 12A and in their Proposed Finding 16. Certainly, it is possible that the line may be approved at a lower level than 765 kV (i.e., 345 kV) or on a route that goes substantially south of the site. It will not finally be known until the state has decided the matter.⁶⁸ The record contains sufficient information to ascertain that if the different route is selected, the stated cost differential between Sterling and Ginna for transmission lines would not occur.⁶⁹ Under this assumption, the economic preference accorded the Sterling site by the Applicants and Staff may not materialize.

b. Consideration of Coal-Fired Plants in Site Selection

180. Applicants' testimony indicates that only four sites which could not accommodate fossil units were determined to be inadequate. DeSeyn Contentions 11 and 12 Testimony at p. 3. However, this was not the reason for excluding these sites from further consideration. Two of the sites lacked sufficient water for either a 1000 MWe fossil or 1000 MWe nuclear unit and the other two were considered to be sufficiently close to the Clarendon-Linden geologic struc-

⁶⁸ The fact that the Public Service Commission has not acted is not a bar to going ahead since analysis of environmental and economic factors indicates that a decision on the acceptability of the Sterling site can be made independent of the PSC determination on the transmission line. See, *Southern California Edison Company* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-171, 7 AEC 37 (1974); ALAB-189, 7 AEC 410 (1974).

⁶⁹ The line from Ginna to the nearest substation is 17.6 miles. Tr. 1128-1129. The line from Sterling to the nearest substation capable of handling its output is 15 miles. Tr. 1128.

ture to create significant design, construction, and licensing problems for a nuclear plant from a seismic standpoint. *Ibid.* The Staff, in its review, concluded that potential sites were rejected for reasons pertinent to a nuclear facility and not solely because they could not adequately handle coal facilities. Supplemental Testimony of Arvin S. Quist on Contentions 12A and B following Tr. 1296 at p. 3. The Board concurs with the Staff that the sites were not improperly rejected as alleged by the contention.

c. Aesthetic Impacts

181. The contention asserts that the Applicant is wrong in concluding that the aesthetic impact of the plant would be greater at Ginna than at Sterling. Additionally, the complaint is raised that the evaluation of impacts at the two sites did not properly consider that Sterling is a virgin site and Ginna already has a power plant on it.

182. Applicants assert that the Ginna site would suffer much greater aesthetic impacts with the addition of a second unit because it would be quite visible at Ginna and, by comparison, much less conspicuous at Sterling where the terrain will reduce any visual impact of the facility. ER at §9.3.17. The Staff noted that the Ginna site is smaller and flatter, with less natural cover and that the rolling hills and vegetation around Sterling would reduce the visual impact of the plant from a landward direction. The two sites would be equivalent from a lake-oriented visual standpoint. FES at p. 9-10; Supplemental Testimony of Dino C. Scaletti on Contention 12C following Tr. 1196 at p. 1. The Intervenor's basic hypothesis is that the second unit at Ginna would blend with the first and thus provide less visual impact. Tr. 1041. The Board is of the opinion, considering the present plant at Ginna and the lesser visibility of a plant at Sterling, that the difference in the aesthetic impact between sites is slight. We thus treated them as essentially equal for purposes of our evaluation.

d. Terrestrial Impacts

183. Approximately 201 acres of the 2800-acre Sterling site will be affected by construction. Hess Testimony⁷⁰ at p. 3. Construction activities will affect approximately 108 acres of man-dominated land and 99 acres of natural communities.⁷¹ The Ginna site has a larger percentage of land in a nonnatural condition than Sterling (77% versus 57%). Salk Contention 12D Testimony⁷² at

⁷⁰ See n. 21, *supra*.

⁷¹ The difference between the 255-acre figure reported in the FES at §4.3.1.1 and the 207 acres reported in Table 4.2, page 4-4, is attributable to the different techniques used for the Table. Mr. Hess, at page 3 of his testimony, indicates the correct acreage is 201 acres.

⁷² Supplemental Testimony of Martha S. Salk on Contention 12D, following Tr. 1296 (hereinafter "Salk Contention 12D Testimony"), at p. 1.

p. 1. At Ginna, 150 acres would have to be cleared for a plant and associated facilities. *Ibid.*

184. Thirty-three acres of mature beech maple forests will be cleared at Sterling, which amounts to a loss of 64% of the remaining mature beech maple forests on the site. At Ginna, 8 to 15 acres of intermediate-to-mature hardwoods would be cleared. *Ibid.*; Tr. 937-938. Therefore, in terms of the number of acres of natural communities to be cleared, the impact would be less at Ginna than at Sterling. However, the habitats which will be cleared at Sterling are not unique to the region since mature hardwoods are relatively common in the area along the southern shore of Lake Ontario. Salk Contention 12D Testimony at p. 1; Tr. 1352-1353.

185. A 179-acre wooded swamp exists on the Sterling site and about one acre of it will be altered due to construction. FES at p. 4-4. Applicant will undertake proper mitigative action to reduce potential impacts on the swamp that could result from increased runoff and sediment loading due to erosion. Hess Testimony at p. 2. The Board has examined Applicants' proposed mitigative program. Based on these commitments and the small reduction in area, the Board concurs with the Staff's assessment that the wooded swamp (wetland habitat) onsite will be minimally affected by the power plant construction and operation. FES at pp. 4-4, 9-10; Tr. 970-971. Construction activities will also directly affect terrestrial biota presently inhabiting the site. None of the species identified will suffer unacceptable impacts. FES at p. 4-5. There are no unique faunal species on the Sterling site and no threatened species use the site preferentially. Hess Testimony at p. 2.

186. The Board feels that, on balance, there will be less terrestrial impacts (both qualitatively and quantitatively) at Ginna because of the existing nature of that site.⁷³

187. The Staff concluded that either Sterling or Ginna would be acceptable, Salk Contention 12D Testimony at p. 2; FES at p. 9-11,⁷⁴ and that the Ginna alternative does not present, overall, a more desirable site from an environmental viewpoint than the Sterling site. The Board finds that, although comparison of the two sites is quite similar, a small advantage must be accorded the Ginna site on environmental considerations.

e. Response to Board Inquiry

188. In addition to concerns raised by the contention, the Board sought an

⁷³In terms of terrestrial biology, Applicants' site selection consultant had rated Ginna over Sterling. ER, Appendix 9A, page 15.

⁷⁴The Atomic and Space Development Authority of the State of New York concluded in an assessment of sites that Sterling is a prime site for nuclear power generating facilities. FES at p. 9-10.

economic assessment by Applicant of potential savings realizable by adding a second unit at the already developed Ginna site. Tr. 130. Applicants identified a range of savings attributable to operation of two units at Ginna for an overlapping period of 25 years but concluded that there would not be any savings in the construction phase.⁷⁵ Tr. 1397. After intensive cross-examination on this subject the Board requested the Applicants to submit a more detailed assessment of cost differentials between Ginna and Sterling. Tr. 1502-04. The Applicants' second evaluation considered preconstruction cost (environmental studies, land acquisition); construction cost, including transmission; operating cost and de-commissioning cost. In light of these factors, Applicants estimated that siting the plant at Ginna would result in additional costs of approximately \$33 million in 1984 dollars. Applicants' Response⁷⁶ at p. 24. The second evaluation included \$2.2 million in land acquisition cost necessary to site a second nuclear unit at Ginna. The \$33 million figure includes approximately \$29 million in transmission-related cost (\$21 million for the line plus about \$8 million for substation and right-of-way) for connecting Ginna with the bulk power grid. However, the \$33 million figure assumes transferability of the SNUPPS concept with its engineering design from Sterling to Ginna. Tr. 2447-2451. This may be optimistic with possible redesign efforts required. Assuming that the SNUPPS concept is transferable to Ginna, additional environmental and engineering costs would amount to about \$11-\$15 million. Applicants' Response at p. 20.

189. One aspect of the analysis warrants particular comment. Applicants' analysis as described above does not attribute any land costs at Sterling to the Sterling Nuclear Plant. This was on the theory that the land was already purchased for the ultimate purpose of a multi-unit generation site and that the first application for generating capacity at the site was for two coal-fired units. Since then, plans for the fossil units have been indefinitely postponed. In response to Board questions whether land costs should be attributed to the Sterling plant, Applicant has presented an alternate means of analysis, involving allocating a portion of the cost of each site, according to the proportion of the total megawatt potential of each site which would be used up by the respective plants. This approach would reduce the land acquisition cost advantage of Sterling from \$2,200,000 to \$1,100,000. Applicants' Response at pp. 3-4; Tr. 2686-2690. The Board does not find this reasonable, and in agreement with Intervenor's Proposed Finding 15, attributes the total cost of Sterling land, which reduces the comparison between sites from \$33 million to \$20.4 million.

190. We have previously indicated in paragraph 179, *supra*, that the transmission cost differential between Sterling and Ginna may not materialize. Also, the record is somewhat confusing on the issue of whether differences in substation

⁷⁵The document setting forth the estimated operational savings follows Tr. 1396.

⁷⁶Applicant's Response to Board Inquiry on Cost Review, following Tr. 2445 (hereinafter "Applicant's Response").

costs favor the Sterling site. Tr. 1422, 2531. We are, therefore, eliminating from our present comparison the entire transmission-related costs of \$29 million. On this basis, there is about an \$8-\$9 million dollar differential in favor of Ginna. However, as mentioned in paragraph 188, *supra*, some reengineering, additional studies, etc., would be required at an estimated cost of \$11-\$15 million. In view of the uncertainties in this analysis, the Staff asserts and the Board agrees that it seems fair to rate the two sites as essentially economically equal.

191. Intervenors have raised the concern of committing a "virgin" site (Sterling) to power generation when an already so-called "spoiled" (Ginna) site is available. The Board shares this concern especially in view of the fact that both sites are under the same ownership and are only a distance of about 35 miles apart. In addition, although the differences are small, the environmental comparison appears to favor slightly the Ginna site, whereas the economic comparison may be about equal. Of greater importance from an environmental viewpoint is the possibility of an unnecessary commitment of a partially forested, partially cultivated, lake-front site. Although, 1984 dollar values have been placed upon the value of the Sterling site, the impact of removing it from other uses, if unnecessary, is impossible to quantify. It should also be mentioned that if a second nuclear unit were to be sited at Ginna, there still appears to be space available for additional generating capacity, judging by the proposed location of fossil units at Ginna as displayed in Figure I-1 of Applicants' Response. Furthermore, RG&E has filed no plans for generation other than the Sterling plant in its latest long-range plans before the N. Y. State PSC. Tr. 2544.

192. Applicants assert that a change in site from Sterling to Ginna would result in about a two and one-half year delay in construction of the nuclear plant. This factor alone might appear to settle the issue in favor of Sterling since the Board already ruled in Contention 1 that Applicants' case for the need for power was indeed justified, and Sterling would reasonably be required by 1984. However, the NYPP has projected a surplus of 35% by 1984. If this goal were to be realized, power would be available during the period of delay, but the record indicates this may not be a reliable estimate, particularly if some of the construction programs fail to materialize. Spore Testimony at p. 16; Tr. 807. Alternatively, Applicants' witness testified that replacement power could be provided in the interim by gas turbine generation. This being the case, the final resolution of the suitability of the site must rest upon further analysis of the economics of the situation.

193. Applicants have estimated the penalty for a two and one-half year delay to amount to \$450 million which includes escalation costs for delayed construction and the higher cost for replacement power in comparison with Sterling generation costs. The Board tends to discount partially the former amount since escalated costs are paid for by dollars which are of lesser value due to inflation. However, it has been estimated that replacement power may range

from a low of 32 mills per kWh for average generation power to a high of 68 mills per kWh for gas turbine generation. Using conservative estimates, the additional generating costs amount to over \$100 million per year, compared with Sterling generation costs, beginning in 1984. On this basis, the Board concludes that Sterling is the preferred site for economic reasons. If, however, a delay of two or more years were to occur in the beginning of construction of Sterling, then a reevaluation of site selection must be given serious consideration.

K. Contention 13B

The Applicant has not established that the bioaccumulation factors used in determining concentration of radioactive isotopes in aquatic organisms take into account the effects of the aquatic food chain.

194. The Staff and Applicant assessed, through bioaccumulation factors, the concentration of radioactive isotopes in aquatic organisms in order to take into account the effects of the aquatic food chain in their determination of anticipated radiological effects of operation of the Sterling facility.

195. Bioaccumulation factors relate the concentration of a particular radionuclide or other element in water to its concentration in aquatic organisms. Uptake of radionuclides into aquatic organisms occurs through various mechanisms, including direct uptake from water and from ingestion of other organisms. Congel Testimony⁷⁷ at p. 4. When the uptake rate of a radioisotope equals the removal rate for a particular organism, equilibrium is said to occur. *Ibid.* Bioaccumulation measurements do not distinguish direct uptake from water from ingestion through the food chain for any particular organism. Thus, dose assessments performed under such conditions do account for both direct and indirect uptake of radionuclides. *Id.* at 5.

196. The bioaccumulation values used in the Applicants' assessment are based upon an extensive literature review of concentration factors. Those factors are derived largely from direct measurements in the environment. Since those measurements were performed on aquatic organisms which freely consumed substances in their natural habitat, such consumption is reflected in the subsequently reported element concentrations in the organism. ER at §5.2; Testimony of Dr. Robert C. Mecredy on Contention 13B following Tr. 3050. Moreover, Applicants' witnesses testified that the preliminary estimates of the bioaccumulation factors from the Applicants' continuing stable element study, which is an actual field analysis on Lake Ontario, do not significantly increase the doses to man. Tr. 3051-3052, 3054, 3068-77.

197. The Board finds that the use of bioaccumulation factors to determine

⁷⁷See n. 60, *supra*

the concentration of radioactive isotopes in aquatic organisms accounts for the effects of the aquatic food chain.

198. Contention 13C asserted that Applicants had presented conflicting models for predicting dilution of radioactive effluents in Lake Ontario and that an adequate basis had not been provided for selection of the one used in calculating deposition of radioactive materials on sediments in the Lake. The Board granted Applicants' Motion for Summary Disposition of the contention, Tr. 52, but requested that further information be provided on maximum depositions of radioactive materials in the sediments. Tr. 53.

199. The Staff conservatively evaluated the effects of hydrological dispersions of radionuclides by assuming dilution only by cooling water flow and determined that individual dosages resulting from such dispersion would be extremely small. Testimony of Frank J. Congel on Board Question Regarding Lake Dilution and Sedimentation, following Tr. 3501. The Staff also evaluated doses to man and other biota resulting from concentration of routinely released radionuclides in sediment on the bottom of Lake Ontario. The Staff's calculations show that such dosages are anticipated to be extremely small. *Id.* at p. 2.

200. In response to the Board's request, the Applicant, in addition to the analysis set forth in the ER, ER at §§5.2, 5.3, presented a second evaluation in accord with the techniques set forth in Regulatory Guide 1.109.⁷⁸ Use of that guide, which provides a more realistic method for calculating the deposition of radioactive materials on sediment, results in doses which are between 10 and 100 times less than those presented in the Environmental Report. Response to Board Question Regarding Deposition following Tr. 3102; Tr. 3103. The results were in agreement with those of the Staff. Tr. 3503-3506.

201. The Board finds that there has been an adequate evaluation of sedimentation deposits and their resultant doses.

L. Contention 17

The monitoring program during plant operation is not adequate. It does not ensure that releases from the Nine Mile Point nuclear plants will not inflate offsite radiation measurements. Monitored effects of Sterling releases may be understated as a result of misleading offsite monitoring data.

202. In the Environmental Report, Applicants describe the radiological monitoring plan for plant operation, ER at §6.2. The Staff in its FES reviewed in detail Applicants' preoperational monitoring plan which is to be initiated two

⁷⁸ *Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I*, issued for comment in March 1976.

years prior to operation. FES at §6.1.4. Applicants expect to continue the proposed preoperational plan with refinements to reflect land use changes or experience gained in the two years of use during the operating period. FES at §6.2.2.

203. Applicants, while expressing reservations about a detailed examination of operational monitoring plans at this construction permit stage, Tr. 3094, provided evidence as to the adequacy of the plan. Testimony of Robert C. Mecredy on Contention 17 following Tr. 3093. The Staff indicated that monitoring systems can be designed which would insure that releases from surrounding plants are adequately considered, Tr. 3494, but stated that detailed examination of the operational plan for Sterling would not be made until the operating license stage. FES at §6.2.1; Tr. 3988.

204. Detailed examination of an operational monitoring plan is not required at the construction permit stage.⁷⁹ However, in order to address this contention, Applicants' witness testified that the proposed program, including the location of the monitoring station and the in-plant surveillance procedures, has the capability to distinguish between radioactive releases at Nine Mile Point and the Sterling facility. The Board finds that, although no affirmative showing of the adequacy of the plan can be made at the present time, the testimony presented adequately addresses Intervenor's concerns.

M. Contentions 19A and B

- A. Applicant should be required to set forth the procedures which it plans to use for shipments of irradiated fuel and low-level waste materials by truck from the Sterling plant in order to determine that such shipments will comply with the applicable Nuclear Regulatory Commission and Department of Transportation regulations pertaining to release of radiation during shipment.
- B. Applicant should assess the impacts of radiation emitted during shipments on residents along the truck route resulting from acts of sabotage.

a. Transportation Procedures

205. Staff witness Robert F. Barker testified that NRC and DOT regulations set forth the requirements which must be met by persons shipping "irradiated fuel and low-level waste material by truck"—such as that which may be shipped from the Sterling plant. None of these regulations, however, require either the shipper or the carrier to describe the procedures elected to be used for such shipment. Under the regulatory scheme, the shipper is free to select any shipment procedure it chooses, so long as the regulatory requirements are met. The

⁷⁹See *South Carolina Electric and Gas Company* (Virgil C. Summer Nuclear Station, Unit 1), ALAB-114, 6 AEC 253, 255 (April 13, 1973).

Commission's regulations do not require that specific procedures for such shipments be approved by the Staff. Testimony of Robert F. Barker on Contention 19A, following Tr. 3617.

206. Shipments from the Sterling facility will not begin until some time after the plant goes into operation in 1984. Shipment procedures have not yet been developed. The Applicants have indicated, however, that they will prepare specific procedures for the shipment of irradiated fuel and low-level waste material from the Sterling plant and that such procedures, when developed, will ensure compliance with all applicable regulations. Testimony of Robert C. Mecredy on Contention 19A, following Tr. 451.

207. RG&E has sent approximately 100 shipments of low-level wastes and 121 truck loads of irradiated fuel from its R. E. Ginna Nuclear Power Plant since 1969. Those shipments were made pursuant to procedures developed to assure compliance with Commission and Department of Transportation regulations. *Id.*, Tr. 452-54. That experience gives confidence that there is no need to require Applicants to set forth procedures for the shipment of irradiated fuel and low-level waste material at this time.

b. Sabotage During Transportation

208. The Applicant and Staff presented testimony describing the potential impacts of radiation emitted during shipments of spent fuel on residents along the truck route resulting from acts of sabotage. Spent fuel will be transported from Sterling in massive, durable, heavy casks. A shipping cask is generally cylindrical in shape and about 20 feet long. The cask is made up of a steel inner vessel containing the radioactive materials and spacers or neutron absorbers for protection against criticality. The inner vessel is surrounded by several inches of shielding encased in a steel jacket. Several inches of hydrogenous material (such as water) for attenuation of neutron radiation surround the gamma shield. A steel outer jacket completes the package. The closed inner vessel is filled with a primary coolant (air, helium, water) to aid in the dissipation of heat generated by radioactive decay. The cask is designed to withstand, without release of radioactive material in excess of regulatory limits, an accident damage test sequence to simulate the effects of high speed impact, puncture, fire, and immersion in water. The test sequence includes: (1) a free fall from a height of 30 feet onto an unyielding horizontal surface, striking the surface in a position for which maximum damage is expected; (2) a free drop of 40 inches, striking (in a position which is expected to cause maximum damage) the top end of a vertical cylindrical steel bar, 6 inches in diameter and at least 8 inches long, mounted on an essentially unyielding horizontal surface; (3) a thermal test in which the cask is exposed to heat equivalent to that of an oil fire and (4) immersion in water to the extent that all portions of the cask being tested are under at least 3 feet of

water for a period of not less than 8 hours. Revised Testimony of Donald J. Kasun and Vernon Hodges on Contention 19B, following Tr. 451.

209. The same design features for withstanding severe transportation accidents also enable the cask to withstand attack by small arms fire and explosives. The Staff concluded that it would require extraordinary skills and materials not commonly available to breach the inner vessel. Criminal acts involving the intentional opening of containers would require an appreciable amount of time, elaborate planning, and shielding and handling facilities. Spent fuel cask covers cannot be removed by hand because of their bulk and weight. Overhead cranes would have to be employed and the removal would have to be performed remotely, usually under water, because of the high radiation levels experienced upon opening of the cask. A massive rupture of the cask by mechanical means or by high explosives is considered by the Staff to be extremely unlikely. *Id.* at p. 5.

209. A small break into the inner vessel of a shipping cask was analyzed by the Staff. A breaching charge sufficient to blow a hole in a cask containing 3 PWR fuel assemblies holding about 1.5 metric tons uranium and plutonium would cause loss of primary coolant, fragment some fraction of the spent fuel and result in the release of gases (krypton), a portion of the solids of highest volatility (cesium), and a portion of the nonvolatile solids. *Id.* at p. 6. Assuming that 100% of the gases and 1% of the volatile and nonvolatile solids in the form of respirable aerosols are released to the environment, the number of effects in a population density of 100 people per square mile and averaged over many weather histories was calculated to be less than one early death and about 12 latent cancer fatalities. For population densities greater than 100 people per square mile, the number of fatalities may be scaled up linearly. These calculations do not take into account any protection likely to be afforded by buildings or evacuation of the endangered area. It is believed, however, that these factors would have a mitigating effect, reducing expected consequences substantially. *Id.* at p. 7.

210. Radioactive wastes will be shipped by truck from Sterling Nuclear in drums. In the event that the drums are opened by accident or by criminal act, radioactivity is unlikely to be dispersed and would constitute a relatively mild local hazard until removed. *Id.* at pp. 8-11.

211. The Board finds that radioactive releases due to acts of sabotage during transportation are very unlikely. If such an act should occur, the releases would be small and would not constitute a major threat to the public health and safety.

V. ISSUES CONSIDERED ON JULY 16, 1977

A. Closed-Cycle Cooling at Sterling Site

212. Both Applicants and Staff provided additional documents on closed-

cycle cooling at the Sterling site to supplement that earlier provided. See paragraph 66, *supra*. The principal documents provided by the Applicants were Applicants' Exhibit 6, "Cooling Tower Evaluation" (Environmental aspects) and Applicants' Exhibit 7, "Closed-Cycle Cooling Safety Analysis." The responses to the Intervenor's questions, Applicants' Exhibits 10 and 11, also provided data on this topic. The Staff's supplemental testimony on the matter is contained in "NRC Staff Supplemental Testimony Analysis of the Acceptability of Sterling Site Assuming Closed-Cycle Cooling" (hereinafter "Staff Closed-Cycle Cooling Testimony"), "NRC Staff Supplemental Testimony on Cooling Tower—Appendix I" (hereinafter "Congel Supplemental Testimony") and "NRC Staff Safety Assessment of Alternate Cooling System—Closed-Cycle" (hereinafter "Staff Closed-Cycle Cooling Safety Assessment") all following transcript page 4048. The Staff's responses to the Intervenor's questions, also following Tr. 4048, also provide additional testimony. Intervenor presented no direct testimony.

213. All of the supplemental testimony was directed towards a wet natural-draft tower which was found to be the most desirable of the available types of cooling towers. The tower used in the assessment is approximately 500 feet in height and 490 feet in diameter. Its location would be approximately 1100 feet northeast of the reactor building. Appl. Ex. 6 at p. 2.1-1. Using this tower, the requisite design flow of cooling water from Lake Ontario would be approximately 85 cfs. The normal and essential service water systems would share a common intake structure, inlet tunnel, pump structure, service water pumps, traveling screens, associated piping, valves and instrumentation. The makeup water supply would be pumped through the service water pump structure, thus eliminating the need for the screen-well and pump structure of the once-through system. *Id.* at pp. 2.2-1, 2.3-1; Staff Closed-Cycle Cooling Testimony at pp. 2-3.

214. A six-sided, submerged intake structure built of reinforced concrete with a maximum diameter of 35 feet would be used for the closed-cycle system. Each intake port would be protected by bars designed to keep large objects from entering the system. The structure would be located 3750 feet offshore, slightly closer to shore than the intake structure for once-through cooling. As a result of this, the intake would be 30 feet below mean lake elevation, rather than 35.5 feet for the once-through case. The water intake velocity at the bars would be approximately 0.23 fps. An approximately four-foot diameter underground pipeline terminating in a submerged discharge port approximately 1400 feet offshore would replace the open surface discharge of the once-through system. *Id.* at pp. 2-3, 5-6; Appl. Ex. 6 at pp. 2.3-1 - 2.3-3. A barge slip would be substituted for the discharge canal. Staff Closed-Cycle Cooling Testimony at p. 20.

215. Operation of the Sterling plant with a closed-cycle cooling system will decrease plant capacity. The Applicant has estimated this loss resulting from the combined effect of the decrease in turbine output and increase in plant auxiliary

load to be 20 megawatts for the worst cooling conditions occurring about one percent of the time and five megawatts averaged over the entire year. *Id.* at pp. 2.1-2-2.1-3, 5.1.1.

216. The Staff has evaluated the Applicants' design for an alternative closed-cycle cooling system at Sterling Nuclear and has concluded that the requisite modifications would result in minimal changes to the safety related systems of the plant. Staff Closed-Cycle Cooling Safety Assessment. The Staff has stated and this Board finds that the imposition of a closed-cycle cooling system, if required, would not alter the conclusions set forth in the Staff's Safety Evaluation, as supplemented, for the Sterling plant. *Id.* at p. 3.

217. Major construction impacts of a closed-cycle cooling system at Sterling Nuclear include increased excavation and construction laydown area, construction of the tower, and addition of a discharge pipe and diffuser. Total excavation for the plant with closed-cycle cooling would be more than twice the amount required for the plant with once-through cooling. Appl. Ex. 6 at p. 3.1-1. Construction and location of a cooling tower system at Sterling Nuclear, because of the physical area involved, would result in a loss of vegetation and in a reduction in population size of various species present at the site. The Applicants and the Staff have demonstrated, and the Board finds, that incremental impacts on terrestrial ecology, land use or aquatic biota resulting from such construction are within reasonable limits. *Id.* at pp. 3.2-1-3.2-5, 3.3-1-3.4-2; Staff Closed-Cycle Cooling Testimony at pp. 12-15, 20-22.

218. Operation of Sterling Nuclear with the closed-cycle cooling system would reduce the cooling flow to approximately five percent of that required for once-through cooling. This reduced flow would modify to some extent the operational impacts at both the intake and discharge. Applicants have estimated that approximately 225,000 fish per year (90 percent of which are expected to be alewives) would be impinged by operating the closed-cycle cooling system at Sterling. Based on the Applicants' and Staff's testimony, such impingement would not result in a significant adverse environmental impact on the lake's ecosystem. With respect to entrainment, losses are expected to be considerably reduced if closed-cycle rather than once-through cooling is used. Since the maximum bottom velocity induced by the intake system for closed-cycle cooling would be about 0.06 fps, the Applicant predicts no significant adverse impact on the local benthic habitat and associated biota from bottom scour. *Id.* at pp. 23-25, 32; Appl. Ex. 6 at pp. 4.1-1-4.1-2.

219. Although the thermal plume resulting from closed-cycle operation would be substantially smaller than the plume due to open-cycle operation, discharge temperatures would be higher. Nonetheless, based on the Applicants' and Staff's detailed analyses, resultant heat and cold shock mortality from closed-cycle operation would be negligible. Closed-cycle operation would cause certain chemicals to be discharged into Lake Ontario. These chemicals result

from a combination of cooling tower blowdown and the industrial waste processing system. Applicants' and Staff's evaluations of biological effects associated with the discharge of such chemicals indicate no potentially significant adverse impact on the Lake Ontario biota. *Id.* at pp. 4.3-1—4.3-11, 4.3-13—4.3-17, 4.3-21—4.3-25; Staff Closed-Cycle Cooling Testimony at pp. 26-30.

220. Radiological and chemical effluents from the plant using the closed-cycle cooling system, for the most part, would be the same as for a once-through cooling system. Differences arise from the addition of sulfuric acid for scaling control in the cooling tower, salt depositions from cooling tower drift, and altered patterns of effluent dispersion in the lake because of the lower water discharge rate. The Staff performed an evaluation of the impact of the chemical constituents of the liquid effluent and determined that those not already at a safe concentration in the discharge would reach such a level after minimal dilution in Lake Ontario. The Staff concluded that the discharge effluents, including heat, would comply with applicable Federal and state water quality standards. *Id.* at pp. 6-8, 28-30. The Applicants' assessment reached a similar conclusion. Appl. Ex. 6 at p. 4.3-22.

221. Because of the lowered discharge flow rate for the closed-cycle cooling system, the Staff reevaluated the doses resulting from radioactive liquid effluents. The evaluation showed that, although population doses would be unchanged, the individual organ dose would be increased by about 12 times. These increased values are nonetheless sufficiently low that the Staff's conclusions in the FES regarding radiological impact are unchanged. Congel Supplementary Testimony. The Applicants performed a similar analysis. Although their assessment produced different numbers, the doses again are within all applicable limits. Appl. Ex. 6 at pp. 4.5-1—4.5-7. Based on this testimony, the Board finds that the normal operation of the Sterling plant with closed-cycle cooling, if required, would result in no significant environmental effects on humans or other biota from the routine operational releases of radioactive material.

222. The cooling tower and its plume would be visible from Lake Ontario and from Fair Haven Beach State Park. The maximum visibility of the plume would occur at the north-east site boundary, where it would be visible about 60 hours per year, primarily during periods of high humidity. The effects of the tower on ground fog, ice, precipitation and ambient noise levels in the vicinity of the plant are not expected to be significant. *Id.* at pp. 15, 19; Appl. Ex. 6 at p. 4.2-1 and Appendix 2A. Some threat to migratory birds, including water fowl, could result from the tower. With the appropriate combination of weather conditions and bird migration, it is conceivable that bird casualties exceeding 100 to 200 individuals could occur during a given season. *Id.* at p. 4.2-4; Staff Closed-Cycle Cooling Testimony at pp. 15-17, 33.

223. The Applicants and Staff also performed assessments of the increase in salinity concentrations resulting from salt deposition from a natural-draft cool-

ing tower plume. Based on those analyses, the Applicant and the Staff have concluded that no measurable damage to vegetation, inland aquatic species and land use resulting from atmospheric drift emissions from the cooling tower at the Sterling site is expected. *Id.* at pp. 4.2-6-4.2-8 and Appendix 2A; Staff Closed-Cycle Cooling Testimony at pp. 17-19, 33.

224. The imposition of a closed-cycle cooling system at the Sterling plant would increase both capital construction and operation and maintenance costs. The plant with a closed-cycle cooling system would be approximately \$48,398,000 (1984 dollars) more expensive than the same unit using once-through cooling. This amounts to an increase in generation costs of 2 to 2.5 percent. *Id.* at p. 5.2-1; Staff Closed-Cycle Cooling Testimony at pp. 10-11, 33.

225. The Staff has performed a cost-benefit balance of the change from once-through to closed-cycle cooling, *id.* at pp. 31-34, with which the Board concurs. The Staff finds, and we agree, that the proposed closed-cycle system is acceptable. The economic penalty of the closed-cycle system would cause the cost-benefit balance to favor the once-through system, but the overall cost-benefit balance for Sterling is favorable for either cooling system. Therefore, if required by Federal or state regulatory authorities, we find the use of a natural-draft cooling tower to be an acceptable alternative.

226. The proposed findings of fact of the Intervenors regarding the cooling tower alternative focus primarily on the uncertainties in the projected impact on the environment with respect to induced snowfall and visibility of the plume. The Board has carefully reviewed these proposed findings and, more importantly, Intervenors' conclusion that we do not have sufficient evidence to make the determination that a cooling tower is acceptable. Accepting Intervenors' basic premise that the effects of the cooling tower cannot be predicted precisely, we find that even with allowance of significant errors in the predictions, the effects will be small. As an example of the small effect of the uncertainties, we note Intervenors' second proposed findings where they draw our attention to Applicants' response to one of their questions regarding induced snowfall. In response to a request to estimate how often meteorological conditions found elsewhere to induce snowfall occur at the Sterling site, Applicants estimate that the specified conditions occurred during an average of 33 hours per year. Appl. Ex. 11 at p. 4. The following question, to which Intervenors do not call our attention, asks what depth of snow has been associated with such conditions elsewhere. Applicants' response is that the maximum depth was 2.5 centimeters of very fluffy, light snow amounting to less than 1 millimeter of precipitable water, and that if the results at Sterling differed from those observed they would likely be smaller. *Id.* at pp. 5-6. If the Board conservatively assumes that such a snowfall occurs ten times a year, it would total less than 0.4 inches of precipitation per year. A comparison of this with the average annual precipitation from snowfall of 7 to 12 inches, ER at p. 2.6-5, inevitably leads to the conclusion that it is a trivial

effect. Other findings assert that the model used by the Staff to assess salt deposition, fogging and icing has not been validated by comparison with an operating natural-draft tower. The model has, however, shown good comparability with a mechanical-draft tower, Staff's Answers to May 30, 1977, Questions, following Tr. 4048, at p. 8, and Intervenor has made no showing that it is not adequate. In addition, Intervenor has not challenged the Applicants' analysis, Appl. Ex. 6, Appendix 2A, which reaches similar conclusions. These proposed findings must, therefore, be rejected.

B. Alternate Site Considerations

227. In keeping with their understanding of the guidance from the Appeal Board and Commission decisions in the *Seabrook* proceeding, see paragraph 4, *supra*, the Applicants provided a new study of alternate sites. Appl. Ex. 8 as revised May 16, 1977. This study includes a review of the twenty-seven sites in the RG&E territory previously reviewed, a new comparison of the Sterling and Ginna sites assuming use of a closed-cycle cooling system, and a study of sites in the territories of each of the other participating utilities. The Regulatory Staff also presented testimony reviewing the Applicants' study and setting forth the Staff's evaluation of the sites. Staff Alternate Site Testimony.⁸⁰ The Intervenor presented neither testimony nor proposed findings on this issue.

228. In the Applicant's original study 27 alternate sites were investigated. All but six of these would have required reservoirs. Of the 21 sites requiring reservoirs, six⁸¹ were rejected because of insufficient water supply. Since water consumption (as opposed to water flow through the plant) was the limiting requirement, those sites remain unacceptable if the closed-cycle cooling alternative is assumed. Similarly, land use and hydrologic factors which resulted in the elimination of ten additional sites remain controlling when closed-cycle cooling is assumed. Four sites were eliminated because of their unsuitability with respect to geologic/seismologic setting and/or ground water problems. The remaining "reservoir" site was eliminated because its development was considered to have an unacceptable environmental impact on the diverse terrestrial habitats to be inundated by the proposed reservoir as well as for other reasons. Cooling towers at those sites would not render them more suitable and in many cases would aggravate their negative features. *Id.* at pp. 2-3; Appl. Ex. 8 at pp. 5, 5a, 6.

229. Since the proposed reservoirs for the sites referred to above would not

⁸⁰NRC Staff Supplemental Testimony—Alternate Sites by Dino Scaletti, following Tr. 4048 (hereinafter "Staff Alternate Site Testimony").

⁸¹The FES is in error in that it shows five additional sites (Sites 11, 12, 13, 14 and 19) rejected for that reason. See Staff Alternate Site Testimony at p. 2. They were actually rejected for the reasons set forth at pages 5 and 5a of Applicants' Exhibit 8. The FES is hereby corrected to reflect this information.

qualify as closed-cycle cooling systems under EPA requirements, it is likely that the reservoirs would have to be complemented with cooling towers at those sites. Whether or not this is the case, the major environmental differences between development of Sterling with closed-cycle cooling and development of one of the reservoir sites would be those associated with the reservoir. These effects are considerable, involving the destruction of very large areas of terrestrial and aquatic habitats. No environmental advantage of the reservoir sites (even if developed with once-through cooling) has been identified which would approach compensating for this impact. App. Ex. 10 at pp. 10-14. The Staff evaluation concurs with that of the Applicants. Staff Alternate Site Testimony at pp. 2-3. Based on this testimony, the Board finds that the reservoir sites would have greater impacts than the Sterling site with or without closed-cycle cooling.

230. The remaining six sites are located along the shore of Lake Ontario. It seems reasonable to assume that if a closed-cycle cooling system is required at Sterling, it would also be required at the other sites. Be that as it may, four of these sites (all except Sterling and Ginna) were rejected for reasons other than the cooling system. These reasons are still valid. *Id.* at p. 3; FES at Table 9.2; Appl. Ex. 8 at pp. 6-7. Therefore the Board finds that of the 27 sites studied, the evidence shows that the Sterling and Ginna sites are the most suitable for either once-through or closed-cycle cooling.

231. Proceeding on the reasonable assumption that a state or Federal requirement for closed-cycle cooling at the Sterling site would be equally applicable to the Ginna site, both Staff and Applicants reassessed the comparison between the two sites. Staff Alternate Site Testimony at p. 4; Appl. Ex. 8 at pp. 8-14. Both parties concluded that the Ginna site does not offer a significant environmental advantage over Sterling. The Board has set out its view of the comparison (for the case of once-through cooling) in its discussion of Contention 12, *supra*. Briefly summarized, we found that the Ginna site had a small advantage on an environmental basis, but that the economic penalties resulting from a change to the Ginna site at this time (absent a delay in start of construction at Sterling for some unrelated reason) far outweighed the small environmental advantage at Ginna. We see no reason to alter that finding in the event that a closed-cycle cooling system is required at either or both sites.

232. In preparing the FES, the Staff compared the relative merits of RG&E's Sterling site with certain sites in the territories of the other three Applicants. FES at pp. 9-7 - 9-8. The potential of the Sterling site to support a facility with once-through cooling, however, was a factor in this comparison. The Applicants and the Staff have now evaluated such sites under the assumption that a cooling tower would be required at Sterling. Appl. Ex. 8 at pp. 15-40; Staff Alternate Site Testimony at pp. 4-7. Representative sites in each of the three service areas were analyzed and compared environmentally with the Sterling site. While each had relative advantages and disadvantages with respect to

environmental impact, none emerged as obviously superior to the Sterling site, or as even offering significant advantages over the proposed Sterling site. *Id.* at p. 7; Appl. Ex. 8 at pp. 39-40.

233. Based on the factors discussed above and the other evidence in the record, the Board finds that no alternate site is obviously superior to the Sterling site. In addition, it should be noted that although we have taken the economic costs of changing the site into consideration only in comparing Sterling and Ginna, they are equally applicable to the comparisons between Sterling and the other alternate sites.

C. Health Effects of the Coal and Nuclear Fuel Cycles

234. Comparisons of the environmental and economic merits of coal and nuclear plants were earlier set forth by the Applicants, ER at pp. 9.2.4-9.2.5, 9.2.9b, and the Staff, FES at pp. 9.2-9.3, and both had concluded that the nuclear plant was the preferred alternative. Pursuant to the *Hartsville* decision, see paragraph 5, *supra*, the Staff supplemented this analysis with additional testimony which compared the health effects of the coal and nuclear fuel cycles. Gotchy Testimony.⁸² The Staff witness was cross-examined extensively by the Intervenor. Tr. 4081-4289.

235. The written testimony of the Staff witness was prepared on a generic basis and has been presented in essentially the same form in several other proceedings. For the purpose of this decision, a very brief description is sufficient. The witness compared all of the health effects (insofar as they could be ascertained) of the entire coal and nuclear fuel cycles for typical plants producing 0.8 gigawatt-years per year of electric energy. For coal, the cycle consists of mining, fuel transportation, processing, power generation and waste disposal. The nuclear fuel cycle includes mining, milling, uranium enrichment, fuel preparation, fuel transportation, power generation, irradiated fuel transportation, and reprocessing and waste disposal. Gotchy Testimony at p. 1. His calculations indicated that the annual excess mortality for the nuclear plant was 0.47 deaths per year and that for the coal plant it was 15-120 deaths per year. *Id.* at Table 1. Similarly, he calculated excess morbidity and injury to be 14 for the nuclear plant and 57-210 for the coal plant. *Id.* at Table 2. Looking in more detail at the excess mortality summary, he calculated that for the nuclear plant over three-fourths of the excess deaths were to workers and less than one-fourth to the general public. Of the occupational deaths, most were accidental deaths primarily caused by fatal nonradiological accidents such as falls and explosions and the balance were deaths due to disease, primarily radiogenic cancers and leukemias.

⁸²NRC Staff Supplemental Testimony Regarding Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives by Dr. R. L. Gotchy, following Tr. 4068 (hereinafter "Gotchy Testimony").

Id. at Table 1. For the coal plant the situation was somewhat different. The large majority of the excess deaths resulting from the coal plant involved the general public and only a small percentage were occupational. The majority of the occupational deaths (0-7) were caused by pneumoconiosis and related respiratory diseases and a smaller number (0.35-0.65) by accidents, primarily in mines. Among the general public, 1.2 accidental deaths per year were estimated, primarily from accidents with coal trains at railroad crossings, and 13-110 deaths per year from disease were estimated, primarily from respiratory failures caused by combustion products. *Ibid.* The witness concluded that the nuclear fuel cycle is considerably less harmful to man than the coal fuel cycle. *Id.* at p. 11.

236. The witness pointed out that his analysis was a generic one, comparing typical plants. As such, it is generally applicable to Sterling, although some of the specific assumptions he made, *see id.* at Appendix A, would need to be modified if the methodology were to be specifically applied to Sterling. For example, his calculations of effects to the general public from stack emissions of a coal-fired plant were based on a certain assumed population within a 50-mile radius of the plant. The actual population within that distance of the Sterling site is only about 40% of that assumed. Thus, the effects from the coal plant would be reduced. On the other hand, he assumed coal would be shipped 300 miles from a mine to the plant, whereas, for a plant at Sterling, coal would be shipped about 800 miles, Tr. 4077, increasing the transportation-related effects. It should be noted, however, that the witness estimated that the uncertainties in his results were about one order of magnitude for the nuclear effects and about two orders of magnitude for the effects of a coal-fired plant. Gotchy Testimony at p. 1. In view of this, the inaccuracies resulting from use of a generic rather than a specific comparison, to the extent that they do not balance each other, are negligible.

237. A topic of substantial cross-examination of the witness was the sources of his data. He testified that in every instance where there was a value in Table S-3, or its backup documents NUREG-0116 and NUREG-0216, he used that value. Tr. 4227. Since the purpose of his testimony was to compare the overall health effects of the two types of plants, he required some additional data. Typical items in this category were health effects from normal operation of the power plants and accidents during the mining and transportation phases of the fuel cycles, including occupation risks. For these other effects, data from the "Final Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel In Light-Water-Cooled Reactors" were used when they were available. When data were not available from these sources, the best available data were used, including where appropriate the "Reactor Safety Study" (WASH-1400). In view of this systematic selection of source data, the Board cannot accept the premise that the witness picked and chose his sources to suit his biased needs that is recurrent through the Intervenor's cross-examination and proposed findings.

238. One other matter raised by several of Intervenor's proposed findings deserves comment. The witness based his estimate of annual health effects attributable to the nuclear fuel cycle on the 50-year dose commitment for one year of operation of each type of facility, considering the continuing biological uptake of long-lived radionuclides for 40 years following the year of release. Gotchy Testimony at Appendix A. Although he indicated that emissions from some long-lived radionuclides may continue for long periods of time subsequent to the period for which he calculated health effects of the nuclear fuel cycle, Tr. 4107-4108, 4133, he did not attempt to quantitatively calculate health effects far into the future. When cross-examined by the Intervenor on this point, he stated that in his judgment, increases in health effects to future generations attributable to the nuclear fuel cycle involved changes in the risks to populations and individuals on the order of one in a million or less. Tr. 4111. This incremental risk to any given future generation, the witness concluded, was so small as to be meaningless in terms of other risks which those populations cannot control. Tr. 4114.

239. Those proposed findings regarding health effects submitted by the parties which are not incorporated directly or inferentially or specifically discussed above are rejected as not being supported by reliable, probative and substantial evidence.

240. Based on the prepared testimony of the Staff's witness and the oral examination by the Board and parties, the Board finds that the nuclear fuel cycle is less harmful to human health than the coal fuel cycle. This finding does not affect our original finding that the nuclear plant is the preferred alternative, nor does it substantially alter the cost-benefit balance.

VI. CONCLUSIONS

241. The application and the proceedings thereon comply with the requirements of the Act and the Commission's regulations.

242. A. In accordance with the provisions of 10 CFR §50.35(a):

- (1) The Applicants have described the proposed design of the facility including, but not limited to, the principal architectural and engineering criteria for the design, and have identified the major features or components incorporated therein for the protection of the health and safety of the public.
- (2) Such further technical or design information as may be required to complete the safety analysis and which can reasonably be left for later consideration, will be supplied in the Final Safety Analysis Report.
- (3) Safety features or components, if any, which require research and development have been described by the Applicants, and the Appli-

cants have identified, and there will be conducted, a research and development program reasonably designed to resolve any safety questions associated with such features or components.

- (4) On the basis of the foregoing, there is reasonable assurance that (i) such safety questions will be satisfactorily resolved at or before the latest date stated in the Application for completion of construction of the proposed facility, and (ii) taking into consideration the site criteria contained in 10 CFR Part 100, the proposed facility can be constructed and operated at the proposed location without undue risk to the health and safety of the public.
- B. RG&E is technically qualified to design and construct the proposed facility.
- C. The Applicants are financially qualified to design and construct the proposed facility.
- D. The issuance of a permit for construction of the facility will not be inimical to the common defense and security or to the health and safety of the public.
- E. In accordance with 10 CFR Part 51 of the Commission's regulations, the Board concludes as follows:
 - (1) The environmental review conducted by the Staff pursuant to Part 51 has been adequate.
 - (2) The requirements of § 102(2)(A), (C) and (E) of NEPA and 10 CFR Part 51 has been adequate.
 - (3) Upon independently considering the final balance among conflicting factors contained in the record of this proceeding, the appropriate action to be taken is issuance of a construction permit, conditioned as set forth herein.

VII. ORDER

WHEREFORE, IT IS ORDERED, in accordance with the Atomic Energy Act of 1954, as amended, and the rules and regulations of the Commission, that the Director of Project Management is authorized to issue to Applicants a permit to construct the Sterling Power Project, Nuclear Unit No. 1, consistent with the terms of this Initial Decision, and upon the following conditions:

1. The Applicants shall take the necessary mitigating actions, including those summarized in Section 4.5 of the Final Environmental Statement, during construction of the plant, associated transmission lines, and the railroad spur to avoid unnecessary adverse environmental impacts from construction activities. Near-shore lake dredging operations (other than maintenance dredging) will be prohibited during the spawning period (mid-June to mid-August) unless approved by the Commission. Maintenance

nance dredging is defined as the removal of littoral drift materials deposited in previously dredged excavations.

2. In addition to the preoperational monitoring programs described in Section 6.1 of the Environmental Report with amendments, the Staff recommendations included in Section 6.1 of the Final Environmental Statement (as modified by Revisions in FES Proposed Recommendations and Conditions, p. 3 following Tr. 4030) and supplemented Tr. 3904 shall be followed.
3. The design and construction of the 765 kV transmission line shall include provisions for adequate grounding and surveillance to minimize shock hazards.
4. To reduce entrainment losses of fish larvae and juveniles, the Applicants shall position the intake structure at a minimum bottom depth of 35.5 feet below mean lake elevation in the case of once-through cooling, as shown in the Environmental Report, Figure 3.4-3, Revision 2, or 30 feet in the case of closed-cycle cooling. Approach velocities at the intake ports shall be limited to 0.8 feet per second. To study the impact of higher intake velocities the Applicant is authorized to operate at an intake velocity not to exceed 1.5 feet per second for a total of 12 months during the first 36 months of plant operation.
5. Before engaging in a construction activity not evaluated by the Commission, the Applicants will prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not evaluated in this Environmental Statement, the Applicants shall provide a written evaluation of such activities and obtain prior approval of the Director of Site Safety and Environmental Analysis for the activities.
6. The Applicants shall establish a control program that shall include written procedures and instructions to control all construction activities as prescribed herein and shall provide for periodic management audits to determine the adequacy of implementation of environmental conditions. The Applicants shall maintain sufficient records to furnish evidence of compliance with all the environmental conditions herein.
7. If unexpected harmful effects or evidence of serious damage are detected during plant construction, the Applicants shall provide to the Staff an acceptable analysis of the problem and a plan of action to eliminate or significantly reduce the harmful effects or damage.

IT IS FURTHER ORDERED, in accordance with 10 CFR §§2.760, 2.762 and 2.764, that this Initial Decision shall be effective immediately and shall constitute the final action of the Commission forty-five (45) days after the date of issuance hereof, subject to any review pursuant to the above-referenced rules.

Exceptions to this Initial Decision must be filed within seven (7) days after service of the Decision. A brief in support of the exceptions must be filed within fifteen (15) days thereafter (twenty days in the case of the NRC Staff). Within fifteen (15) days of the filing and service of the brief by the Appellant (twenty days in the case of the NRC Staff), any party may file a brief in support of, or in opposition to, the exceptions.

**THE ATOMIC SAFETY
AND LICENSING BOARD**

George C. Anderson, Member

Lester Kornblith, Jr., Member

Edward Luton, Chairman

**Dated at Bethesda, Maryland,
this 26th day of August 1977.**

**[Attachment A has been omitted from this publication but is available in the
NRC Public Document Room, 1717 H Street, N.W., Washington, D.C.]**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Samuel W. Jensch, Chairman

David B. Hall

Paul W. Purdom

IN THE MATTER OF

VERMONT YANKEE NUCLEAR
POWER CORPORATION

Docket No. 50-271

OL No. DPR-28

Amendment (Increase
Spent Fuel Storage)

(Vermont Yankee Nuclear
Power Station)

August 30, 1977

Upon stipulation of the parties and after evidentiary hearing, Licensing Board issues an Initial Decision authorizing licensee to expand the capacity of its spent fuel pool from 600 fuel assemblies to 2000 fuel assemblies.

TECHNICAL ISSUE DISCUSSED: Spent fuel pools.

INITIAL DECISION
APPROVING AMENDMENT TO OPERATING LICENSE
TO AUTHORIZE ENLARGEMENT
OF SPENT FUEL POOL STORAGE

Appearances

Thomas G. Dignan, Jr., Esq., Robert K. Gad III, Esq., on
behalf of Vermont Yankee Nuclear Power Corporation,
Licensee

Karin Sheldon, Esq., Mary Just Skinner, Esq., on behalf of
New England Coalition on Nuclear Pollution, Vermont
Public Interest Research Group, Inc., and Conservation
Society of Southern Vermont, Intervenor

M. Jerome Donovan, Esq., John A. Calhoun, Esq., Benson
Scott, Esq., on behalf of the State of Vermont

John L. Ahlgren, Esq., on behalf of the State of New Hampshire

Edwin J. Reis, Esq., Auburn L. Mitchell, Esq., on behalf of the U.S. Nuclear Regulatory Commission

Vermont Yankee Nuclear Power Corporation (Vermont Yankee or Licensee), holder of operating license number DPR-28 has filed a request to amend its license to permit enlargement of its spent fuel pool storage. Vermont Yankee will need the enlarged space by 1978 in order to continue operation. The present need is shown by the fact that Vermont Yankee does not have adequate space in its existing pool to presently permit a full core discharge of spent fuel, as ordinarily would be required by prudent engineering and operating practice. The expansion of the Vermont Yankee spent fuel storage capacity is proposed to be accomplished by changing to a new type of spent fuel storage rack.

An evidentiary hearing was held on June 21, 1977, following a special prehearing conference held on April 26, 1977. Interventions were sought by and granted in accordance with 10 CFR §2.714 to New England Coalition on Nuclear Pollution, Conservation Society of Southern Vermont and Vermont Public Interest Research Group, collectively (NECNP) as one intervenor; in addition, intervention was granted to the State of Vermont.¹ The State of New Hampshire participated solely as an "interested state" pursuant to 10 CFR §2.715(c).²

The evidentiary hearing commenced by the presentation of a stipulation³ of agreed facts by the parties, but a reservation was made of the right to object to the relevancy or materiality of any of the statements.⁴ The Atomic Safety and

¹ The State of Vermont signed a stipulation with the other parties regarding admitted facts. In addition, the Licensing Board held the record open for a week for the State to determine if any additional assertions would be made after its review of the Safety Evaluation and the Environmental Impact Appraisal filed by the Staff ten days prior to the commencement of the evidentiary hearing. The Staff also filed a Supplement No. 1 to the Safety Evaluation and Environmental Impact Appraisal on the day of the hearing. This Supplement was corrected in some respects at the hearing. The State later informed the Board and the parties that after its review, no further assertions would be made. The Board therefore and by this Initial Decision determines that the record of evidentiary matters is closed. The NECNP letter request for opportunity to present some other, but undefined, matters is denied.

² The State of New Hampshire appeared by an attorney at the prehearing conference but did not raise any issues and was not represented in any capacity at the evidentiary hearing.

³ A copy of the stipulation is attached as Appendix A.

⁴ The Regulatory Staff (Staff) contended that certain statements in the stipulation and included in the NECNP proposed findings are not relevant to the allowed contentions. Such objected statements appear more as argument or statements of positions and not solely of facts.

Licensing Board considered the scope of the amendment requested by Vermont Yankee, the contentions allowed, as well as the stipulation, and conducted certain inquiries on pertinent aspects of the Vermont Yankee request.

Vermont Yankee is in the situation of having almost fully utilized its spent fuel storage facility, which situation, however, is common to many operating utilities in the United States. This situation is aggravated by the absence of any permanent spent fuel storage facility in this country. Vermont Yankee asserts it is ready to ship offsite its spent fuel when a permanent storage facility is selected and rendered operative. In the meantime, in common with other utilities, the Vermont Yankee view is that its only alternative is to enlarge its present onsite storage facility. Vermont Yankee contends this course of action is feasible and will provide adequate storage capacity until 1990.

The Nuclear Regulatory Commission, in a general policy statement, has determined in effect⁵ that individual reactor proceedings need not resolve the long range permanent storage of spent fuel waste problem, but that a permanent spent fuel storage facility will be available when needed by the nuclear utilities, after full utilization of expanded onsite storage pools. To this extent, many of the NECNP assertions are answered concerning the need to resolve now the character of a permanent storage location and facility and the program for permanent spent fuel storage. The Licensing Board is bound by the Commission's determination and thus rejects, as hereinafter identified, certain of the NECNP proposed findings on these subjects.

The existing Vermont Yankee spent fuel storage pool was designed to handle a maximum "normal" (T. 125°F) heat load of 4.46×10^6 Btu/hr and an emergency heat load (T. 150°F) of 17.9×10^6 Btu/hr. Actual operating experience has shown this design to be extremely conservative. The spent fuel pool cooling system is presently operating at half of design flow and is throttled to maintain a pool temperature between 80° and 90°F. These conditions exist despite the storage of a greater than "normal" amount of spent fuel.

The reasons the pool water temperature is lower than predicted by the original analyses are:

- a. Connecticut River water is cooler than originally assumed. Plant service water runs at least 10°F cooler than design numbers used.

⁵ The determination that eventually adequate permanent offsite spent fuel waste storage will be available is the effect of the following positions taken by the Commission:

The statutory provisions cited above make it clear that no statutory requirement exists that the Commission determine the safety of ultimate high level waste disposal activities in connection with licensing of individual reactors. (42 *Federal Register*, at 34392.)

The Commission believes that the direction and progress of the present overall high level waste management program is satisfactory and provides a reasonable basis for continued licensing of facilities whose operation will produce nuclear wastes. (42 *Federal Register*, at 34393.)

- b. The cooling components are conservatively sized.
- c. The spent fuel heat loads are conservatively analyzed.

Even assuming a complete loss of cooling capability and a recent complete core off-load, over eight hours would elapse before boiling occurred. This would provide adequate time to either repair the system or arrange for necessary make-up water to be pumped to the pool.

No alteration of the spent fuel pool or its cooling or demineralizer systems is contemplated as a result of the proposed amendment.

As a result of the information gained in actual operation as to the temperatures generated by the decay heat from spent fuel assemblies, the Licensee is now estimating a 400 percent margin of safety on the "normal" (125°F) limit using 1976 operating data for system capacity and the projected "normal" plant discharge of spent fuel through 1987.

Using original design data, the definitions established in the Final Safety Analysis Report (FSAR) and the current heat load analyses, the Licensee estimates that at a 150°F temperature, a 50 percent design margin on the spent fuel pool cooling system will exist.

As indicated, Vermont Yankee proposes a new type of spent fuel storage rack which consists of modules of two sizes. Those 73 inches square and approximately 178 inches tall can accommodate 100 spent fuel assemblies. Those which are 51 inches x 73 inches x 178 inches can store 70 fuel assemblies. The racks are free standing. After the entire installation is completed, storage space for 2,000 fuel assemblies will be provided. Each module is composed of an upper and lower cast grid structure made of 356-T51, ASTM B-26 alloy aluminum. The upper and lower grids are joined together by 6061-T651 alloy aluminum side plates which are bolted in place by 2024-T4 alloy aluminum bolts and pins. Captured between the grid structures and arranged in a checkerboard configuration are double-walled "cavity cans" made of 5052-H32 alloy aluminum with boral neutron absorbing shields sealed between the walls.

The boral seal in the cavity cans is accomplished by forming the ends of the outer can and welding it to the inner can. When it is first formed and welded the inner can is vacuum and pressure checked to assure its integrity against leakage. At the completion of the fabrication and welding of this assembly the same test is applied again. Any discernible leakage is cause for rejection in this test. The pressure tap hole is then welded shut and dye penetrant inspected to ascertain integrity of this weld. Finally, two different visual inspections are conducted on these welds to ensure their quality through final rack assembly and transportation to the plant site.

The likelihood of a leaking weld in one of these assemblies is very small for several reasons. First, the volume of water which will flow through such a small opening is minimized because flow is restricted and finally terminated by

aluminum oxide buildup in the opening. This greatly reduces the possibility of the full length of the boral strip being exposed to water. In addition, in a closed area initial aluminum oxidation coats the surface of the aluminum and seals the water from it. At the same time aluminum ions are released to the water reducing, and finally virtually eliminating, its corrosive effect. During this initial corrosion period dissolved oxygen in the water is depleted further reducing its corrosiveness. Thus, initial corrosion of the 1100 alloy aluminum in the boral occurs but soon slows and finally is virtually eliminated. Tests of bare boral completely immersed in demineralized water for over a year exhibit a negligible weight loss.

The racks will rest on the stainless steel pool liner on stainless steel feet which are separated from the aluminum rack structure by ABS plastic insulators which minimize the possibility of galvanic corrosion between the dissimilar metals. The required properties of the ABS plastic (thermal, structural and effects of radiation) were checked for compatibility with the spent fuel pool environment. These properties are well within requirements. The aluminum alloys used in the proposed racks were chosen to assure maximum compatibility with the deionized spent fuel pool water.

In addition to further assure maximum integrity of this equipment over the design life, all aluminum surfaces in contact with the pool water are inerted against corrosion by anodizing before assembly of the rack modules. (In comparison, the existing racks are unanodized aluminum structures with no provision to protect from galvanic corrosion between the aluminum racks and the stainless steel pool liner.)

Studies done by the Licensee of the potential for corrosion of the new fuel racks indicate that this will not be a problem. The Staff concurs in his judgment.

In addition, a corrosion test program has been instituted to monitor the performance of material used in construction of the racks. The samples are installed in the pool and will be removed periodically for examination. If any unanticipated conditions are noted, the necessary corrective action will be taken. Extrapolations from elevated temperature corrosion studies show that there is no concern for corrosion of fuel assemblies over the anticipated storage period. More specifically, one thousand years of exposure to spent fuel storage conditions would result in about one mil of material loss.

The fuel assemblies utilized at Vermont Yankee contain zircaloy and stainless steel and Inconel 718. While the possibility of stress corrosion cracking of sensitized stainless steel or zircaloy cannot be eliminated entirely, its probability is believed to be extremely low. Past experience has shown no corrosion problems after residence of similar fuel assemblies in fuel pools for over ten years. And calculations indicate that zircaloy clad's corrosion rate is sufficiently low to provide an adequate containment for at least 100 years.

Even assuming that there is leakage of the fuel rods, this is not expected to

be a problem for a number of reasons. The in-reactor leak causes most of the fission gases to escape to the reactor coolant prior to their unloading into the spent fuel pool, and the excellent corrosion resistance of the UO_2 pellets has prevented significant deterioration of the fuel during long-term storage. The ion exchange resins in the Vermont Yankee fuel storage pool cooling system are capable of removing any radioactive impurities that may enter the pool due to loss of rod integrity. Further, any loss of rod integrity due to corrosion reactions during storage would most likely be very local, so that any sources for release to the pool environment would be small and the contamination readily removed by the ion exchange resins.

The Licensee has done an analysis of the reactivity of the new spent fuel rack design.

This analysis shows that the highest reactivity, at any temperature likely, in fact, to occur, occurs at a pool temperature of 68°F (20°C) as seen below:

Temp., $^\circ\text{F}$ ($^\circ\text{C}$)		K° (including uncertainty)
68	(20)	0.868
150	(65.6)	0.858
200	(93.3)	0.849

The Staff also has analyzed the possibility of an inadvertent criticality and has determined that even in the unlikely event that the water temperature dropped to 32°F (0°C), the neutron multiplication factor could still increase only to 0.873.

A seismic analysis for the new racks was made using the same ground acceleration values (as detailed in the Vermont Yankee FSAR) as were used for all Class I equipment (including the now in-place racks). A multidegree of freedom dynamic model was derived and subjected to the fuel pool floor motions calculated in the reactor building seismic analysis. All properties affecting the dynamic behavior of the rack have been considered including nonlinearities such as fluid interaction and fuel bundle-cavity impact.

The results obtained from the dynamic analysis were used to check stresses in all parts of the rack. Stresses were found to be within the allowables for Class I structures and equipment.

The Staff has reviewed the seismic analysis of the new rack design, and has concluded that the design is sufficient to withstand the seismic loading which would accompany a design basis earthquake.

There is sufficient free space in the spent fuel pit to permit the installation of some new fuel racks without first removing any old racks or moving any fuel. Once these new racks are installed, fuel will be transferred to them from the old racks. The vacated old racks will then be removed from the spent fuel pit and

new racks will be installed in their place and the process repeated until all of the new racks are installed.

When the old racks are first removed from the spent fuel pit, they will be washed down over the pit to remove any loose contamination. They will then be transferred to the dryer-separator storage pit where they will be further decontaminated using a hydro-laser technique, cut up into pieces with a cutting torch, and then placed in shipping containers to be shipped for burial as low level rad-waste at a licensed burial site.

The Staff has reviewed the proposed installation methods and found them acceptable.

Calculations and analyses by both the Licensee and the Staff reveal that the increased radiation doses resulting from installation of the new racks and the continued storage of increased amounts of fuel are not significant.

The Board finds that the increased doses to workers resulting from these events will be kept as low as is reasonably achievable, as required by 10 CFR Section 20.1.

The foregoing and detailed recital of factual matters provide adequate basis to reject⁶ the contentions asserted by NECNP and its associated parties as joint intervenors. The evidence adduced by both the Licensee and the Staff are related to each of the allowed contentions and describe with specificity the reasons and present the facts to permit full consideration of all aspects of the contentions.

Upon this basis, the Licensing Board concludes in reference to each of NECNP contentions, that reliable, probative and substantial evidence has been presented to determine that:

- (1) The margin of cooling capacity remaining in the expanded spent fuel storage pool is adequate;
- (2) The demineralization systems are adequate;
- (3) The comparative strength of the new racks to the old racks is established to be sufficient and that adequate margins of safety with respect to normal and accidental stresses on the proposed racks are shown to be present;
- (4) The proposed new racks can withstand seismic stress with the same safety margins as the original racks;

⁶Not to be overlooked is Licensee's general objection to the joint intervenor contentions, which Licensee contends merely state positions without any references to factual matters. The Licensing Board concludes, as the Staff implies, that reasonably valid contentions may be supported by facts developed upon later cross-examination. Equally important, under then Judge (now Mr. Chief Justice) Burger's opinions in the *Church of Christ* cases (*Office of Communication of the United Church of Christ v. FCC*, 359 F.2d 994 (D. C. Cir. 1966); *op. after remand*, 425 F.2d 543 (D. C. Cir. 1969)), the contentions are valid for hearing purposes.

- (5) Adequate safety margins have been shown to be available for the process of moving spent fuel while new racks are installed and the removal, decontamination and cutting of old racks and shipment and storage of old racks;
- (6) Adequate safety margins will be available for the effect on the spent fuel storage pool material of exposure to the higher temperatures likely to be present;
- (7) Adequate safety margins have been established by the design and plans to maintain continued integrity of the spent fuel rods during storage in the spent fuel pool and for the prevention of any possible increased radioactive releases;
- (8) Adequate safety margins will be maintained from the effectiveness of methods for boral sealing;
- (9) The differences between the materials and fabrication processes for the current spent fuel racks and the new racks have been shown and are found adequate;
- (10) The bases for the most reactive pool temperature for proposed fuel configuration have established adequate margins of safety; and
- (11) The seismic design of the proposed new spent fuel racks is adequate.

NECNP asserted other contentions which are related to costs of the proposed enlargement and the cost of alternative possibilities. The total cost associated with the proposed modification of the spent fuel storage pool is estimated to be approximately \$1.8 million, or about \$1300 for each of the 1400 additional fuel assemblies. The \$1.8 million estimated cost covers \$1.4 million for equipment and fabrication of the new racks, \$110,000 for labor and installation, \$110,000 for engineering, \$34,000 for overhead, and \$102,000 for interest and allowance for funds used during construction.

A consideration of costs for alternatives to the proposed modification of the spent fuel storage pool involves the effects of a shutdown of the Vermont Yankee facility which would be necessary if the storage pool is not available for additional spent fuel. Vermont Yankee has computed the cost of replacement energy at \$225,000 per day. The Staff made a detailed analysis⁷ of such Vermont Yankee computation and concluded that the \$225,000 figure is reasonable. Vermont Yankee submitted, in a response to a suggested but rejected certification of question consideration, an affidavit from the chief engineer of the Vermont Public Service Board, who computed that the cost of a six-months'

⁷This analysis by the Staff is reflected in the public hearing record now before the Appeal Board in its consideration of effects of revised Table S-3 values on environmental effects.

shutdown of the Vermont Yankee facility would be approximately \$50,000,000 for the ratepayers in New England.

A third cost concern raised by NECNP related to exposure limits for workers and the public from the proposed modification. The Vermont Yankee estimate of man-hours needed is 2000 and the total exposure will be approximately 4 man-rem. The Staff made an estimate based upon experience at other nuclear facilities and computed a 10 man-rem dose. On an annual basis, the proposed modification will add less than 2 percent of the total occupational radiation exposure burden at the facility. For the longer period, and by an analysis of the likelihood of the kind and release expectations from various nuclides,⁸ the Staff computes that such releases will result in additional total body dose at the site boundary to an individual of less than 0.001 millirem per year, which is obviously insignificant from a comparison of the approximately 100 millirem per year that an individual receives from natural background radiation. The calculated total body dose to the estimated population within a 50-mile radius of the nuclear facility is less than 0.005 man-rem per year.

The sum of the presentations by both Vermont Yankee and the Staff is that based upon reliable, probative and substantial evidence, directed to the NECNP contention on health, safety and environmental considerations, Vermont Yankee has provided adequate basis that the proposed fuel storage modification reflects the optimum of actions available at the present time.

NECNP has proposed that a condition be attached to any decision and order authorizing the proposed storage pool modification to require that 232 or less spent fuel assemblies be stored for no longer than six months and that spent fuel be stored for no longer than twelve months, otherwise, the Vermont Yankee facility should be shut down. In addition, NECNP proposes that a safe and environmentally acceptable location and method of storage be utilized by Vermont Yankee within five years of the approval of the proposed pool modification.

The Atomic Safety and Licensing Board concludes that Vermont Yankee and the Staff have established by reliable, probative and substantial evidence that the proposed condition is not required by the evidence presented and that adequate safety margins⁹ have been shown for the proposed modification of the spent fuel pool. Of vital importance, also, is the Staff determination, as shown in its safety evaluation, with which the Board agrees, that the installation and use

⁸ The volatile fission product nuclides of most concern that might be released through defects in the fuel cladding are the noble gases (xenon and krypton), tritium and the iodine isotopes.

⁹ The Staff statement is: "As regards safety considerations, it *appears* in general that the systems affected, such as the spent fuel pool cooling system and the demineralizer system, are *adequate* to handle the minor increased load." (Emphasis added.) The Board believes that it is not merely a safety appearance, but that adequate safety margins have been established.

of the new fuel racks does not alter the consequences of the design basis accident.

In accordance with its obligation to independently review subjects and matters within the scope of the National Environmental Policy Act (NEPA), the Licensing Board has inquired into items suggested by the parties and items of concern to the Board. The State of Vermont suggested that a detailed environmental impact statement was required for the considerations in this proceeding pursuant to Section 102(2)(C) of NEPA. While the State did not pursue that contention, the Board notes that the Staff did file an Environmental Impact Appraisal (EIA) which, except for the omission of circulating it among several governmental agencies and units, closely conforms to a Final Environmental Statement (FES) which is usually filed in all major nuclear facility construction and operating license proceedings. The EIA is, in a sense, a supplement to FES previously submitted by the Staff and considered in prior proceedings. The EIA describes the proposed modification of the fuel storage and the need for it, as well as an outline of the features of the nuclear plant, its fuel inventory, cooling water systems, radioactive waste handling systems, and the spent fuel pool cooling and demineralizer system. Environmental impacts are analyzed for land and water uses and radiological effects. The balance of the EIA considers in detail the alternatives available and concludes with a final evaluation of environmental impacts, both unavoidable and avoidable, and a cost-benefit balance. In sum, the EIA is comprehensive and supports the Vermont Yankee and Staff position that the proposed modification of the spent fuel storage pool is not a major Federal action that significantly affects the quality of the human environment, and therefore, the formal Final Environmental Statement is not required. Comments from other governmental units are not needed for this analysis, although such units should be free to submit comments if they desire. The specific reasons supporting this position are enumerated and summarized as set forth in Staff proposed finding number 24, which in part is as follows.

Environmental impacts attributable to the increase in storage are insignificant. The proposed modification will not alter the external physical geometry of the spent fuel pool. The modification will not affect in any way the generation of spent uranium fuel by the facility. There will be no change in land use. There will be no significant liquid or gaseous radioactive releases to the environment as a result of the proposed modification. The amount of increased solid radioactive waste resulting from the proposed modification would not have any significant environmental impact. The proposed modification will add less than two percent to the total annual occupational radiation exposure at the facility and will not result in any significant increase in doses received by workers. There will be no change in the chemical or biocidal effluents from the plant as a result of the proposed modification. Any increase in heat discharged to the atmosphere or to the

Connecticut River will be negligible. No significant environmental impact on the community is expected to result from the fuel rack conversion or from subsequent operation with the increased storage of spent fuel in the spent fuel storage pool. (References omitted.)

The Staff, as heretofore indicated, analyzed alternatives reasonably available to Vermont Yankee. The possibility of shipment of spent fuel waste to another reactor site was considered; however, further details would add additional support to the rejection of this alternative. Vermont Yankee is part of the New England power pool which includes other reactor facilities, some of which are operating and some of which are under construction. These possibilities may have received somewhat of a cursory review¹⁰ which might be expanded in other proceedings involving reactor facilities in the New England power pool. Other alternatives were more thoroughly analyzed.

The Atomic Safety and Licensing Board concludes upon the basis of the record presented, the contentions asserted and allowed, evidence adduced, proposed findings and conclusions submitted that reliable, probative, and substantial evidence warrants the grant of the amendment requested by Vermont Yankee to expand and utilize the Vermont Yankee spent fuel pool storage at the site at Vernon, Vermont. The Vermont Yankee and Staff findings and conclusions in conformance with this Board determination are accepted and specific rulings are therefore not made on each of the Vermont Yankee and Staff proposed findings and conclusions. The stipulation of the parties reflects adequate public concern considerations and is accepted by the Board.

Specific rulings on proposed findings and conclusions submitted by NECNP are as follows:

No. 1 is accepted.

Nos. 2, 3, and 4 are rejected as not relevant to the issue of spent fuel pool storage in Vernon; however, the Staff Environmental Appraisal directed to this issue does contain the sentences to the effect that: "Reprocessing of the spent fuel . . . is no longer an available alternative for its disposal . . . the President . . . deferred indefinitely commercial reprocessing . . . No facility exists or is under construction for the long-term . . . disposal or storage of spent fuel from Vermont Yankee . . ."

¹⁰ The Staff proposed findings in this regard contain this brief analysis: "Alternatives (1) and (3) (shipment to another reactor site) are presently not available to the licensee or could not be made available in time to meet the licensee's need. . . . shipment to another site is not appropriate because of costs and the fact that there does not appear to be any surplus spent fuel pool capacity at other facilities." (Parentheses and emphasis added.) At least a shipment of spent fuel anywhere offsite would, at least, conform to expectations of people in Vermont of no greater fuel storage than originally contemplated.

Nos. 5 and 6 are accepted upon the basis of the present record, but this ruling is without prejudice to consideration in other proceedings.

Nos. 7, 8, and 9 are accepted.

Nos. 10 and 11 are rejected as not relevant to the issue of spent fuel pool storage in Vernon; however, the Staff Environmental Appraisal directed to this issue does contain a sentence to the effect that: "...there is no assurance that the spent fuel stored at Vermont Yankee will ever be removed from the site ..." and the evidence by Vermont Yankee is to the effect that the requirement that fuel be removed from the site at the end of the license period and the absence of a place to locate it once removed is a "catch 22 situation."

Nos. 12 and 13 are accepted.

Nos. 14 and 15 are rejected as not relevant to the issue of spent fuel pool storage at Vernon; although the parties stipulated as correct that Vermont Yankee has no plans for the disposal of the accumulated spent fuel after 1990 and the record reflects that if no long-term disposal solution has been chosen, the fuel will remain onsite.

Nos. 16, 17, and 18 are accepted.

No. 19 is rejected as not supported by reliable, probative and substantial evidence.

No. 20 is accepted, except for the last sentence which is not supported by reliable, probative and substantial evidence.

Nos. 21, 22, 23, 24, 25, 26, and 27 are rejected as not relevant to the issue of spent fuel pool storage in Vernon, although the stipulation by the parties is that it is correct that increasing the capacity of the Vermont Yankee spent fuel pool storage is not an adequate long-term storage solution, and the Staff in its appraisal has concluded that the existing storage pool was not designed for perpetual storage, etc.

Nos. 28, 29 and 31 are rejected as not supported by reliable, probative and substantial evidence.

Nos. 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, and 42 are rejected as not relevant to the issue of spent fuel pool storage in Vernon; in addition, NECNP proposed finding no. 38 is not supported by reliable, probative and

substantial evidence, proposed findings nos. 40, 41, and 42 are rejected as argumentative and not supported by reliable, probative and substantial evidence.

Upon the basis of the foregoing Initial Decision, reflecting a consideration and determination of the entire record, the Atomic Safety and Licensing Board concludes that:

- (1) The facility will operate in conformity with the application, the provisions of the Atomic Energy Act of 1954, as amended, and the rules, regulations and decisions of the Commission.
- (2) There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations.
- (3) The requirements of the National Environmental Policy Act (Sections 102(2)(C) and (E)) and the Commission's regulations (10 CFR Part 51) have been adequately satisfied.

WHEREFORE, IT IS ORDERED, in accordance with the Atomic Energy Act, as amended, the rules and regulations of the Nuclear Regulatory Commission, and the National Environmental Policy Act that the request by Vermont Yankee Nuclear Power Corporation (Vermont Yankee) to amend its operating license No. DPR-28 is granted to modify and enlarge its existing spent fuel pool storage in the manner and to the extent described by Vermont Yankee in its application filed on November 5, 1976, to expand the capacity of its spent fuel pool from 600 fuel assemblies to 2000 fuel assemblies,

and the Director of the Office of Nuclear Reactor Regulation is authorized, upon making requisite findings with respect to matters other than those placed in controversy by the parties and determined in this Initial Decision, to issue the requested amendment as aforesaid authorizing the Licensee Vermont Yankee to replace the existing racks with those described in this application so as to increase the Vermont Yankee nuclear power station spent fuel pool storage capacity up to 2000 assemblies, and

IT IS FURTHER ORDERED, in accordance with Sections 2.760, 2.760a, 2.762, 2.764, 2.785, 2.786 and 2.788 of the Commission's Rules of Practice, that this Initial Decision shall be effective immediately and shall constitute the final action of the Commission forty-five (45) days after the date of issuance hereof, subject to any review pursuant to the Rules of Practice. Exceptions to this Initial Decision and supporting briefs may be filed by any party within seven (7) days after the service of this Initial Decision. Within fifteen (15) days thereafter (20 days in the case of the Staff) any party filing such exceptions shall file a brief in support of such exceptions. Within fifteen (15) days after service

of the brief of appellant (20 days in the case of the Staff) any other party may file a brief in support of, or in opposition to, the exception.

**ATOMIC SAFETY
AND LICENSING BOARD**

David B. Hall

Paul W. Purdom

Samuel W. Jensch, Chairman

Issued:

August 30, 1977

Bethesda, Maryland

[Appendix A has been omitted from this publication but is available in the NRC Public Document Room, 1717 H Street, N.W., Washington, D.C.]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Victor Gilinsky
Richard Kennedy
Peter Bradford

In the Matter of**DOCKET NOS. 50-443
50-444****PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, et al.****(Seabrook Station, Units 1 and 2)****September 15, 1977**

Upon petitions for review of portions of ALAB-422, 6 NRC 33, and ALAB-423, 6 NRC 115, the Commission denies the lead applicant's petition but grants, in part, the petition of an intervenor. The Commission reserves decision on review of one other issue pending receipt of a forthcoming supplemental dissenting opinion of an Appeal Board member on that issue. It reaffirms an earlier ruling (CLI-77-14, 5 NRC 1323) that the issue of emergency planning for persons outside the low population zone is more appropriately left to generic rulemaking.

ORDER

On July 26, 1977, the Atomic Safety and Licensing Appeal Board decided ALAB-422 and ALAB-423, 6 NRC 33 and 115, which deal with the proposed Seabrook facility. Petitions to review portions of those decisions pursuant to 10 CFR §2.786 have been filed with the Commission by the lead applicant, Public Service Company of New Hampshire, and by one of the intervenors, the New England Coalition on Nuclear Pollution. The NRC staff opposes both petitions for review. On August 26, the time for consideration of those petitions was extended until September 15.

The Commission has decided to deny the applicant's petition and to grant the NECNP petition in part. Commission review shall be limited to the issues specified below:

1. In ALAB-422 the Appeal Board majority found that applicants had a

reasonable assurance of obtaining the necessary funds to cover construction and fuel cycle related costs. In connection with our review of this question, we desire the parties to review the general nature of the Commission's responsibilities under Section 182a of the Atomic Energy Act which requires the Commission to pass upon the financial qualifications of applicants for licenses. 42 U.S.C. 2232(a). This analysis may appropriately focus on the following two subissues: (a) did the Appeal Board majority err in holding that the financial qualifications requirement of the Atomic Energy Act "centers upon whether the funds can be obtained and not on the price of or difficulty in obtaining them," ALAB-422 (6 NRC at 79), and (b) what weight, if any, may properly be accorded to the prospect of public utilities obtaining future rate increases in the evaluation of their financial qualifications as applicants for licenses from the Commission. In connection with discussion of this question, we invite the parties to explain how the regulatory statutes and practices of the states other than New Hampshire regulating utilities involved in the Seabrook project compare with the New Hampshire law referenced by the Board. Additionally we desire the parties to summarize their views on the state of the evidence in the record on this issue and the extent to which it supports the findings of the Licensing and Appeal Boards. We expect that in large measure the parties will be able to accomplish this task by referencing and incorporating in their briefs portions of the papers they have already filed with the Appeal Board.

2. The parties should discuss whether it was proper for the Appeal Board to accord binding effect to findings of the Environmental Protection Agency pursuant to Section 316(a) of the Federal Water Pollution Control Act with respect to the impacts of once-through cooling on the marine environment. The parties should focus on the policy and legal considerations relevant to the Commission's use in carrying out a portion of its NEPA responsibilities of a finding made by another Federal agency pursuant to a different statute. Additionally we desire the parties to summarize their views on the state of the evidence in the record on the impacts of once-through cooling on the marine environment and the extent to which it supports the findings of the Licensing and Appeal Boards. We expect that in large measure the parties will be able to accomplish this task by referencing and incorporating in their briefs portions of the papers they have already filed with the Appeal Board.

3. NECNP asserts that the Appeal Board, in exercising its independent authority to review the record, make findings, and rule on the basis of those findings, has "distort[ed] the meaning of the testimony, and thus, its rulings are in error." While we have no intention of undertaking *de novo* review of the findings of fact below, we invite NECNP to provide us with specific instances where testimony distorted by the Appeal Board resulted in er-

roneous rulings by the Board on the seven specific issues as to which NECNP has sought Commission review.

4. The parties should discuss whether the Appeal Board erred in according presumptive validity to the July 17, 1977, decision of the Atomic Safety and Licensing Board comparing the Seabrook site with possible alternative sites in Southern New England and elsewhere.

NECNP has also raised an issue regarding the Appeal Board majority's affirmance of the selection of an earthquake of Modified Mercalli Intensity VIII as the safe shutdown earthquake for the facility and its use of a ground acceleration value of 0.25g as the design value for the facility. Member Farfar has indicated that he is preparing a supplemental dissenting opinion on this subject. We are extending the time within which we may consider whether to review the seismic issue until we have received and analyzed that supplemental opinion.

Finally, NECNP has raised the issue of applicant's obligation to perform emergency planning for persons situated outside the low population zone. That issue was previously decided by the Appeal Board in ALAB-390, 5 NRC 733 (April 7, 1977) and it reaffirmed its prior decision in ALAB-422. In an order dated June 17, we announced our intention not to review the issue of emergency planning outside the LPZ in the adjudicatory context. However, we indicated our very real concern about the issue and directed our staff to carry forward a study as a "priority matter." We further announced our intention to initiate a rulemaking on the issue at an early date.

Our staff informs us that the study has been conducted on an expedited basis and we now have it before us for consideration. We expect to initiate a rulemaking on the issue soon. On that basis we see no reason to depart from our previous judgment that this matter is more appropriately left to be resolved as part of that generic rulemaking. We expect to complete the rulemaking on this subject before the Seabrook facility reaches the operating license stage.

The parties to the review proceeding shall be NECNP, the Audubon Society of New Hampshire and the Seacoast Anti-Pollution League, the NRC staff, and the Public Service Company of New Hampshire.¹ Since the parties have already briefed some of these issues to the Appeal Board, we are imposing an expedited briefing schedule which will enable us to review and resolve these issues without undue delay. The parties' initial briefs shall be *received* by the Commission by the close of business October 7, 1977. Any reply briefs should be *received* by the Commission by the close of

¹Those are the only parties to have filed papers with the Commission on the issues which we are reviewing, and in the circumstances of this case, we believe that they adequately reflect the spectrum of conflicting opinions on those issues. 10 CFR §2.786(b)(6).

business, October 17, 1977. Oral argument will be scheduled in a subsequent Order.²

It is so ORDERED.

By the Commission

Samuel J. Chilk
Secretary of the Commission

Dated at Washington, D.C.,
this 15th day of September 1977

²Commissioner Bradford has reviewed his prior participation as a member of the Maine Public Utilities Commission in matters involving the Seabrook facility and has determined that there is no reason why he should abstain from participating in this review. He has furnished the parties with a statement disclosing his prior involvement and offered to consider any objections to his participation. No such objections were made.

Chairman Hendrie has decided not to participate in the Commission's Seabrook review because of his prior involvement with the Seabrook proceeding as Deputy Director for Licensing and Technical Review of the Atomic Energy Commission.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Joseph M. Hendrie, Chairman*
Victor Gilinsky
Richard T. Kennedy
Peter A. Bradford

In the Matter of

Docket Nos. 50-275 OL
50-323 OL

**PACIFIC GAS AND ELECTRIC
COMPANY**
(Diablo Canyon Nuclear Power
Plant, Units 1 and 2)

September 15, 1977

The Commission denies the applicant's petition for review and declines to review *sua sponte* an Appeal Board decision (ALAB-410, 5 NRC 1398) permitting an intervenor limited access to the applicant's physical security plan.

RULES OF PRACTICE: APPEAL

A petition for review of an Appeal Board decision on an issue certified to it from a Licensing Board is not authorized by the Commission's rules, 10 CFR §2.786(b).

ORDER

In this proceeding on an application for an operating license, the Appeal Board has ruled that the intervenor is entitled to limited access to the ap-

*Chairman Hendrie has reviewed his prior participation as Deputy Director for Licensing and Technical Review of the Atomic Energy Commission and as a member of the Advisory Committee on Reactor Safeguards in matters involving the Diablo Canyon facility. He has no recollection of any involvement on the question of applicant's physical security plans, and a records search did not indicate any such participation. Accordingly, he has determined that there is no reason why he should abstain from participating in consideration of ALAB-410. In the future, when other matters involving this facility come before the Commission, he will consider anew his status as a participant.

plicant's physical security plan required under 10 CFR §§50.34(c), 73.55, subject to certain safeguards to protect against unauthorized release of the plan. *Pacific Gas and Electric Company* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-410, 5 NRC 1398 (June 9, 1977). A petition for Commission review on behalf of the applicant has been received and the Staff has filed an answer opposing review. We note that the petition seeks review of an Appeal Board decision on an issue certified to it for determination, and is therefore not authorized by our rules. 10 CFR §2.786(b). By this order, the Commission denies the petition and declines to exercise its *sua sponte* review authority. See 10 CFR §2.786.

Nonetheless, the prospect of even limited disclosure of physical security plans for nuclear facilities poses serious and difficult questions. See letter of Chairman Bender, ACRS, to Chairman Hendrie, dated August 18, 1977, copy attached. The nature and detail of the security plans submitted by applicants and licensees under our recently promulgated 10 CFR §73.55 differ significantly from the plans that were at issue in earlier adjudicatory proceedings in which we were involved. *E.g.*, *Consolidated Edison Co. of New York* (Indian Point Station, Unit 2), CLI-74-23, 7 AEC 947 (1974). Nonetheless, our responsibilities require the Commission to make certain findings and determinations before issuing an operating license for a nuclear power reactor, and the sufficiency of an applicant's proposed safeguards plans and procedures are relevant to those findings and determinations. The extent to which the above principles and the facts of this case require disclosure beyond the general outlines and criteria of the applicant's security plan is a matter for the Licensing Board to decide in the first instance and under the guidelines of ALAB-410, subject of course to the ordinary procedures for review by the Appeal Board and the Commission.

By the Commission

Samuel J. Chilk
Secretary of the Commission

Dated at Washington, D.C.,
this 15th day of September 1977.

[The attachment has been omitted from this publication, but is available in the NRC Public Document Room, 1717 H Street, N.W., Washington, D.C.]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Richard S. Salzman
Jerome E. Sharfman

In the Matter of

Docket Nos. 50-346A
50-500A
50-501A

THE TOLEDO EDISON COMPANY
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

(Davis-Besse Nuclear Power
Station, Units 1, 2 and 3)

THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY, et al.

Docket Nos. 50-440A
50-441A

(Perry Nuclear Power Plant,
Units 1 and 2)

September 2, 1977

The Appeal Board grants motions by the City of Cleveland and the Department of Justice, respectively, to strike certain appendices to applicants' reply brief.

Messrs. William Bradford Reynolds and Robert E. Zahler, Washington, D.C., for applicants Cleveland Electric Illuminating Company, Toledo Edison Company and Pennsylvania Power Company.

Messrs. Reuben Goldberg and David C. Hjelmfelt, Washington, D.C., and **Malcolm Douglas and Robert D. Hart**, Cleveland, Ohio, for the City of Cleveland.

Mr. Melvin G. Berger and Ms. Janet R. Urban for the Department of Justice.

Mr. Roy P. Lessy, Jr., for the Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

The City of Cleveland and the Department of Justice have each moved to strike a different appendix to applicants' reply brief in this antitrust proceeding. We will discuss each motion in turn.

The City of Cleveland seeks to strike Appendix A, a series of charts purportedly showing where the parties' initial briefs discuss certain findings in the decision below. There are extensive footnotes to the charts consisting of legal argument. The City contends that this appendix violates the 100-page limitation set by us for reply briefs in this case. The City is correct. The lengthy footnotes are plainly legal argument and, therefore, should have been in the body of the brief. The charts themselves are also argumentative in nature for they are explained by applicants as having been submitted for the purpose of demonstrating that the staff, the Justice Department and Cleveland have not gone beyond the "language" of the decision below in attempting to support their positions.¹ That this proposition is controversial is shown by the staff's answering papers, which claim that the charts are incomplete in significant respects. We view Appendix A as simply an attempt by the applicants to exceed the page limitations which we set. We decline to countenance it. Their contention that there may have been similarly improper appendices attached to other parties' briefs filed earlier is beside the point; they did not complain about those appendices at the time they were filed. We will therefore grant this motion to strike Appendix A and disregard any arguments made therein which are not also set forth in the body of the brief.

The Department of Justice moves to strike Appendix B to the reply brief. Its motion is supported by the staff. This appendix relates to an affidavit of Justice Department witness William M. Lewis, Jr., which was admitted into evidence at the hearing below. The appendix consists of several letters submitted for the purpose of showing that Mr. Lewis' testimony that the affidavit "was not prepared in connection with any then-pending litigation" (Tr. 5619), relied upon in the Justice Department's brief, was not true. In fact, if anything, the documents substantiate this testimony. They seem to show that his affidavit was prepared to assist the Department in determining what advice to give this Commission, pursuant to Section 105c

¹Applicants also state that another purpose of the appendix was to demonstrate the failure of these parties to coordinate their positions on appeal. This purpose is hardly relevant to the merits of the appeal; nor is it relevant to any other issue now before us.

of the Atomic Energy Act, regarding whether activities under a license to construct the Beaver Valley power plant (not involved in this case) would create or maintain a situation inconsistent with the antitrust laws. Advice of this nature is required by that section on each construction permit application. It is rendered whether or not a hearing is recommended by the Department. Indeed, Justice represents (and applicants do not deny) that it recommended against an antitrust hearing on Beaver Valley and that none was held.²

Still, we cannot permit Appendix B to become part of the record. That would be unfair because the Justice Department would not have the opportunity to present evidence explaining it or rebutting it. This might be prejudicial were some reviewing tribunal to interpret the bare documents differently than we do. If the letters in the appendix were newly discovered evidence and tended to show that significant testimony in the record was false, we might be sympathetic to a motion to reopen the hearing.³ However, in this case, the applicants do not deny the Department's assertion that they had the Appendix B documents in their possession for over a year prior to the introduction of Mr. Lewis' affidavit at the hearing and for more than 2-1/2 years before the submission of Appendix B to this Board. Applicants' assertion that they were not aware of the existence of the letters in their own files until well after the close of the hearing below neither excuses nor justifies their unauthorized attempt to supplement the record by appending the documents to their appellate brief.

For the reasons stated, the motions to strike Appendices A and B of applicants' reply brief are *granted*.⁴

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

²While Appendix B does show that Mr. Lewis' recollection was faulty when he testified that he believed the affidavit was prepared in connection with the Zimmer plant (Tr. 5617), applicants have not shown why that mistake is of any consequence.

³No such motion has been made by the applicants.

⁴In addition to Appendix B, the Justice Department would have us strike the last sentence in footnote 9 on page 13 of the body of the reply brief. Although we decline to take that action, it should be noted that the sentence in question contains argumentation based exclusively upon the contents of Appendix B. In view of our determination respecting that appendix, the sentence obviously will not serve to advance applicants' cause.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Richard S. Salzman

In the Matter of

DUKE POWER COMPANY

Docket Nos. STN 50-488
STN 50-489
STN 50-490

(Perkins Nuclear Station,
Units 1, 2 and 3)

September 8, 1977

Upon appeal from denial by Licensing Board of untimely intervention petition, the Appeal Board rules that, where the petition is filed two and one-half years late and petitioner is unable substantially to justify the delay, and where it appears that he does not possess expertise that would help to develop the record and that his intervention would broaden and delay the proceeding, the Licensing Board did not abuse its discretion in denying the petition.

Licensing Board order affirmed.

RULES OF PRACTICE: UNTIMELY INTERVENTION

A tardy petition for leave to intervene may not be entertained unless the petitioner makes "a substantial showing of good cause for failure to file on time," 10 CFR §2.714(a). "Good cause" is based on both (1) the substantiality of the justification for the late filing and (2) the four factors enumerated in Section 2.714(a).

RULES OF PRACTICE: UNTIMELY INTERVENTION

Where an untimely petitioner for intervention tenders no good excuse for tardiness, the petitioner's demonstration on the other factors included in 10 CFR §2.714(a) must be particularly strong.

Messrs. J. Michael McGarry, III, Washington, D.C.,
and William L. Porter, Charlotte, North Carolina, for
the applicant, Duke Power Company.

Mr. David Springer, Mocksville, North Carolina, petitioner, *pro se*.

Mr. Charles A. Barth for the Nuclear Regulatory Commission staff.

DECISION

This construction permit proceeding involving the three units of the proposed Perkins Nuclear Station was noticed for hearing several years ago.³⁹ 39 Fed. Reg. 26470 (July 19, 1974). The deadline specified in the notice for the filing of petitions for leave to intervene was August 19, 1974. Before us now is the appeal of David Springer (hereinafter "petitioner") under 10 CFR §2.714a from the denial by the Licensing Board as untimely of an intervention petition filed by him last April—more than two and one-half years late.¹ We affirm.

1. The Perkins facility is to be located on the east bank of the Yadkin River, approximately seven miles ESE of Mocksville, Davie County, North Carolina. Final Environmental Statement, pp. 2-1, 2-5. It is to utilize mechanical-draft cooling towers for cooling purposes. The towers will draw required makeup water from the Yadkin. *Id.* at p. 3-2.

Petitioner assertedly owns property adjacent to the Yadkin approximately five miles downstream from the Perkins site, as well as riparian property on the upper reaches of High Rock Lake—the body of water into which the river flows approximately 16 miles downstream from the site. His concern lies in the impact that the withdrawal of makeup water from the river might have upon his interests as a riparian property owner. In the furtherance of these interests, he would have the facility utilize a once-through cooling system. Should once-through cooling prove not to be feasible at the proposed site, petitioner offers the alternative of the transferral of the facility to a site on Lake Norman some thirty miles distant. This lake is said to be owned by the applicant and to have ample capacity to accommodate a once-through cooling system for the three units in question.

According to the intervention petition at hand, further consideration of the substitution of once-through cooling for cooling towers is called for by

¹See unpublished order of the Licensing Board dated July 15, 1977, as amended by order of July 25, 1977. The July 15 order also denied an earlier, also untimely, intervention petition filed by Mr. Springer in 1976. It appears, however, from the notice of appeal and supporting brief that the appeal is addressed exclusively to the denial of the April 1977 petition. Accordingly, we confine ourselves in this opinion to a consideration of the correctness of that denial.

two developments. The petition alludes first to the July 1976 decision of the Court of Appeals for the Fourth Circuit in *Appalachian Power Co. v. Train*, 545 F. 2d 1351, which purportedly removed a then existing requirement that cooling towers be employed at the Perkins site. Second, reliance is placed upon a statement of national energy policy issued by the President on April 18, 1977, which, in petitioner's view, points in the direction of the conservation of energy through the use where possible of once-through cooling in lieu of mechanical-draft cooling towers. More specifically, the contention is that, in light of these developments, the Final Environmental Statement for the facility must be amended "to quantify the environmental impact of mechanical draft cooling towers as compared to once through cooling at the Perkins Station."

2. Under the Commission's Rules of Practice, an untimely intervention petition may not be entertained in the absence of a determination by the Licensing Board "that the petitioner has made a substantial showing of good cause for failure to file on time." 10 CFR §2.714(a). It is settled that the "good cause" determination is to be made on the basis of a consideration of both (1) the substantiality of the justification offered for the late filing and (2) the four factors specifically enumerated in Section 2.714(a).² See e.g. *Nuclear Fuel Services, Inc.* (West Valley Reprocessing Plant), CLI-75-4, 1 NRC 273 (1975); *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 2), ALAB-384, 5 NRC 612, 615 (1977). Further, in circumstances where no good excuse is tendered for the tardiness, the petitioner's demonstration on the other factors must be particularly strong. *Ibid.*

In this instance, we are in total agreement with the Licensing Board that the extreme belatedness of the petition was not justified by either of the developments upon which petitioner relies. Apart from all other considerations, petitioner has not satisfactorily explained why he waited for nine months after the rendition of the *Appalachian Power* decision before filing his petition. The record does suggest that the reason was not a lack of an early awareness of the decision. Counsel for the applicant represented to the Licensing Board that petitioner had referred to the decision on October 27, 1976, during the course of proceedings conducted by the North Carolina

²Those factors are:

- (1) The availability of other means whereby the petitioner's interest will be protected.
- (2) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.
- (3) The extent to which petitioner's interest will be represented by existing parties.
- (4) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

Environmental Management Commission (Tr. 1428). The accuracy of that representation was not challenged by petitioner.³

Insofar as the President's statement of national energy policy is concerned, it cannot be seriously contended that that statement opened the door for the first time to the exploration of the energy conservation implications attendant upon resort to one cooling mode rather than another. To the contrary, as we had occasion to observe in a related context in *Three Mile Island 2*, ALAB-384, *supra*, the assertion and litigation of contentions bearing upon energy conservation has been possible since well before this proceeding was noticed for hearing. See 5 NRC at 616-18.

In view of the foregoing, the denial of the petition cannot be said to constitute an abuse of the Licensing Board's discretion⁴ unless it should appear that in combination the four additional factors to be considered (see fn. 2, *supra*) weigh heavily in petitioner's favor. It does not so appear.

To begin with, the present participants in the proceeding include Mary Apperson Davis and the Yadkin River Committee. That committee, of which Ms. Davis is chairman, is comprised of, *inter alia*, landowners near or adjacent to the Yadkin River (Ms. Davis herself owns riparian property downstream from the Perkins site). Its concern, in common with that of the present petitioner, embraces the effect that water withdrawal from the Yadkin would have upon the riparian rights of committee members and other similarly situated persons. That concern manifested itself in extensive cross-examination by counsel for Ms. Davis and the committee of the applicant's witnesses during evidentiary hearings in April 1976. See Tr. 526-84; 893-997.

Thus, the petitioner does not seek to advance an interest totally foreign to those which have already been asserted by existing parties to the proceeding. It nonetheless may be that, because Ms. Davis and the Yadkin River Committee did not advance and press the precise contentions that his belated petition would raise, petitioner's interests in precluding water withdrawal from the river have not been fully represented by them. We will further assume in the absence of sufficient information on the point that petitioner was not able to protect those interests adequately through his participation in the hearings last fall before the North Carolina Environmental Management Commission—in which (so the NRC staff tells us) he

³In his notice of appeal, petitioner states that *Appalachian Power* was "mandated" on December 8, 1976—which we take to mean that the mandate of the Fourth Circuit issued on that date. We perceive no good reason why the filing of the intervention petition would have had to abide that event. Be that as it may, an additional period of more than four months elapsed before petitioner acted.

⁴See *Project Management Corp.* (Clinch River Breeder Reactor Plant), ALAB-354, 4 NRC 383, 389 (1976) and cases there cited.

presented evidence with regard to the Lake Norman once-through cooling alternative.

But thereby according him the benefit of the doubt on the first and third factors (as seemingly did the Licensing Board) does not aid the petitioner's overall position. For the second and fourth factors manifestly cut against allowing him to intervene at this late date.

The Licensing Board concluded that petitioner, who is a lawyer by profession, had made no showing that he possesses "any expertise or information that would be of help in developing the record" (order, p. 11). Our independent examination of the record gives us no cause to quarrel with that appraisal. Nor has petitioner provided such cause in his appellate brief, which simply makes note of the fact that he is a lawyer with expertise in discovery and cross-examination of witnesses. On the fourth factor, petitioner fares even worse. By his own admission, he seeks to inject new questions into the proceeding despite the fact that the evidentiary hearing on water availability has been concluded. In these circumstances, as a matter of virtual certainty a grant of the petition at this juncture would not merely broaden the issues but, as well, bring about significant delay in the completion of the proceeding. Given the want of any justification for petitioner's extreme tardiness, the Licensing Board was quite right in declining to countenance such a result.

The order of the Licensing Board under appeal is *affirmed*.
It is so ORDERED.

FOR THE ATOMIC SAFETY
AND LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Michael C. Farrar

In the Matter of

Docket Nos. 50-361
50-362

SOUTHERN CALIFORNIA EDISON
COMPANY
SAN DIEGO GAS & ELECTRIC
COMPANY

(San Onofre Nuclear Generating
Station, Units 2 and 3)

September 14, 1977

Upon *sua sponte* review of LBP-77-34, 5 NRC 1270, the Appeal Board approves the Licensing Board's holding that the applicant's lack of control over a tidal beach in the exclusion area is of such little potential safety consequence as to warrant being dismissed as *de minimis*.

Initial decision affirmed.

EXCLUSION AREA: CONTROL REQUIREMENT

An applicant can justify partial control of the exclusion area only in rare circumstances when it can be shown that the uncontrolled area will not be used by the public or will be used in such a limited way that there is no threat to public health or safety during normal operations or in the event of an accident.

DECISION

We issued an order last year directing the Licensing Board to consider further one issue in this construction permit proceeding involving Units 2 and 3 of the San Onofre Nuclear Generating Station, located on the California coast near San Clemente. ALAB-308, 3 NRC 20 (1976). Specifically, the Board was called upon to decide, after the receipt of additional evidence, whether the applicants' lack of control over a segment of the now proposed

exclusion area' for the two units can be deemed of such little potential safety consequence as to warrant being dismissed as *de minimis*. The segment in question is that portion of the beach, separating the facility site from the Pacific Ocean, which lies below the mean high tide line (hereinafter "tidal beach").²

In carrying out our directive, the Licensing Board conducted an evidentiary hearing on four specific factual questions and, following receipt of the proposed findings of fact and conclusions of law of the respective parties,³ held oral argument. On May 20, 1977, the Board rendered an initial decision in which, on the basis of its appraisal of the record, it concluded that the tidal beach would receive limited use and that such use would pose no threat to the public health and safety either during normal operation of the reactors or in the event of an accident. LBP-77-34, 5 NRC 1270 (1977).

No exceptions to the initial decision have been filed; we thus may fairly assume that there is agreement among the parties both that the findings below accurately reflect the state of the record and that the Licensing Board's ultimate conclusion is justified by those findings. Further, it is quite apparent to us from a close scrutiny of the decision that the Board not only correctly perceived the ingredients of its task but, as well, carried out that task in a thorough and thoughtful manner. Nonetheless, as a part of our customary review *sua sponte* of an initial decision in the absence of an appeal, we have undertaken to examine independently and with care the totality of the evidence. This was prompted by the unusual character of the matter at hand. As pointed out in ALAB-308, it will not be often

that an applicant will be able to justify an exclusion area which—leaving aside railroads, highways and waterways—it does not fully control. To the contrary, we think that this will be possible only in the very rare instances in which, because of unusual circumstances, it can be said with a high degree of confidence that the noncontrolled segment of the exclusion area either (1) will not be used at all by the public; or (2) will be susceptible at most of a limited, defined use which, because of its character, will pose no health and safety threat during normal reactor operations or in the event of an accident. Needless to say, the burden

²The exclusion area originally proposed by the applicants was found unacceptable in ALAB-268, 1 NRC 383 (1975). The applicants then came forward with a revised proposal, calling for an exclusion area of significantly smaller size. The remand in ALAB-308 was in the context of the reduced exclusion area and all references in this opinion to the exclusion area are to it.

³The reasons why this inquiry was crucial in determining the acceptability of the proposed exclusion area are sufficiently developed in ALAB-308 (3 NRC at 24-30) and do not require repetition here.

⁴Those parties included, in addition to the applicants and the NRC staff, the Consolidated Intervenor.

will always be on the applicant to demonstrate the existence of such circumstances and the resultant unimportance from a safety standpoint of its inability to determine all activities within the exclusion area (or to exclude the public from the area entirely).

3 NRC at 28. Given the heavy responsibility of this agency to obviate risks to the public health and safety, our role as the Commission's delegate in adjudicatory matters requires that—notwithstanding our large confidence in the Board below—we be personally satisfied that the applicants have fully discharged that burden here.

We are so satisfied. There is ample record foundation for the several pivotal findings of the Licensing Board. And, in combination, these findings establish that the applicants' lack of control over the tidal beach is not of significance in terms of the protection of the public health and safety during reactor operation.

There is no occasion to rehearse in detail the summary of the evidence contained in the decision below. Suffice it to note our full agreement with the Licensing Board that, for the variety of reasons which it assigned, very few members of the public are likely to use the tidal beach for recreational activities despite its length of 0.8 miles. In this connection, the applicants conducted, over a seven-month period in 1976 (February–September), a twice daily (10 a.m. and 3 p.m.) head count of the persons located within the beach and bluff portions of the exclusion area—including the tidal beach. See Exhibits SCE-1 and SCE-2. Only on one occasion—a Sunday in June—did the total exceed 100 and on a majority of occasions the number of persons was less than ten. Even on the two days of the Independence Day weekend (July 3 and 4), the 3 p.m. count was no greater than 65.⁴ And, as the Licensing Board pointed out, the applicants have committed themselves to take certain action (including the installation of a walkway and fences and the posting of signs) which might well be expected to reduce still further the utilization of the tidal beach within the exclusion area. See 5 NRC at 1282-84. Moreover, although not normally empowered to preclude public access to the tidal beach, the applicants have made arrangements with local law enforcement authorities which will enable their own security personnel to effect the removal of persons from the area should an emergency situa-

⁴It does not appear from the report of the head counts (Exhibit SCE-1) how many of the observed persons on any particular day were located within the tidal beach portion of the exclusion area. The report does contain, however, a distribution by activity; *i.e.*, stationary, in transit, swimming, surfing. Because the tidal beach is essentially wet even at low tide (see 5 NRC at 1274-76), it is reasonable to suppose that most of the stationary individuals were situated above the tidal beach on dry sand. In the case of the peak count (108), 40% of the individuals were stationary. *Id.* at 1281.

tion arise. *Id.* at 1284. In view of the small number of individuals who would be involved—dispersed over a stretch of beach approaching a mile in length—there is no cause to believe that such evacuation could not be accomplished expeditiously and without untoward incident.

What is left for consideration, then, is the question of the amount of radiation exposure which a tidal beach user might experience in the event of an accident. See ALAB-308, *supra*, 3 NRC at 30, fn. 11. The significant evidence on this question is sufficiently discussed and analyzed in the initial decision. 5 NRC at 1284-88. In common with the Licensing Board, we conclude that there is a high probability that the radiation exposure will be well within permissible limits. See 10 CFR §100.11.

The initial decision of the Licensing Board is *affirmed*.
It is so ORDERED.

FOR THE ATOMIC SAFETY
AND LICENSING APPEAL BOARD

Margaret E. Du Flo
Secretary to the Appeal Board

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Richard S. Salzman

In the Matter of

Docket Nos. STN 50-488

STN 50-489

DUKE POWER COMPANY

STN 50-490

(Perkins Nuclear Station,
Units 1, 2, and 3)

September 16, 1977

Upon consideration of a nonparty's appeal from the Licensing Board's denial of his motion to dismiss the construction permit proceeding for want of jurisdiction, the Appeal Board dismisses the appeal.

RULES OF PRACTICE: STANDING TO APPEAL

Except in the case of denial of a petition for intervention, an appeal may be taken only by a party to the proceeding. 10 CFR §2.762(a).

RULES OF PRACTICE: INTERLOCUTORY APPEALS

Except in the case of the denial of a petition for intervention, the Rules of Practice forbid interlocutory appeals from Licensing Board rulings made during the course of a proceeding. 10 CFR §2.730(f).

Mr. David Springer, Mocksville, North Carolina, appellant, *pro se*.

MEMORANDUM AND ORDER

On July 15, 1977, the Licensing Board denied as untimely the petition of David Springer for leave to intervene in this construction permit proceeding

involving the three units of the proposed Perkins Nuclear Station. On Mr. Springer's appeal under 10 CFR §2.714a, we affirmed the denial. ALAB-431, 6 NRC 460 (September 8, 1977).

In the course of its July 15 order, the Licensing Board made reference to, but did not expressly rule upon, a motion Mr. Springer had previously filed to dismiss the construction permit proceeding for lack of jurisdiction. On August 5—while his appeal from the denial of the intervention petition was still pending before us—Mr. Springer filed a request with the Licensing Board for a ruling on the motion. On September 6, the Licensing Board acted upon that request. Explicitly prescinding the question whether one who is not a party to a proceeding may file a motion to dismiss, the Board denied the motion. It held, contrary to Mr. Springer's assertion, that this Commission has jurisdiction under the Atomic Energy Act to entertain an application for a permit to construct a nuclear power facility without there being "allegation and proof" by the applicant that it has "title to a specific plot of land and title to a specific source and quantity of water requisite for the safe use of the proposed fuel."

Before us now is Mr. Springer's attempt to appeal from that holding. For two independent reasons the appeal will not lie. First, under the Commission's Rules of Practice an appeal (other than from the denial of intervention) may be taken only by a party to the proceeding. 10 CFR §2.762(a); *Tennessee Valley Authority* (Bellefonte Nuclear Plant, Units 1 and 2), ALAB-237, 8 AEC 654 (1974). See also *Gulf States Utilities Co.* (River Bend Station, Units 1 and 2), ALAB-317, 3 NRC 175, 176-180 (1976).¹ Second, subject to the same single exception, the Rules of Practice also forbid interlocutory appeals from licensing board rulings made during the course of a proceeding. 10 CFR §2.730(f); *Public Service Co. of Oklahoma* (Black Fox Station, Units 1 and 2), ALAB-370, 5 NRC 131 (1977), and cases there cited. Clearly, the denial of a motion to dismiss a proceeding is interlocutory in character.

Appeal *dismissed*.

It is so ORDERED.

FOR THE ATOMIC SAFETY
AND LICENSING APPEAL BOARD

Romayne M. Skrutski
Secretary to the Appeal Board

¹To date at least, Mr. Springer has not invoked his right to petition the Commission to review ALAB-431, *supra*. See 10 CFR §2.786(b)(1), as amended effective June 1, 1977, 42 Fed. Reg. 22128 (May 2, 1977).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL PANEL

Alan S. Rosenthal, Chairman

In the Matter of

Docket No. 50-549

**POWER AUTHORITY OF THE
STATE OF NEW YORK**

(Greene County Nuclear Plant)

September 16, 1977

Interlocutory appeal by intervenors from a Licensing Board ruling partially denying their contentions is dismissed.

RULES OF PRACTICE: INTERLOCUTORY APPEALS

Except in the case of the denial of a petition for intervention, interlocutory appeals from Licensing Board rulings are not permitted by the Rules of Practice. 10 CFR §2.730(f).

Messrs. Robert J. Kafin and Jack R. Lebowitz, Glens Falls, New York, for the intervenor, Citizens to Preserve the Hudson Valley.

MEMORANDUM AND ORDER

The Citizens to Preserve the Hudson Valley (Citizens) has been granted intervention in this construction permit proceeding involving the proposed Greene County Nuclear Plant. On September 7, 1977, the Licensing Board issued a memorandum and order in which, *inter alia*, it denied certain of the contentions which Citizens wishes to litigate. Citizens seeks to appeal that denial.

The appeal may not be entertained. *Puerto Rico Water Resources Authority* (North Coast Nuclear Plant, Unit 1), ALAB-286, 2 NRC 213 (1975). As we there observed

10 CFR §2.730(f) contains a general prohibition against interlocutory appeals from licensing board rulings made during the course of a pro-

ceeding. The single exception to this prohibition is found in 10 CFR §2.714a. Insofar as a petitioner for intervention is concerned, that section allows an appeal from an order concerning his petition if—but only if—the order denied the petition outright.

2 NRC at 214 (footnote omitted).

Appeal *dismissed*.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL PANEL CHAIRMAN

Romayne M. Skrutski
Secretary to the Appeal Panel

This action was taken by the Appeal Panel Chairman under the authority of 10 CFR §2.787(b).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Edward Luton, Chairman
Oscar H. Paris
Frederick J. Shon

In the Matter of

NORTHERN STATES POWER
COMPANY

Docket Nos. 50-282
50-306
(Spent Fuel Pool
Modification)

(Prairie Island Nuclear Generating
Plant, Units 1 and 2)

September 8, 1977

Upon consideration of applicant's motion to reconsider a condition of its operating license requiring it to compare the employee radiation exposures from two alternative methods of fuel rack disposal, the Licensing Board denies the motion on two grounds: (1) the affidavit submitted in support thereof makes conflicting arguments; and (2) no case or regulation cited by applicant supports its claim that the \$1,000 per man-rem value from 10 CFR Part 50, Appendix I, can be used to determine whether a licensee has met the as-low-as-reasonably-achievable occupational exposure requirement of 10 CFR Part 20.

ATOMIC ENERGY ACT: APPENDIX I

The \$1,000 per man-rem value from 10 CFR Part 50, Appendix I, relates specifically to 10 CFR §50.34a(a), design objectives for equipment to reduce radiation dosage to the general population in unrestricted areas. It does not relate to the as-low-as-reasonably-achievable occupational exposure requirements of 10 CFR Part 20.

TECHNICAL ISSUE DISCUSSED: Fuel rack disposal.

ORDER

Before us is Applicant's "Motion for Reconsideration of a Condition in the Initial Decision," dated August 19, 1977. In our Initial Decision dated August 12, 1977 (LBP-77-51, 6 NRC 265), we authorized the issuance of license amendments requested by Applicant Northern States Power Com-

pany (NSP) with two limiting conditions (Initial Decision, LBP-77-51, 6 NRC at 292-293). Applicant requests that we order the deletion of Condition No. 1,¹ pertaining to the method of rack disposal, from the Initial Decision. As a basis for its motion, Applicant provided "additional explanation and information. . . in the form of an affidavit of Dale M. Vincent with an attached report which contains information of the type which the condition would require NSP to submit" (Applicant's Motion to Reconsider, paragraph 3). The aforesaid report entitled "Report of Investigation of Alternative Methods and Resulting Exposure and Cost Associated With Spent Fuel Rack Disposal" dated August 16, 1977, was prepared by "the Prairie Island Radiation Protection Group."² The affidavit and report respond to our observation in the Initial Decision that the alternative method of rack disposal deserves additional analysis, because the record suggests that it might result in less occupational exposure than the method of disposal proposed by the Applicant' (LBP-77-51, 6 NRC at 284-286, paragraphs 51-58). Applicant says that the affidavit provides an analysis of exposure and costs for both methods of disposal and should enable us to determine whether the proposed method of disposal will meet the "as low as is reasonably achievable" (ALARA) requirement of 10 CFR §20.1(c)(Applicant's Motion to Reconsider, paragraph 11). Applicant requests that we receive the affidavit and report into the record in order to make such a determination.

The reason for Applicant's request that we now relieve it from complying with Condition No. 1 is that the condition "presents a practical difficulty for NSP in accomplishing the spent fuel pool modification authorized by the amendments" (Applicant's Motion to Reconsider, paragraph 2). That

¹Condition No. 1 is stated as follows:

The licensee shall be authorized to proceed with the fuel pool modification as requested, except for rack disposal. After the old racks have been removed and washed down measurements shall be made of the radiation levels that would be experienced by workers cutting the racks and packing the pieces in drums and by workers preparing the racks for crates and crating them. The licensee will then assess, based on these measurements, the total occupational dose that would result from each method of disposal: cutting and packing the pieces in drums for shipment offsite; and preparing intact racks for placement into crates, placing them in crates, and loading the crates for shipment offsite. This assessment shall be submitted to the NRC Regulatory Staff for its evaluation. Following its evaluation, the Staff shall recommend to this Licensing Board whether the license should be allowed to proceed with disposal as planned or shall be required to crate intact racks for shipment. Upon considering the Staff's recommendation, and any additional evidence presented to us at that time, the Board will issue its further decision on this matter.

²The Prairie Island Radiation Protection Group is not identified further.

³Applicant has proposed to cut the old racks into pieces and pack the pieces in drums for shipment offsite. The alternative method explored in the evidentiary hearing involves packing intact racks into crates for shipment offsite.

difficulty results from "there [being] no room inside the plant to store the racks intact after they have been removed from the pool. Therefore, NSP will have to decontaminate the racks and place them in wooden boxes for storage outside" pending resolution of Condition No. 1 (Applicant's Motion to Reconsider, paragraph 7). Also, Applicant says that crating and shipping intact racks would cost an estimated additional \$33,440 to save an estimated 7 man-rem exposure, or nearly \$5,000 per man-rem. Applicant argues that this amount exceeds "what is required by the Commission to meet its ALARA requirements," and cites the \$1,000 per man-rem cost-benefit balancing criterion contained in 10 CFR Part 50, Appendix I (*Id.*, paragraph 9).

Both Intervenor Minnesota Pollution Control Agency (MPCA) and the NRC Staff have submitted responses, dated August 29, 1977, and September 2, 1977, respectively, opposing the motion to reconsider. MPCA and the Staff concur that the affidavit which Applicant has requested that we receive into evidence contains a number of conclusory statements, and both say that the rack disposal issue is not one which can be resolved by the affidavit and report submitted with the motion (MPCA Response to Motion to Reconsider at pp. 5, 8-10; Staff Response to Motion to Reconsider at p. 2). MPCA argues, further, that the affidavit and report must be tested by cross-examination pursuant to 10 CFR §2.743(a) if the Board receives them as evidence (MPCA Response to Motion to Reconsider at p. 7).

With reference to Applicant's purportedly urgent need for relief from Condition No. 1, *i.e.*, because there is insufficient room in the plant to store racks pending resolution of the rack disposal issue, MPCA says it is "baffled" by NSP's assertion *both* that it cannot store the racks *and* that cutting up the racks for disposal would take more than three months. Intervenor points out that presumably the racks would have to be stored prior to cutting (*Id.*, fn. 9).

With regard to Applicant's argument that it should not be required to expend more than \$1,000 per man-rem to reduce occupational exposure, MPCA notes that the regulation cited by NSP, 10 CFR Part 50, Appendix I, is inapplicable to the issue at question here (*Id.*, p. 13). Staff takes a similar position and says, further, that it "knows of no case in which a specific dollar amount has been used by a licensing board in assessing whether a specific procedure proposed by a licensee results in occupational exposure 'as low as [is] reasonably achievable' " (Staff Response to Motion to Reconsider, fn. 4).⁴

⁴In a Brief in Support of Northern States Power Company's Exception to Initial Decision, dated September 6, 1977, Applicant cited two recent cases which, it claims, support its assertion that the \$1,000/man-rem value is applicable to occupational exposure under ALARA. The same two cases were cited by Staff in support of its contrary position on this question. (*Id.*)

We conclude, first, that there is no basis, neither in the record of this proceeding, the Commission's regulations, nor in the administration of regulations by licensing boards, to support Applicant's claim that the \$1,000 per man-rem value from 10 CFR Part 50, Appendix I, is applicable to a licensee's meeting the ALARA requirement of 10 CFR Part 20. The guides contained in 10 CFR Part 50, Appendix I, Section II, relate *specifically* to 10 CFR §50.34a(a), which concerns design objectives for equipment to effect reduction in dose to the general population from radioactive materials released to unrestricted areas. We see nothing to suggest its relevance to the ALARA requirement of 10 CFR Part 20.

Second, we find that, like the Intervenor, we, too, are "baffled" by the apparent contradiction between the Applicant's claim that it cannot now store the racks pending resolution of Condition No. 1, without crating them and placing them outside, and the evidence we received earlier to indicate that the Applicant planned to take from two to five months to complete the job of cutting the racks (Tr. 480-482). Presumably the racks could not be left in the pool and removed one by one, because new racks must be in the pool prior to the refueling of Unit 2 which is scheduled for this fall (NSP's Motion to Divide Its Application . . . dated June 20, 1977, p. 3). We are unable to resolve this apparent contradiction on the evidence which is before us.

We conclude, lastly, that the affidavit of Mr. Vincent and the Report of the Prairie Island Protection Group do not provide an adequate basis for us to resolve the rack disposal issue in favor of the Applicant. If we were to receive those documents as evidence, we would have an obligation and a need to hear cross-examination on them. To follow that course would consume much time, and time, we are told, is of the essence in this case.¹ Consequently, we reject that course as not being in the best interests of the public or the Applicant.

With expediency in mind, we note that both the Intervenor and the Staff have stated that they would not oppose a request by the Applicant for authority to ship the racks intact in wooden crates, and that they would not object to the use of the affidavit and report for the limited purpose of confirming the belief that disposing of the racks in this manner would involve less occupational exposure. We stand ready to consider such a request from the Applicant. Absent such a request, we see nothing to cause us to disturb our Initial Decision.

¹We are told in footnote 6 of Staff's Response to Motion for Reconsideration that Applicant has advised Staff that removal of racks from the small pool was to begin on September 1. The racks will be decontaminated and crated. Removal of racks from the large pool is scheduled to begin in mid-September.

In view of the foregoing and for the reasons stated above, the Motion for Reconsideration is denied.

IT IS SO ORDERED.

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

Edward Luton, Chairman

**Dated at Bethesda, Maryland,
this 8th day of September 1977.**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Samuel W. Jensch, Chairman
Frank F. Hooper
Gustave A. Linenberger

IN THE MATTER OF

Docket Nos. STN 50-522
STN 50-523

PUGET SOUND POWER AND
LIGHT COMPANY, et al.

(Skagit Nuclear Power
Project, Units 1 and 2)

September 15, 1977

Upon consideration of the applicant's petition for reconsideration of the Initial Decision (LBP-77-44, 6 NRC 141) permitting certain pre-LWA work but denying other requested work, the Licensing Board finds that (1) within the contemplation of *Kansas Gas & Electric Company*, ALAB-331, 4 NRC 771, *affirmed*, CLI-77-1, 5 NRC 1, 12, the environmental impact resulting, *inter alia*, from cutting trees which could take generations to replace is not "so trivial an impact that it can be safely said that no conceivable harm would have been done to any of the interests sought to be protected by NEPA should the eventual outcome of this proceeding be a denial of the . . . application," and (2) in such circumstances, authorization to perform such work would also be precluded by the Wild and Scenic Rivers Act.

Petition for reconsideration denied.

ORDER DENYING PETITION FOR RECONSIDERATION
OF JULY 7, 1977, INITIAL DECISION

Puget Sound Power and Light Company, *et al.* (Applicants) filed a petition for reconsideration (modification and clarification) of the Initial Decision issued on July 7, 1977, granting authority for certain pre-LWA work, but denying authority for pre-LWA work in areas: first, in a zone for road-work construction of 150 feet west of Wiseman Creek and north of SR-20; second, in areas requiring tree removal; and finally denying authority for a projected sewer line, which would be a component of the ultimate nuclear

project, if authorized. The petition requested reconsideration of the denial of both the sewer project and the tree removal and roadway work. In view, however, of the later Regulatory Staff request for additional data respecting the sewer line and the possibility of radioactive materials, if any, entering the sewer line, Applicants' request is now limited to roadway expansion and rerouting and the tree removal connected therewith.

At the evidentiary hearing held on July 23, 1977, the Atomic Safety and Licensing Board requested, and again, following that hearing, the Board suggested the presentation of additional data particularly in reference to the total number of trees in the areas sought to be affected by the roadway work and the number of trees which would necessarily be removed if the construction were undertaken. The Applicants have not indicated the results of their endeavors, if any, to secure a stipulation in this regard. The data requested by the Board, however, have been presented in affidavit form, copies of which have been served on all parties, and no objection has been asserted upon the grounds of accuracy. In any event, the affidavit form is considered sufficient for purposes of a petition for reconsideration and will be so accepted by the Board.

The reduced scope of the roadwork east of Wiseman Creek bridge would require the removal of 107 trees that are larger than 2 inches in diameter at breast height (dbh). These would be primarily cedar, alder and maple trees. Twelve of the 107 trees exceed 12 inches dbh, with the largest being a 22-inch fir, an 18-inch cedar and an 18-inch alder. More specifically, the trees to be removed range in number and size (all in dbh) from 33 of 7-inch to 12-inch, 6 of 14-inch, 3 of 16-inch, and 2 of 18-inch, all of which may be concluded to be of adequate size for lumber. In other words, the trees to be removed are not easily nor readily replaceable without fairly substantial time periods likely to be needed for the regrowth. All of the trees to be removed are located either within the existing rights-of-way of SR-20 and Bacus Road, or, within the proposed new right-of-way that would be established for the realigned portion of Bacus Road. The reduced roadwork proposal is believed to constitute an improvement both to the Hoehn Road/SR-20 intersection and the Bacus Road/SR-20 intersection from the point of view of traffic safety.

The Regulatory Staff opinion is that from an environmental point of view, the projected reduced roadway work and the proposed tree removal do not constitute an adverse environmental impact and thus the Staff supports the Applicants. Intervenor Skagitationians (SCANP) did not file a formal response by answer to the petition for reconsideration but did indicate at the evidentiary hearing opposition based largely upon the prohibition of the Wild and Scenic Rivers Act.

The petition for reconsideration places again in focus the precise scope

of the considerations particularly pertinent in this Skagit proceeding, *i.e.*, the environmental impact considerations, and the Wild and Scenic Rivers Act directions to Federal agencies.

Regarding environmental impact considerations in reference to LWA proceedings, the Appeal Board restriction is contained in the language that to the Licensing Board warrants further elucidation. The Appeal Board restriction prohibits any LWA authority unless the environmental impact is "... so trivial an impact that it can be safely said that no conceivable harm would have been done to any of the interests sought to be protected by NEPA¹ should the eventual outcome of this proceeding be a denial of the ... application."² In many of the pre-LWA and LWA applications, requests by applicant have been directed to changes in open fields, with easy restoration to avoid irreversibility, and the like, as reflected in the *Kansas Gas and Electric* case. Certain it is that the large size of the several species of trees indicates that even a rapidly growing area will need many years of growth to permit trees of the 12-inch to 22-inch size to reappear if the Applicants' nuclear project is rejected. With those factors in mind, the Licensing Board cannot conclude that the proposed tree removal, made necessary by the reduced roadwork construction and rerouting is trivial; nor is it "... so trivial ... that no conceivable harm would have been done to any of the interests sought to be protected by NEPA" Replacement of some of the trees sought to be removed by the pre-LWA proposal must take generations.³ Parenthetically, the Licensing Board does not believe that time is so much of the essence that a pre-LWA authority need be granted.

Equally important in this Board's determination is that direction given by the Wild and Scenic Rivers Act that no Federal agency shall "... assist by loan, grant or otherwise ..." in the construction which would have an adverse effect on the values for which the Skagit River might be designated. The Staff believes that the sewer line (not now involved in this portion of the petition for reconsideration) would be precluded from authorization by NRC in view of the Wild and Scenic Rivers Act. The licensing Board believes that the same considerations apply to the tree removal and roadwork sought to be undertaken by the applicants.

In the presentations made by Applicants and the Staff, no reference is made to the legislative history of the Wild and Scenic Rivers Act, which was

¹National Environmental Policy Act.

²*Kansas Gas and Electric Company, et al.*, ALAB-331, 3 NRC 771; *affirmed* by NRC, 5 NRC at 12.

³The Board recognizes that these determinations involve subjective reflections, to some extent; but, NEPA requires consideration of the possible irreversible character of the action proposed to be taken, and the extended time needed for restoration is not to be overlooked in the event this application is denied.

set out in the Initial Decision issued herein on July 7, 1977, wherein the reports show that the term "or otherwise" was considered to mean "or in any manner." The definition thus provided is sufficiently broad to extend the ban believed by the Staff to apply to the sewer line to the tree removal as well. Any pre-LWA or LWA authority, if granted for the Skagit project, would assist the nuclear plant to go forward with facilities needed for the construction. In the view of the Licensing Board, the Wild and Scenic Rivers Act prevents the NRC from issuing the requested pre-LWA authority.

The Applicants' petition for reconsideration should be denied.

WHEREFORE, IT IS ORDERED, in accordance with the Atomic Energy Act, as amended, the Rules of Practice of the Nuclear Regulatory Commission, the National Environmental Policy Act, and the Wild and Scenic Rivers Act, the petition for reconsideration filed by Applicants, and as limited to the identified road construction and rerouting as well as the proposed tree removal, is denied.

IT IS FURTHER ORDERED, in accordance with Sections 2.760, 2.762, 2.785 and 2.786 of the Rules of Practice of the Nuclear Regulatory Commission, that this Order Denying Petition for Reconsideration of July 7, 1977, Initial Decision shall be effective immediately and shall constitute the final action of the Commission thirty (30) days after its date, unless exceptions are taken or the Commission directs that the record be certified to it for final decision. Within seven (7) days after service of this Order Denying Petition for Reconsideration, any party may take an appeal to the Atomic Safety and Licensing Appeal Board by filing exceptions. A brief in support of exceptions shall be filed within fifteen (15) days thereafter (twenty (20) days in the case of the Staff). Within fifteen (15) days after the service of the brief of the appellant (twenty (20) days in the case of the Staff), any other party may file a brief in support of, or in opposition to, the exceptions.

ATOMIC SAFETY AND LICENSING BOARD

Frank F. Hooper

Gustave A. Linenberger

Samuel W. Jensch, Chairman

Issued:
September 15, 1977
Bethesda, Maryland

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

Docket Nos. 50-329
50-330

CONSUMERS POWER COMPANY

(Midland Plant, Units 1 and 2)

September 23, 1977

Upon consideration of whether to continue, modify or suspend the licensee's construction permits pending the outcome of a court-ordered remand proceeding, the Licensing Board declines to modify or suspend the permits in view of the balance of the equities. It concludes that, although timely intervention brought to light infirmities in the NEPA review and the ACRS letter, sunk costs, the costs of delay, the existing foreclosure of alternatives, the need for electricity and process steam and the cost advantage of nuclear fuel over the life of the plant weigh against suspension.

RULES OF PRACTICE: SUSPENSION OF PERMITS

The standard for granting suspension of a construction permit during a remand proceeding caused by a NEPA review deficiency is less stringent than the standard of 10 CFR §2.788 for stays on appeal. The movant need not show a substantial chance of prevailing on the merits on the remand.

NEPA: COST-BENEFIT BALANCE

In considering matters related to cost-benefit balancing as between one plant in which a substantial investment has been made and a replacement plant, credit must be given to the partially completed site for work already done, where the integrity of the NEPA process up to the hearing time has been sound. Where that is not the case, the cost to society of ignoring sunk costs may be justified if to add sunk costs as a benefit to an existing site would be unjust.

ORDER

1. This order is the result of a hearing held on whether or not existing construction permits for Units 1 and 2 of Consumers Power Company

Midland Plant be continued, modified, or suspended until the time action is taken on certain issues remanded to the Commission by the Court of Appeals for the District of Columbia as the result of appeals taken from the issuance of those construction permits. For convenience we will frequently refer to the proceeding which has led to this order as the "suspension proceeding" to distinguish it from the proceeding on the merits of the issues remanded; we will occasionally refer to that as the "remand proceeding." Based upon the evidence presented in this suspension proceeding, we decline to modify or suspend the licenses pending the outcome of the remand proceeding.

BACKGROUND

2. The parties to this proceeding are Consumers Power Company (Licensee or Consumers), the Nuclear Regulatory Commission Staff (Staff), the Dow Chemical Company (Dow), and a group of intervenors other than Dow who have taken a consolidated position (Intervenors).

3. Licensee made an application on January 13, 1969, for permits to construct two pressurized water nuclear reactors at Midland, Michigan. Unit No. 1 is designed to have a gross electrical output of 506 MW and to produce process steam; Unit No. 2 is designed to have a gross electrical output of 855 MW electric. After hearings, construction permits were issued on December 14, 1972. When their appeals within the Commission failed, the Intervenors filed a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit on August 6, 1973. That Court on July 21, 1976, in a case captioned *Nelson Aeschliman, et al. v. U. S. Nuclear Regulatory Commission*, 547 F.2d 622, remanded the matter to the Commission because the Court held that the Commission had failed to properly consider energy conservation as an alternative to the Midland plant, that the Advisory Committee on Reactor Safeguards had failed to provide a clear report, that there should be an inquiry as to whether circumstances have changed regarding Dow's need for process steam, and that the Commission failed to consider the environmental impacts of the nuclear fuel cycle. The fuel cycle issue came as a result of a decision in the same court on the same day in *Natural Resources Defense Council, et al. v. U. S. Nuclear Regulatory Commission*, 547 F.2d 633.

4. On August 13, 1976, the Commission issued a General Statement of Policy (GSP) entitled *Environmental Effects of the Uranium Fuel Cycle*, 41 FR 34707, in which it discussed the agency response to the decisions relating to the fuel cycle. On August 16, 1976, the Commission reconvened an Atomic Safety and Licensing Board (Board) in this proceeding, ordered it to consider whether the construction permits should be continued, modified,

or suspended pending the promulgation of an interim fuel cycle rule, and directed that no hearing should be held on the merits of the other issues remanded by the Court of Appeals until the decision of that Court had become final. CLI-76-11, 4 NRC at p. 65. On September 3, 1976, the Court of Appeals issued its mandate in *Aeschliman* and on September 14, 1976, the Commission ordered this Board to consider all of the *Aeschliman* issues as well as the fuel cycle issue to determine whether or not to continue, modify, or suspend the licenses. CLI-76-14, 4 NRC at p. 163.

5. An interim fuel cycle rule was promulgated on March 14, 1977, at 42 FR 13803. The Appeal Board then ordered this Board to consider the interim fuel cycle rule in this case. ALAB-396, 5 NRC 1141.

6. The August 16, 1976, Memorandum and Order of the Commission directed that a Board be reconvened for the purpose of considering whether the construction permit for Midland be continued, modified or suspended, for fuel cycle reasons. In accord with the Commission's GSP, well established equitable factors were to be considered in the resolution of the continuation, suspension or modification issue. Among those factors are: (1) the extent of the NEPA violation; (2) the timeliness of objections; (3) the likelihood that significant adverse impacts would occur until a new fuel cycle rule is in place; (4) the effect of the delay; (5) the need for the project; (6) whether reasonable alternatives will be foreclosed by continued construction; (7) the possibility that the cost-benefit balance would be tilted through increased investment; and (8) general public policy concerns.

7. After the *Aeschliman* mandate was issued, the Commission directed the Board to consider the other matters remanded by the court in that decision,¹ but provided no new framework within which resolution of the issues should be considered. In March 1977, the Commission indicated that the framework for deciding cases involving suspension may be found in a traditional balancing of equities and the consideration of any likely prejudice to the decision that might be called for by the remand,² a rule which seems to us a broad way of stating the more specific eight points listed in the GSP.³

8. Licensee urges that among the equitable factors to be applied in this suspension proceeding are those relating to stays on appeal stated in *Virginia Petroleum Jobbers A'ssn. v. FPC*, 259 F.2d 921, 925 (D.C. Cir.

¹Memorandum and Order, CLI-76-14, 4 NRC 163 (September 14, 1976).

²*Public Service Company of New Hampshire* (Seabrook, Units 1 and 2), CLI-77-8, 5 NRC 503-521 (March 21, 1977) (reviewing ALAB-366 cited at footnote 3) which was cited by the Appeal Board in this case in ALAB-395, 5 NRC 772.

³The Appeal Board's rejection of the GSP factors in its *Seabrook* decision of January 21, 1977, ALAB-366, 5 NRC 39, at page 71, seems to us to not vitiate this view. ALAB-366 dealt with a case in which there was one fact of such significance that it alone could be relied upon for decision making.

1958). Of the four tests mentioned in that case, the one strongly urged for application here is whether or not the moving party must make a strong showing that it is likely to prevail on the merits. It is clear that the *Virginia Petroleum Jobbers* tests apply in NRC proceedings where a stay pending appeal is requested.⁴ But we are bound by Commission and Appeal Board holdings that the tests do not apply to a case involving the possible suspension of a license for NEPA defects. In *Seabrook* (5 NRC at 521), the Commission specifically distinguished the test there announced from *Virginia Petroleum Jobbers* and said it was less stringent than the latter. The Appeal Board in *Midland* emphasized that result in ALAB-395, 5 NRC 772, 784 and 785 (April 29, 1977). We have concluded that the moving parties here need not prove what their chances are on the remand hearing and that at this juncture we must view the latter proceeding as one in which any party has a substantial chance of success.

9. Another aspect of *Seabrook* (5 NRC at 530) influences our decision on suspension. The Commission in *Seabrook* took the view that in considering matters related to cost-benefit balancing as between one plant in which a substantial investment has been made and a replacement plant, one must take the facts found to exist. Thus credit must be given to the partially completed site for the work already done. This rule holds where the integrity of the NEPA process up to hearing time has been sound; where that is missing, the cost to society of ignoring sunk costs may be justified if to add sunk costs as a benefit to an existing site would be unjust. An example of this injustice is where consideration of such sunk costs might reward an Applicant who had withheld information adverse to his plan for construction.

10. There is evidence in this record that Licensee has considered conducting its share of this proceeding in such a way as to not disclose important facts to the Board. Notes taken by a Dow attorney of meetings with Consumers' attorneys indicate the desire of the latter to "finesse" the dispute with Dow if no Intervenor appeared (Intervenors Ex. 25, page 2, paragraph B). The same notes reflect the exploration by a Consumers' attorney of the possibility of using Dow witnesses unfamiliar with the facts relating to the Dow-Consumers dispute to testify at the hearing; they further disclose a proposed strategy by Consumers to "drag feet" in the hearing process because as long as construction continues, Consumers "has a lever" (page 3, paragraph 4). Assuming that the proposals set out here were made and acted upon, none were successful. Aggressive Intervenor did appear and the Dow-Consumers matter was aired; the Dow witnesses furnished were highly knowledgeable men (Mr. Temple headed the Michigan Division of Dow); and Licensee has not slowed the suspension hearing. Of course there remains

⁴This requirement was lately codified at 10 CFR §2.788.

the suspicion, raised by the disclosure of these instances, that there may have been similar ploys which were successful.

11. These may be the kinds of activity that the Commission had in mind in describing the situation where the use of sunk costs is unjust. If so, we decline in this instance to ignore sunk costs. If it is generally proper to use sunk costs in the comparison of alternatives, we think that to ignore several hundred million dollars worth as a punishment would work an out-of-proportion injustice on those who will ultimately provide the money.

12. With this background in mind, we turn to a discussion of the facts and the law.

ANALYSIS OF THE EQUITIES RELATIVE TO SUSPENSION

A. The Extent of the NEPA Violations

13. An appraisal of the magnitude of the NEPA violation relative to the fuel cycle issue has been assisted by a number of events which have transpired since the construction permit was issued in this case. At that time there was no generic rule regarding the uranium fuel cycle and costs related to that cycle were not considered in licensing cases. After Midland was licensed, the Commission adopted its Table S-3 as a part of 10 CFR §51.20. That table gave values to the various aspects of the uranium fuel cycle and the attendant regulation directed that those values would be used in cost-benefit balancing for the NEPA evaluation. The environmental effects of the fuel cycle were said by the Commission to be "relatively insignificant" but ones which should be recognized. 39 FR 14188, 14190. Then followed *NRDC v. U. S. Nuclear Regulatory Commission, supra*, which struck down Table S-3 and remanded the cases in which it had been used. It likewise caused (through *Aeschliman*) the remand of this case for failure to consider the environmental effects of the cycle at all. Next came an interim rule promulgated on March 14, 1977, with respect to which the Commission said the values in the old rule and those in the interim rule "are not substantially different." The Commission in that order indicated its belief that the operation of the interim rule would not be likely to require suspension of a construction permit. We conclude therefore that while failure to reconsider the effects on the environment of the nuclear fuel cycle was a NEPA violation, it was one of small magnitude.

14. The second NEPA violation is more difficult to treat. The plant was designed and located under an assumption that Dow would purchase process steam from Consumers. The steam to be sold to Dow was not a

¹Vermont Yankee Nuclear Power Corporation, et al., CLI-77-10, 5 NRC 717 (1977).

byproduct of power production; the reactors were designed so that one would provide about 800 MWe and the second, of the same thermal capacity, would produce about 500 MWe and the balance of its capacity would be utilized in producing steam for Dow. Because steam can be delivered only over relatively short distances, the plant was situated near the Dow industrial facilities in Midland.⁶

15. Following the issuance of the construction permit, Intervenor twice sought an order reopening the proceedings because of changes in the Dow-Consumers relationship. The motions culminated in a Commission order dated April 11, 1974, which recited that the Commission had reviewed the contracts and that there were no changed circumstances warranting a reopening. The order went on to say that it was significant that Dow had a contract to buy steam and electricity from Consumers. CLI-74-15, 7 AEC 311.

16. The Court of Appeals in its remand has assumed, "that the Commission will take into account the changed circumstances regarding Dow's need for process steam, and the intended continued operation of Dow's fossil-fuel generating facilities." *Aeschliman*, page 632.

17. Dow continues to need process steam. Mr. Joseph G. Temple, General Manager of the Michigan Division of Dow Chemical USA, which is a unit of the Dow Chemical Company (Temple, page 1)' testified that it was essential to its operation (Tr. 2357). The company now produces its own steam in antiquated facilities that will not likely be operable through 1984 (Temple page 3, Tr. 2669, 2733), which do not now meet Michigan air quality standards, and which are being operated under a waiver from the Michigan Air Pollution Control Commission (Temple, page 4). Further waivers depend upon what the Michigan Commission might do.

18. Dow's original contract for steam from Midland apparently contemplated the maximum purchase of 4,050,000 lbs/hr (I. D., 5 AEC 214, 215, paragraph 1). The contract was renegotiated in 1974 (Consumers' Ex. 7c attached to Howell's Testimony).^{*} It now provides for a minimum purchase of 2,000,000 and a maximum of 2,400,000 lb/hr of 175 psig steam and 400,000 lb/hr of 600 psig steam (Temple, page 8). The parties originally contemplated that steam deliveries would begin on March 1, 1980, (Temple, Tr. 210 and Howell, Tr. 2020) but there is no fixed contractual date.

19. Dow has continuously reviewed its situation regarding purchase of steam from the Midland plant because of construction delays and cost increases (Temple, page 2). This review resulted in a decision in the summer of

^{*}Initial Decision, 5 AEC 214 (1972).

^{*}The Temple direct follows Tr. page 220.

^{*}Testimony of Stephen H. Howell, following Tr. 2074.

1976 by the Midland Division of Dow that the Consumers contract was no longer advantageous to Dow (Board Ex. 1, Temple 387). A corporate review then took place (Board Exs. 1 and 2; Temple, Tr. 424). This resulted in a conclusion that the Dow-Consumers relationship retained a cost advantage over a Dow owned coal-fired plant but that the original advantage had narrowed (Temple, page 5; Orrefice, Tr. 2699).

20. Aside from steam production costs, Dow is seriously concerned because Consumers' Board Chairman has stated that Consumers will hold Dow liable for about \$600,000,000 in the event that Dow fails to take steam (Tr. 2695 *et seq.*). The two factors that were the most important in the corporate review were the economic advantage of Midland steam and the possibility of liability for failure to buy it. The two items combined were convincing that the relationship should continue (Tr. 2699).

21. New nuclear fuel costs presented at the hearing show an increase in the cost of steam to Dow over that contemplated at the 1976 corporate review (Keeley following Tr. 3646; Roberts, following Tr. 5099).

22. The Dow position is and continues to be one of keeping its options open; in the event that circumstances change, Dow might change its position regarding steam purchases (Tr. 2690-2693). The circumstances which principally concern Dow include the cost of Midland (Tr. 2709, 2301) and the completion schedule (Tr. 2709 and 2711-2712); it has other, perhaps less crucial, concerns about Consumers' ability to operate the plant (Tr. 2709), the Michigan regulatory climate (Tr. 2418), and the cost and availability of nuclear fuel (Tr. 2419).

23. While Dow needs steam, Dow does not necessarily need it from Midland and whether Dow will ever buy steam from that plant is, on the record, speculative. Whether this circumstance will change by the time that the remand hearing is concluded is impossible to know.

24. In the event that Dow fails to buy steam from Consumers, the circumstance will be one of a plant at a site for which only very limited alternatives were explored, designed in substantial part for a purpose which will not be fulfilled. The effect on the values that NEPA protects could be serious unless plant design can be modified to accommodate the changed conditions.

25. The failure to consider energy conservation is a NEPA violation. Substantially less demand could result in the construction of a plant not now needed.

B. Timeliness of Objections

26. Without including here a list of the dates upon which the various issues remanded by the Court of Appeals were first raised by Intervenor, we are easily able to conclude that they acted promptly.

27. We find this a troublesome factor in this proceeding. A timely raising of issues must mean something more than that the Intervenor is not penalized if they are not late. In the administrative and legal system governing these cases, the application for a license alone involves the spending of tremendous sums of money. If the application evolves into a license and construction begins, the amount of expenditure increases rapidly. Here the Licensing Board's initial licensing decision was dated December 14, 1972; the case then worked its way through the Commission, arriving at the Court of Appeals on August 6, 1973, where it remained until a decision was issued on July 21, 1976. It has again been in Commission channels since then and will probably remain there for several more months. In the meantime construction has been underway except for delays due to financial problems accompanying the recession earlier in this decade. Consumers' expenditures at Midland are in the half billion dollar range. Though Intervenor acted promptly, the sunk costs are a factor that is difficult to overcome.

C. Adverse Environmental Impacts Which Might Occur If Construction Is Not Suspended

28. Due to the amount of construction that has been done, the environmental effects of continued construction rather than suspension will not be a decisive factor (Consumers' Exs. 1-3, Wells page 2 *et seq.*).⁹ The continued construction onsite will be attended by the ordinary offsite dust, noise, movement of vehicles, and the like (Wells, page 6 and Echols page 1 *et seq.*).¹⁰

D. Effect of Delay

29. A delay due to suspension would have an effect on Licensee, its investors and customers, Dow, and the Michigan economy.

30. For the purpose of calculating its economic costs during a suspension, Consumers assumed delay period of 5 months and 9 months and that these would actually result in delays in commercial operations of 9 and 15 months respectively because of remobilization of the work force and the like (Keeley III-1).¹¹ We find these estimates to be reasonable; because of our experience thus far in this case, we do not feel it likely that the shorter suspension period of 9 as opposed to 15 months is realistic and therefore limit our analyses to the longer delay.

⁹Wells Testimony following Tr. 2946.

¹⁰Echols Testimony following Tr. page 3056.

¹¹Testimony of Mr. Keeley following Tr. 3638. The delay period was postulated to run from December 1, 1976.

31. It is Consumers' position that total plant costs will increase by about \$245,975,000 in the event of the longer delay (Ex. 16 to Keeley testimony). About \$120,000,000 of this is in AFUDC,¹² \$49,150,000 is in escalation of the costs of major components (\$2,250,000) and other items (\$46,900,000).

32. The Staff generally supports the Consumers' position on additional capital costs (Meltz, following Tr. 4573) though pointing out that the AFUDC is not an out-of-pocket item, rather a load to be borne by the ratepayer if and when the plant gets on the line (Meltz, page 3). What happens to AFUDC if the plant never operates does not appear in the record. Furthermore we have no way of knowing how the Michigan Utilities Commission would handle any costs spent on an incomplete and abandoned plant.

33. Intervenors are critical of both the analysis by Consumers and that of the Staff for failure to consider the time value of money (Timm, page 66).¹³ Dr. Timm contends that his admittedly rough calculations would indicate a benefit to ratepayers of about \$140,000,000 because they would not have to pay for construction during the suspension period; an added benefit he said, would be the extended life of the plant due to a later startup. Mr. Meltz of the Staff discussed this subject in his rebuttal testimony;¹⁴ and Dr. Timm in a surrebuttal affidavit (Intervenors' Exhibit R-1). We conclude that there would be an increase in capital costs as a result of suspension but that the magnitude is uncertain.

34. Another aspect of the economic costs of delay is the projected increase in the cost of nuclear fuel. This is said by the Licensee to be about \$20,000,000 (Ex. 16 to Keeley III), a number we have been given no reason to dispute.

35. A major item in delay costs is replacement power, projected by Consumers to be \$414,000,000 (Heins at 14, following Tr. 1648 and Ex. 14 attached; Keeley at III-7 following Tr. 3638 and Ex. 16 attached; Calcaterra rebuttal affidavit marked Ex. R-1 and attachment 1 thereto). The Intervenors have attacked this figure on several bases. Some of these are the lack of a showing of real need by municipalities and cooperatives for power that Consumers projects it will sell to them, the erroneous treatment of "forced purchases" by Consumers (Timm rebuttal page 15 *et seq.*), and use of unjustifiably high coal costs by Consumers (Timm direct, page 45).

36. The Staff made the assumptions that there would be little or no growth on Consumers' system and that there would be internal fossil fuel capacity to make up the loss of Midland (Feld, following Tr. 4509). A range

¹²Allowance for funds used during construction.

¹³The Timm testimony appears following Tr. 16A in the Rebuttal Volume dated March 23, 1977.

¹⁴The Meltz testimony is in the Rebuttal Volume dated March 23, 1977.

of capacity factors was reviewed. During the hearing, Staff updated its replacement power costs and, based on the assumptions mentioned, arrived at replacement costs of 3.8 to 5.3 million dollars per month for coal-fired capacity and 9 to 12.5 million dollars per month for oil-fired capacity (Feld, updating coal cost estimates, Table 2, following Tr. 5169). Thus, the Staff's high estimate for replacement fuel for a nine-month suspension (which results in 15 months) is \$187,500,000 (15 x \$12,500,000); its estimate at the low end is \$57,000,000 (15 x \$3,800,000). These cost differences have not been reconciled by Consumers or the Staff so that no hard conclusion can be made relative to which estimates are more nearly correct. Our only conclusion can be that Consumers' estimate of replacement fuel cost in the event of a suspension appears to be overstated but that a substantial cost is involved.

37. There are other effects of delay. Consumers' ability to raise funds would likely be impaired (Boris page 5 following Tr. 4912). Mr. Keeley identified several more in his testimony (III page 10, *et seq.*); they include the loss of 2,500 construction jobs with resulting effects on the community.

38. Delay in the construction of Midland might cause Dow to elect to pursue another means of supplying its need for process steam.

E. Need for the Project

39. There is need for electrical power and process steam during the first half of the next decade in the area served by Consumers. Dow's need for steam and for 175 to 200 MW of electricity in 1982 is clear (Temple, Tr. following page 217). Though Intervenor contend that Licensee's load projection is excessive and that it aspires to a higher standard of reliability than is necessary, they have not claimed that there is no need at all for additional generation to serve Consumers' customers. Dr. Timm posits as an alternative to Midland, 800 MWe of capacity in addition to the capacity needed to serve Dow (Timm page 83). The Intervenor thus recognize a need for about 1,000 MWe. The Licensee wants to construct about 1,300 MWe. There is support in the record for new base load capacity (Feld page 6)¹⁵ which may be used to replace oil-fired units in order to obtain lower generating costs and because national policy does not support oil as boiler fuel.¹⁶

40. Our consideration of Midland rather than some other alternative as the supplier for these needs is contained in the next section of this Decision.

¹⁵Follows Tr. 7343.

¹⁶See *Seabrook*, ALAB-422, 6 NRC 33 at 98 (July 26, 1977).

F. Foreclosure of Alternatives by Continued Construction and Tilting the Cost-Benefit Balance Through Increased Investment

41. In its analysis of the effects of the continued construction of the Midland plant as a foreclosure of other alternatives, Consumers concludes that no alternative would be foreclosed because all other alternatives to Midland have already been foreclosed by the passage of time and the expenditure of resources (Keeley IV-7 following Tr. 3636). This conclusion rests on many assumptions including one that the most economical replacement for Midland would be two 800 MW electric coal-fired units (Keeley IV-3). The testimony was received during February 1977, and some of the analyses having to do with periods of abandonment or suspension is outdated because the dates have already passed. There is, however, an analysis of a September 1, 1977, abandonment date that may be used for our purpose here. According to Licensee, the cost of abandonment of Midland on September 1, 1977, is \$578,500,000 (Keeley Ex. 19) and the capital cost of completion as of that date is \$1,100,000,000 (Keeley Ex. 20). The capital cost of building a high sulphur coal replacement facility is \$1,272,000,000. It is appropriate to subtract some recoveries which will occur if Midland is abandoned. These total \$197,900,000. It is also appropriate to add some expenditures made necessary by the abandonment of the Midland site including cancellation of contracts less salvage \$45,400,000 and site restoration \$131,000,000 totaling \$176,400,000 (Keeley Ex. 21). Thus the net for a coal-fired facility is about \$1,250,000,000 or \$175,000,000 more than Consumers estimates for the completion of Midland. The Board notes that the estimates for the cost of the Midland plant have increased tremendously since original licensing and is aware that the current ones may also change. We expect the same may be true of the estimates for the coal-fired alternative.

42. The Licensee also contends (Keeley Ex. 20) that if Midland continues to be built without suspension or abandonment, its noncapital cost over its life will be \$2,163,000,000 broken down into these elements: taxes \$768,000,000, fuel \$840,000,000, operation and maintenance \$502,000,000, and nuclear insurance \$53,000,000. Similar costs for the alternate would be \$7,762,000,000 according to Licensee. This consists of the following items: costs due to delay \$829,000,000, taxes and insurance \$496,000,000, fuel \$6,173,000,000 and operation and maintenance \$264,000,000. Thus, Licensee's evidence is to the effect that there is about a \$5,500,000,000 advantage to the completion of Midland without interruption.

43. The Staff made two observations: Consumers' nuclear fuel costs assumed plutonium recycle (which is no longer realistic) and the nuclear fuel costs appeared high (Robert following Tr. 5099). The Staff did its own

analysis of two 800 MWe plants for both the high and low sulphur coal alternatives. For each alternative the components considered were capital, operation and maintenance, fuel, taxes, decommissioning and insurance; for the coal alternatives cost of replacement power was considered.¹⁷

44. In calculating the cost of replacement power, the Staff assumed an in-service date for the coal alternative of January 1, 1984. As the Midland Units are presently scheduled to come on line on March 1, 1981, and March 1, 1982, abandonment of the Midland Plant would require the generation of replacement power for the period 1981-1983 (Feld testimony, pages 6-7). In its calculations, the Staff has estimated that this replacement power can be made up internally with Consumers' generation while a portion might have to be purchased at greater cost to Consumers (Feld testimony, pages 1-2). The Board is not prepared to conclude that, in view of the history of Midland, these dates are inflexible; we likewise feel that delay may well alter the schedule for construction of a coal plant and that it is realistic to assume a time differential during which replacement power would be needed.

45. The Staff did not consider sunk costs in its analysis which is an additional conservatism (Feld testimony, pages 1-2).

46. The results of the Staff's analysis are presented in Table 1 of the Feld testimony (page 8). The low sulfur coal alternative is the most economic alternative to the Midland Plant with a 30-year levelized cost of 52.5 mills per kWh as compared to a lower 30-year levelized cost of the Midland Plant of 43.3 mills per kWh.

47. Dr. Feld discussed the conservative assumptions involved in the analysis (Tr. 4512-13). These assumptions include the use of total capital costs rather than "to go" costs, escalation in the price of coal at the rate of 5% a year which is the general inflation rate and assumes no real price increase, and the assumption that interim power can be made up by existing units on the Consumers' system and not through purchased power.

48. The Staff's analysis included in its nuclear fuel costs the assumption that plutonium would be recycled. If there is no recycle, nuclear fuel costs would be increased by approximately 10% of the levelized mills per kWh basis which would increase the cost of the Midland Plant but not enough to substantially affect the large spread in costs between the Midland Plant and the low sulfur coal alternative (Feld, Tr. 4545). The levelized cost of the Midland Plant would increase from 43.3 mills per kWh to 44.4 mills per kWh (Feld, Tr. 4545; Feld Testimony, Table 1, page 8). Reprocessing costs are included in the assumption of plutonium recycle.

49. Dr. Feld presented 1981 present worth values for the Midland Plant and low sulfur coal facility (Feld, Tr. 4516). The cost for the Midland Plant

¹⁷Testimony of Sidney E. Feld following Tr. 4509.

is \$3,816,000,000 and the cost for the low sulfur coal facility is \$4,540,000,000. The effect of no recycle of plutonium and reprocessing on the Midland Plant costs in terms of 1981 present worth dollars would increase the cost to \$3,917,000,000 (Feld, Tr. 4554).

50. The Staff updated its coal cost estimates which affected the cost of replacement power and the cost of the coal alternatives.¹⁸ The Staff continued to support the 5% escalation factor applied in its analysis. However, based on more recent information, the Staff determined that it had initially understated the price of coal under new contracts (Feld Testimony, page 1). In a review of more recent data including data gathered from the Federal Power Commission and data presented by Consumers,¹⁹ the Staff developed revised base prices which were then used to update the comparison of alternatives and the cost of replacement power (Feld Testimony, page 2). The results of the analysis are presented in Table 1 (Feld Testimony, page 3). The most reasonable alternative remains the low sulfur coal alternative with a 30-year levelized cost of 59.2 mills per kWh as compared to 43.3 mills per kWh for the Midland Plant.

51. The Staff's analysis was prepared in late 1976 and presented in early 1977 and assumed an in-service date for the coal-fired alternative of January 1, 1984, based on an immediate abandonment of the Midland Plant. The Staff's analysis would be conservative for a later abandonment date for the Midland Plant for, as the abandonment date for Midland is extended, the January 1, 1984, date for the coal-fired alternative becomes less realistic. Consequently, the replacement facility would come on line at a later date and there would be a need for more replacement power assuming the validity of the projected completion dates for Midland.

52. In order to generate its own steam and electricity, Dow would require new generating facilities. Modifying existing facilities so that they could continue to operate has been examined and rejected by Dow (Temple, Tr. 2444-2445). The alternatives to the Midland Plant which were felt to be feasible were examined in the "Comparison of Dow Alternatives for Supplying Steam and Power to the Midland Plant" (Intervenors Ex. 26). The most favorable alternatives were found to be either a new coal-fired steam and electric generating facility or a coal-gas facility. The coal gasification technology consists of a proposed prototype unit so that costs for that system are less reliable than for a conventional coal system (Temple, Tr. 2645). Dow employed its own costs in the analysis. Based on Dow's evaluation, the Midland Plant is clearly preferable at a 30% return on investment and about even at 15%. See Intervenors Ex. 26.

¹⁸Testimony of Sidney Feld following Tr. 5169.

¹⁹Testimony of Robert W. Wilkinson following Tr. 4881.

53. Consumers has examined the alternative of Dow generating its own process steam and electricity.²⁰ In performing its analysis, Consumers used the cost data presented by Dow with the exception of coal costs. Consumers took Dow's 1982 cost assumptions as shown in Case "C," of Midland Intervenor Ex. 26 for feedwater, limestone, operation and maintenance, and capital costs (Brzezinski testimony, page 3) and concluded that Dow's coal costs understated a reasonable projection of expected coal costs (Wilkinson testimony, page 10).²¹ Consumers then used its own coal cost information.

54. The base price of coal identified by Consumers is \$1.23 per million Btu for high sulfur coal and \$2.19 per million Btu for low sulfur coal in 1976. Consumers used an escalation rate of 12% for 1977 and 1978, 10% for 1979-1983 and 9% thereafter (Wilkinson testimony, pages 3-5). Revised nuclear fuel costs and revisions in the projected Dow electric rates consistent with the Consumers' most recent rate case filing were used (Brzezinski testimony, page 5). The results of the analysis are presented in columns 4 and 5 at page 7 to the Brzezinski testimony. Consumers concluded that at either a 15% or 30% rate of return, the Dow alternative of generating its own process steam and electricity was not economically preferred.

55. The Staff has examined as an alternative to the Midland Plant a combination of facilities which could result if Dow decided to provide its own process steam and electricity requirements.²² Under this alternative, Dow would build and operate four high sulfur coal units capable of producing 24,000,000 lb/hr of steam and 167 MW of electricity and Consumers would construct and operate a low sulfur coal plant with a net electrical output of 1,178 MW. The combined electrical and steam output from these facilities would equal the output of steam and electricity from the Midland Plant (Feld testimony, page 1).

56. The Staff used cost data developed by Dow in its analysis of alternatives to the Midland Plant with the exception of coal costs. The coal costs used in the analysis were those of the Staff updated at the hearing (Feld testimony, page 1).

57. The Staff presented coal cost information which corroborated the high sulfur and low sulfur base prices selected by Consumers (Feld testimony, pages 1-2). However, the Staff employed a more conservative 5% escalation rate in its analysis (Feld, page 5).

58. For the separate facility to be constructed by Consumers, the Staff analyzed a low sulfur coal plant as it was found to be more economical than a high sulfur alternative. The costs associated with an 1,178 megawatt elec-

²⁰Testimony of Richard F. Brzezinski following Tr. 4959.

²¹Testimony of Robert W. Wilkinson following Tr. 4881.

²²Testimony of Sidney E. Feld following Tr. 5169.

tric coal plant were taken to be directly proportional to the costs associated with the 1,600 megawatt electrical coal plant (Feld, pages 2-3).

59. The results of the Staff's analysis are presented in Table 1 of the Feld testimony. In the table the Midland Plant (including sunk costs) was compared with the alternative of self-generation by Dow plus a reduced size coal-fired plant to be constructed by Consumers. The Midland Plant has a cost advantage of from \$1,277,000,000 to \$1,775,000,000.

60. Intervenors also presented testimony on a Dow alternative to the Midland Plant. The alternative proposed that Dow construct facilities and generate all of its electrical and process steam requirements using coal-fired boilers and that Consumers construct an 800 megawatt electric coal-fired generating facility (Timm testimony, page 83)²³ rather than the 1,178 MWE facility proposed by the Staff.

61. It was assumed in the analysis that the Dow facilities would be completed by 1982, and the Consumers facility would be completed in 1983 (Timm testimony, page 83). Capital costs for the coal generating facility and for the Midland Plant were the same costs used by Consumers in its analysis. Capital costs for the Dow facilities were those used by Dow in its analysis (Timm testimony, page 85). However, Intervenors did use separately developed coal costs (Timm testimony, page 85).

62. The results of Intervenors' analysis are presented in Intervenors Ex. 46. This exhibit shows a cost advantage of \$150,000,000 for the Dow alternative, disregarding sunk costs. Sunk costs in the project were projected to be \$578,500,000 on September 1, 1977 (Keeley Ex. 19 following Tr. 3646).²⁴ Assigning these sunk costs to the Dow alternative would thus result in a cost disadvantage for that alternative of approximately \$428,000,000.

63. The analysis performed did not include the costs of replacement power for the years 1981-83 because Intervenors concluded that the added two years of generating capability associated with the coal alternative coming on-line in 1983 as opposed to the Midland Plant on-line date of 1981 would roughly cancel out the costs associated with replacement power (Timm testimony, page 86).

64. Dr. Timm updated Intervenors Ex. 46 at the hearing to incorporate a variety of changes. Using the modified values, he concluded that the Dow alternative was \$288,000,000 cheaper than continued construction of the Midland Plant (Timm, Tr. 6170-6179). When sunk costs are applied, the alternative becomes \$290,500,000 more expensive than Midland.

65. The Board finds that the alternative analysis performed by In-

²³Testimony of Richard J. Timm bound in the special transcript volume of March 23, 1977, following Tr. 16A.

²⁴\$595,000,000 less various salvage items and plus site restoration and other expenses.

tervenors has no cost advantage for the Dow alternative when sunk costs are considered.

66. Based on the evidence presented at the suspension hearing and the Commission's decision in *Seabrook* relative to sunk costs and their relation to suspension, the Board concludes that no alternative to Midland will be foreclosed due to continued construction because all other alternatives have now been foreclosed.

OTHER MATTERS

A. ACRS Report

67. Thus far we have said little about that part of the remand having to do with the ACRS letter. *Aeschliman* held that the original ACRS report dated June 18, 1970, (with its supplement dated September 23, 1970) did not meet the requirements of the Atomic Energy Act because it failed to provide sufficient information for a layman to understand the matters that concerned the Committee about the plant. That original report has been augmented and there is now before the Board a new report. As a part of the remand procedure we will determine whether the report as it now stands satisfies, in our view, the requirements of the Court. It is the Intervenor's position that because of the "opacity" of the report²⁵ and because some generic ACRS items are allegedly never resolved (Tr. 4216-4227 and 4259-4266) there is no way for anyone to know how much it might cost to modify the plant to provide a safe solution to ACRS concerns or at what point construction has progressed so far that solutions are foreclosed. The Licensee contends that all the generic ACRS items identified have either been provided for so that solutions for them are not foreclosed or that there has not been a resolution of the problem so that there is nothing to foreclose.²⁶ It appears that of the 11 generic items identified by ACRS, the Staff has concluded that none would be foreclosed by continued construction.²⁷

68. It has long been the practice in this licensing procedure to permit deferral of the resolution of generic safety items such as these to the operating license stage.²⁸ We are reluctant to conclude that this practice should be suspended in this instance because of the faulty ACRS letter in the absence of some indication of a problem that will create serious safety

²⁵Intervenors' Brief filed with their Proposed Findings, page 4.

²⁶Licensee's Brief filed with its Proposed Findings, page 27.

²⁷Testimony of Mr. Crocker following Tr. page 4177.

²⁸See *Georgia Power Company* (Alvin W. Vogtle Nuclear Plant, Units 1 and 2), ALAB-291, 2 NRC 404, 411.

concerns should construction continue until the remand decision is issued. We therefore decline to suspend construction on that ground.

B. Quality Assurance and Quality Control

69. Intervenors have indicated their belief that inquiry into Consumers' Quality Assurance and Quality Control program is a proper subject for this case and that the results of such inquiry would provide further grounds for a suspension. Intervenors' Proposed Findings 8, 9, 67-73. We disagree. The Commission orders relative to remand of the case to a Licensing Board defined quite carefully the issues that were to be considered. Jurisdiction over other matters was not delegated and thus resides elsewhere.²⁹ There is a procedure available under the rules which is designed to permit any person to raise questions such as these. See 10 CFR Sec. 2.200 *et seq.*, particularly Sec. 2.206.

BALANCING THE EQUITIES

70. As we have endeavored to show, there are substantial equities favoring the Intervenors' case for suspension. They have timely demonstrated in the construction permit proceeding the weakness of the original NEPA review and the weakness of the original ACRS letter. The defects in that proceeding were significant enough that the Court of Appeals remanded the matter to the Commission.

71. On the other side of the balance, are the need for the project, the effects of delay, the foreclosure of alternatives caused by construction and investment, and the cost advantage over the plant's life of the use of nuclear fuel. The need for generating capacity and process steam weigh against suspension. Delay would result in an economic cost and would have other effects mentioned in the foregoing parts of this Order. Based on the present record, it is our view that, considering future operating costs and sunk costs, there is no alternative which if now begun, would not result in an increase in total costs of several hundred million dollars.

72. We conclude that on balancing the equities we should not order suspension or modification of the Midland construction permit pending a decision on the items remanded by the Court of Appeals. We do this with the understanding that if construction continues as planned and sunk costs are credited to Midland, the balance and the foreclosure will, with time, become more pronounced.

²⁹See *Vogtle, supra*.

ORDER

IT IS THEREFORE ORDERED:

(1) That all of the motions of the Intervenor for suspension of the construction permits for Midland, Units 1 and 2, are denied and such permits are continued in effect.

(2) That in accordance with 10 CFR §§2.760, 2.762, 2.764, 2.785 and 2.786, this Order shall become effective immediately and shall constitute with respect to the matters covered therein the final action of the Commission thirty days after the date of issuance hereof, subject to any review pursuant to the Commission's Rules of Practice. Exceptions to this Order may be filed by any party within seven days after service of this Order, and a brief in support of such exceptions may be filed by any party within fifteen days [twenty days in the case of the Staff] thereafter. Within fifteen days of the filing and service of the brief of the appellant [twenty days in the case of the Staff], any other party may file a brief in support of, or in opposition to, the exceptions.

(3) That because we are not certain that this is an appealable order under the Commission's Rules of Practice,³⁰ and because we think it is important that it be reviewed now, we refer to the Appeal Board the rulings made herein.

IT IS SO ORDERED.

THE ATOMIC SAFETY AND LICENSING BOARD

Dr. J. Venn Leeds, Member

Dr. Emmeth A. Luebke, Member

Frederic J. Coufal, Chairman

Dated at Bethesda, Maryland,
this 23rd day of September 1977.

³⁰*The Toledo Edison Company, et al.* (Davis-Besse Nuclear Power Station) and *The Cleveland Electric Illuminating Company, et al.* (Perry Nuclear Power Plant, Units 1 and 2), ALAB-300, 2 NRC 752 at 758.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Robert M. Lazo, Chairman
Hugh C. Paxton
Dr. Paul W. Purdom

In the Matter of

Docket No. 50-219

JERSEY CENTRAL POWER &
LIGHT COMPANY

(Conversion to Full-Term
Operating License Proceeding)

(Oyster Creek Nuclear
Generating Station)

September 28, 1977

Upon consideration of an untimely petition to intervene, the Licensing Board determines after evidentiary hearings that petitioners have not shown excuse or good cause for their three-year filing delay, and that the four factors enumerated in 10 CFR §2.714(a) also do not warrant the grant of the petition.

MEMORANDUM AND ORDER

This Memorandum and Order of the Atomic Safety and Licensing Board (hereinafter referred to as "Board") concerns the Board's disposition of an untimely petition for leave to intervene in this proceeding. In Section I the Board reviews pertinent licensing events which have occurred since Jersey Central Power and Light Company (hereinafter referred to as "Licensee") applied to the Atomic Energy Commission¹ for conversion of its provisional operating license for the Oyster Creek Nuclear Generating Station (hereinafter variously referred to as "Station" or "Oyster Creek Station") to a full-term operating license. In Section II, the Board makes findings of fact regarding good cause for admitting the late filed petition

¹The licensing and related regulatory functions of the Atomic Energy Commission were transferred to the Nuclear Regulatory Commission by the Energy Reorganization Act of 1975, Pub. L. 93-438, §201(f), 88 Stat. 1233, 1243 (codified at 42 U.S.C.A. §5841 (f) (Supp. 1, 1975)). References throughout this Memorandum and Order to "Commission" refer to the Atomic Energy Commission or Nuclear Regulatory Commission as appropriate.

for leave to intervene filed by Sands Point Harbor, Inc., Philip Maimone, Wilson T. Crisman and Ruth L. Chrisman (hereinafter collectively referred to as "Petitioners"). In Section III of this Memorandum and Order the Board, on the basis of the Findings in Section II, concludes that good cause has not been shown that would warrant the admission of Petitioners as Intervenors in this proceeding. Accordingly, in Sections IV and V, the Board orders that Petitioners' intervention request is denied.

I

A. Oyster Creek Station has operated since 1969 under a Provisional Operating License issued by the Commission. In March 1972 the Licensee applied for conversion of its provisional license to a full-term operating license for the Station. On November 28, 1972, the Commission published in the *Federal Register* (37 Fed. Reg. 25190) "Notice of Consideration of Conversion of Provisional Operating License to Full-Term Operating License; Notice of Opportunity for Hearing Pursuant to 10 CFR part 50, Appendix D," providing that any person whose interest might be affected by the proceeding could file with the Commission a petition for leave to intervene within thirty days of publication of the notice in the *Federal Register*. Notice of hearing and opportunity to intervene also appeared in at least one newspaper in the locale of the Station, the Asbury Park Press, on December 7, 1972.

In response to these notices, several requests for hearing and for an opportunity to participate in this proceeding were filed. By Memorandum and Order, dated March 2, 1973, the licensing board appointed to rule on petitions for leave to intervene (hereinafter referred to as "Petitions Board") admitted jointly as Intervenors, Sands Point Marina, Inc., Henry J. Kurtz and Mary A. Kurtz, doing business as Oyster Creek Marina, and Charles B. Mallie and Joseph P. DiPaolo, doing business as Briarwood Yacht Basin, and directed that a hearing be held. A Notice of Hearing on Facility Operating License for the Oyster Creek Station was published shortly thereafter in the *Federal Register* (38 Fed. Reg. 6311). The issues among the parties admitted by the Petitions Board related to Intervenors' allegations of environmental harm—namely, damage resulting from shipworm infestation and silting—at Intervenors' marinas on Oyster Creek.

Following the designation of this Board by the Chairman of the Atomic Safety and Licensing Board Panel to conduct the public hearing in this proceeding, the Board scheduled and publicly noticed a special prehearing conference to be held in Waretown, New Jersey, in the vicinity of the Station site on September 18, 1973 (38 Fed. Reg. 22175). At that prehearing con-

ference, the State of New Jersey who on August 31, 1973, had requested through its Nuclear Energy Council to participate in the proceeding, was admitted under the provisions of 10 CFR §2.715(c). Pursuant to agreements reached at the prehearing conference, discovery was commenced between the parties early in 1974.

Discovery and extensive investigations and negotiations between the parties were conducted through 1974 and into 1975, culminating in a settlement. By letter dated November 14, 1975, counsel for the NRC Staff (hereinafter referred to as "Staff") informed the Board that the parties had been able to mutually resolve the issues in controversy in the proceeding, and submitted a "Joint Motion to Terminate Hearing" signed by Licensee's counsel and counsel for the Staff. The Joint Motion noted that counsel for Licensee had been authorized by counsel for the State of New Jersey to inform the Board that the State of New Jersey had no objection to the Joint Motion. On the same date counsel for the Intervenors filed a Notice of Withdrawal of Intervenors from the proceeding.

Resolution of the issues in controversy as reported in the Joint Motion to Terminate Hearing, required that conditions would be incorporated into the Station's full-term license. Such conditions would require: (1) with respect to the silting issue, that Licensee perform stabilization of the intake and discharge canal banks in the vicinity of the Station; and, (2) with respect to the shipworm issue, that Licensee remove trashwood from Oyster Creek as well as pilings, bulkheads and other wood in all four marinas on Oyster Creek (three of which were Intervenors) that harbor a resident breeding population of marine borers, and carry out an NRC-approved marine borer monitoring program to determine whether continued operation of the Oyster Creek Station results in any other resident marine borer populations which contribute significantly to the spread of marine borer damage in Barnegat Bay. Through the Joint Motion and its attachments it was reported that the required canal bank stabilization already had been completed, that the trashwood removal effort was substantially complete, that the wood removal in the marinas (following acquisition of the four marinas by Licensee) would be underway shortly, and that the approved marine borer monitoring program had commenced in June 1975.

The Board has not ruled on the Joint Motion to Terminate Hearing. In a Memorandum and Order of March 11, 1976, the Board sought clarification of the Joint Motion and additional information regarding the details of the various monitoring programs to be incorporated into the Station's Environmental Technical Specifications. Clarification of the Joint Motion and its attachments was provided the Board by the NRC Staff in a letter to the Chairman, dated March 17, 1976. Progress on a resolution of the few remaining outstanding areas necessary for a complete set of Environmental

Technical Specifications has been reported periodically to the Board by the Staff.

B. Meanwhile, on February 13, 1976, an admittedly untimely Petition for Leave to Intervene in this proceeding was filed by Petitioners Sands Point Harbor, Inc., *et al.* The Petition stated that Petitioners (like the marinas who previously had intervened and withdrawn) are owners of real property bordering on Oyster Creek near the Oyster Creek Station. The Petition raised contentions regarding shipworms and siltation—the subjects placed in issue by the prior Intervenor. Although Petitioners acknowledged that their request for admission was untimely, various reasons were given in an effort to show good cause for failure to file on time.

Licensee and the Staff responded to the late Petition, both stating that good cause for the three-year late petition had not been shown. The Licensee's response dealt only with the question of good cause, did not challenge Petitioners' interest and did not address the adequacy of Petitioners' contentions. The Staff in its response concluded that Petitioners met the interest and adequacy of contentions requirements for timely petitions, but clearly were untimely in their request. For the reasons set out in the Staff's answer of March 8, 1976, and the Licensee's answer of February 26, 1976, the Board in a Memorandum and Order dated June 14, 1976, concluded that a showing of good cause for the untimely filing had not been made by Petitioners in their intervention request, but that Petitioners' explanation for the late request was based on assertions which required factual information before a decision could be made as to whether good cause might exist to admit Petitioners into the proceeding three years after the opportunity for timely requests had expired. Accordingly, the Board adopted the Staff's suggestion that a prehearing conference be held which would offer the Board and the parties an opportunity to explore the factual basis, or lack thereof, for Petitioners' request. Adopting a corollary suggestion by the Staff, the Board ordered Petitioners in advance of the prehearing to provide by affidavit or offer of proof identification of the specific factual bases for Petitioners' allegations that there had been a change in circumstances regarding the shipworm infestation and the silting and that Licensee had failed to implement the agreed upon conditions reflected in the Joint Motion to Terminate Hearing.

Following receipt by the Board and other parties of Petitioners' Response to the Board's Memorandum and Order of June 14, 1976, and further reports by the Staff on the status of discussions between the Staff and Licensee on Environmental Technical Specifications, a conference call was held on December 16, 1976, to schedule a prehearing conference for the purpose of hearing evidence on the question of good cause for allowing the late petition. It was agreed during the conference call that certain documents reporting the results of shipworm investigations in the area of

Oyster Creek Station would be exchanged between the parties and that Licensee and the Staff would file with the Board and other parties statements outlining their respective positions on the question of good cause as well as the evidence each would present at the prehearing conference. Documents subsequently were exchanged between the parties, and Licensee and the Staff provided statements of their position. Licensee in the statement outlining its position maintained that good cause did not exist, that it would present evidence demonstrating compliance with the agreed upon conditions underlying the Joint Motion, and that no significant changed circumstances had occurred. The Staff advanced a position which it characterized as between that of the Licensee and the Petitioners. The Staff's position was that although Licensee had adequately implemented the required conditions regarding canal bank stabilization, wood removal which would largely destroy the shipworm habitat in Oyster Creek, and monitoring for future shipworm activity, there was insufficient data since these efforts had been taken to determine confidently whether the steps were adequate, and that Petitioners should be admitted as "Provisional Interveners" pending the collection and evaluation of more data.

C. Pursuant to a notice of Special Prehearing Conference on Late Petition for Leave to Intervene (42 Fed. Reg. 1320), a prehearing conference open to the public was held in Trenton, New Jersey, on January 26-27, 1977, to hear evidence on the question of good cause for granting Petitioners' untimely petition. Participants in the prehearing were the Licensee, the NRC Staff, Petitioners Sands Point Harbor, Inc., *et al.*, and the State of New Jersey. Petitioners presented three witnesses—K. Elaine Hoagland, William T. Crisman and Clarence F. Wicker. Licensee presented four witnesses—Ivan R. Finfrock, Beatrice R. Richards, Michael B. Roche, and E. Gregory Roome. The NRC Staff presented three witnesses—Edward F. Hawkins, Michael T. Masnik and John A. Strand. The State of New Jersey presented no witnesses of its own but conducted cross-examination of selected witnesses of the other participants. The following exhibits were admitted into evidence by the Board:

Petitioners'
Exhibit No. 1

Affidavit of K. Elaine Hoagland (Davis), dated June 10, 1976, *admitted into evidence at Tr. 74* (cited hereinafter as "Hoagland Affidavit").

Petitioners'
Exhibit No. 2

Hoagland, Turner and Rochester, "Analysis of Populations of Boring and Fouling Organisms in the Vicinity of the Oyster Creek Nuclear Generating Station with Discussion of Relevant Physical Parameters Over the Period April 30-November 30, 1976," (undated), *admitted into evidence at Tr. 77* (cited hereinafter as "Turner/Hoagland Report").

Petitioners' Exhibit No. 3	Affidavit of Wilson T. Crisman, dated June 30, 1976, <i>admitted into evidence at Tr. 152</i> (cited hereinafter as "Crisman Affidavit").
Petitioners' Exhibit No. 4	Affidavit of Clarence F. Wicker, dated June 4, 1976, <i>admitted into evidence at Tr. 184</i> (cited hereinafter as "Wicker Affidavit").
Applicant's Exhibit No. 1	Richards, Rehm, Belmore, and Hillman, "Annual Report For the Period June 1, 1975, to May 31, 1976, on Woodborer Study Associated With the Oyster Creek Generating Station," dated November 30, 1976, <i>admitted into evidence at Tr. 240</i> (cited hereinafter as "Clapp Annual Report").
Applicant's Exhibit No. 2	Richards, Rehm, Belmore, and Hillman, "Progress Report For the Fifth Quarter on Woodborer Study Associated With the Oyster Creek Generating Station," dated September 9, 1976, <i>admitted into evidence at Tr. 242</i> (cited hereinafter as "Fifth Progress Report").
Applicant's Exhibit No. 3	Richards, Rehm, Belmore, and Hillman, "Progress Report For the Sixth Quarter on Woodborer Study Associated With the Oyster Creek Generating Station," dated December 10, 1976, <i>admitted into evidence at Tr. 242</i> (cited hereinafter as "Sixth Progress Report").

II

A. The findings of fact made by the Board in this Memorandum and Order concern the limited question of whether Petitioners have made a substantial showing of good cause for their long delay in requesting leave to intervene in the subject proceeding. The substantive issues involving the cause and effect relationships between Oyster Creek Station operations and questions of past, present, and future silting and shipworms in Oyster Creek are not dealt with except insofar as Petitioners have alleged significant changes in circumstances involving these subjects to support their good cause. Licensee urged the Board, for the limited purposes of its determination of Petitioners' request, to assume that shipworms and silting exist in

Oyster Creek due in part to Station operation, and Petitioners concurred in the limited scope of the Board's inquiry, stating they were not prepared to address the substantive issues. Accordingly, while the Board was lenient with the admission of testimony and evidence whose strict relevance and materiality to the question of good cause was somewhat remote, we did so mindful of our broader responsibilities in this proceeding, including our need to act on the Joint Motion to Terminate Hearing, but making clear to the parties our recognition of the limited inquiry appropriate for a determination on Petitioners' request.² Also, the Board discusses below the criteria required by the Commission's Rules of Practice (10 CFR §2.714(a)) and past Atomic Safety and Licensing Appeal Board and Commission decisions to be considered in acting on a late intervention request.³

B. Petitioners' request for intervention is admittedly late. As an excuse, Petitioners allege certain changed circumstances and a lack of awareness of the shipworm and silting problems and of the NRC proceeding.

The petition was filed more than three years after the opportunity to participate was publicly noticed.⁴ Petitioners stated in their petition that they were unaware of any right to intervene until December 1975, and it was not until early January 1976 that they discovered that the previous Intervenors with similar interests had withdrawn from the proceeding.⁵ Both the Licensee and the Staff in their earlier responses to the Petition found these excuses insufficient to provide good cause.⁶ Taking into account Petitioners' excuses and the other parties' responses, the Board in its Memorandum and Order of June 14, 1976, found that Petitioners had not shown good cause for their late intervention request. No new information or argument related to these excuses was offered by Petitioners during the prehear-

²In this regard see, for example, notice of this special prehearing conference (42 Fed. Reg. 1320), Tr. 74, 80-83, 92.

³See, for example, *Nuclear Fuel Services, Inc.* (West Valley Reprocessing Plant), CLI-75-4, 1 NRC 273 (April 17, 1975), reversing ALAB-263, 1 NRC 208 (March 28, 1975), *Long Island Lighting Company* (Jamesport Nuclear Power Station, Units 1 and 2), ALAB-292, 2 NRC 631 (October 2, 1975); *Virginia Electric and Power Co.* (North Anna Station, Units 1 and 2), ALAB-289, 2 NRC 395 (September 18, 1975).

⁴See 37 Fed. Reg. 25190 (November 28, 1972). *Federal Register* notice constitutes actual notice to all persons whether or not such notice is actually seen. 44 U.S.C.A. §1508. The adequacy of *Federal Register* notice has particular meaning, where a party (such as in the case here of Sands Point Harbor, Inc.) is a business entity. See *Long Island Lighting Company* (Jamesport Nuclear Power Station, Units 1 and 2), ALAB-292, 2 NRC 631, 647 (October 2, 1975).

⁵Petition for Leave to Intervene, dated February 12, 1976, at para. 26.F.

⁶Applicant's Answer Opposing Untimely Petition for Leave to Intervene of Sands Point Harbor, Inc., dated February 26, 1976; NRC Staff Response to Petition to Intervene, dated March 8, 1976.

ing conference. Accordingly, the Board finds that Petitioners' allegations of ignorance regarding the NRC proceeding do not provide good cause for their late intervention.

In affidavits submitted with their Response to the Board's Memorandum and Order of June 14, 1976, Petitioners Philip Maimone and Wilson Crisman both averred that they had been aware of the shipworm problem since about 1971, but were unaware of the severity of the situation until each saw the destruction to wood in the marinas which destruction had become evident in the past two or three years.⁷ In clarification of this statement in his affidavit, Mr. Crisman testified during the special prehearing that he was "shocked" in 1971 to find a piece of wood on his waterfront completely riddled by shipworms, that he personally observed further shipworm damage at his property in 1973 and 1974, and heard a lot about shipworms from his neighbors, the marina owners who had earlier intervened in this same proceeding.⁸ As to his awareness of siltation in Oyster Creek, Mr. Crisman testified⁹ he had acquired his property in 1968 and 1969 and had always experienced some shoaling and sediment problems when the plant was running, but that when the Licensee "went to the dilution pumps" he started to get a buildup. On further questioning, Mr. Crisman admitted he did not know when the dilution pump activity to which he tied the "buildup" began, but he thought it was in 1975.¹⁰ The Board finds that Petitioners were aware of the existence of both shipworms and sedimentation, if not their exact magnitude, at the time the opportunity for intervention requests was initially afforded and acted upon by similarly situated neighbors of these Petitioners along Oyster Creek.

C. In support of their petition, petitioners have alleged as changed circumstances that Licensee has failed to carry out the wood removal and bank stabilization programs described in the Joint Motion, that Licensee's marine borer monitoring program is totally inadequate "since the problem is worsening without detection or concern" by Licensee, and that "the extent of the shipworms far exceeds the original estimates which were prepared at the time the other intervenors withdrew from the action." These assertions were the subject of considerable testimony by all the parties and are discussed *seriatim* below.

1. With respect, first, to the subject of sedimentation and Licensee's compliance with the proposed license condition requiring performance of a

⁷Mr. Crisman's affidavit is Petitioners' Exhibit No. 3; Mr. Maimone did not appear at the prehearing.

⁸Tr. 160-161, 163-164, 174.

⁹Tr. 174, 178.

¹⁰Tr. 179. The issue of "buildup" of silt associated with Station pumping is treated further *infra* in connection with Petitioners' assertions of significant changed circumstances.

canal bank stabilization program, the Board notes at the outset that the sedimentation question has received the attention of the State of New Jersey Public Utilities Commission (hereinafter referred to as "NJPUC") as far back as 1965 and has been an issue in this proceeding since its inception in 1972.¹¹ Petitioners' witness on this subject, Mr. Wicker, who had testified at NJPUC proceedings in 1965, testified at the January 1976 prehearing, that it was not his understanding that silting was a new concern.¹² Testimony by Licensee's, witnesses, Mr. Finfrock and Mr. Roome, echoed Mr. Wicker's opinion that this concern had at least a ten-year history.¹³ In fact, the NJPUC as a result of the 1965-1966 proceedings has required Licensee to conduct periodic sounding surveys in Oyster Creek to monitor for shoaling and Licensee has acknowledged its responsibility to remedy increased shoaling reasonably related to Oyster Creek Station's operation.¹⁴ The Licensee notified the NRC Staff prior to the issuance of the FES of its agreement in the NJPUC proceeding to be responsible for dredging shoals caused by plant operation and of its intention to carry out necessary dredging.¹⁵

Licensee has conducted periodic sounding surveys pursuant to the NJPUC requirement. Comparison of the soundings taken by Licensee since the 1960's shows that scouring of the bottom and silting in other areas of Oyster Creek has occurred. Since the Station commenced operation in 1969, Licensee's sounding data further shows that the rate of sedimentation buildup has been reasonably constant over the years, resulting in a buildup of sedimentation in Oyster Creek generally amounting to one to two feet in those areas where sediment has built up.¹⁶ Other witnesses on the subject of sedimentation were unable to quantify the annual rates of sedimentation or whether the rates have changed from year to year. There was general agree-

¹¹Testimony of Ivan R. Finfrock, *incorporated into transcript following Tr. 221* (hereinafter cited as "Finfrock Prepared Testimony"), pp. 2-3 and Attachment.

¹²Tr. 190-192.

¹³Finfrock Prepared Testimony, pp. 2-3 and Attachment; Testimony of E. Gregory Roome, *incorporated into transcript following Tr. 378* (hereinafter cited as "Roome Prepared Testimony"), pp. 2-3.

¹⁴Finfrock Prepared Testimony, p. 3, and Attachment; Roome Prepared Testimony, pp. 2, 4.

¹⁵JCP&L Response to the Atomic Energy Commission Draft Environmental Statement (December 1973), paragraph 1.C. This Response is reprinted in the Final Environmental Statement at page A-36.

¹⁶Roome Prepared Testimony, pp. 3-4, 6. Mr. Crisman stated that a comparison of surveys he had looked at showed shoaling of four feet had occurred at specific points in front of his property and Mr. Maimone's property between 1966 and 1977. The Board does not regard this testimony regarding certain specific locations as inconsistent with Licensee's data and general observations in Oyster Creek.

ment that as a result of increased Station pumping, there would be more suspended materials available for deposition as sediment in Oyster Creek. While there were data that suggested that the rate of sedimentation in Oyster Creek had actually increased consistent with an increase in Station pumping, we note that increased pumping has occurred at that Station fairly constantly since 1972, that the greatest incremental increase was between 1972 and 1973, and that there has been no recent significant increase (even assuming a commensurate increase in siltation rate would occur in Oyster Creek) that would support a finding of significant changed circumstances warranting intervention at this time.

2. As for Petitioners' assertion that Licensee had failed to carry out the Canal Bank Stabilization Program required by the Staff as a condition to a full-term license, the testimony was uncontroverted that the prescribed program had been completed in August 1975.¹⁷ Petitioners' earlier assertion to the contrary was apparently based on a misunderstanding of the Staff's requirement that Licensee perform stabilization of the banks along the entire length of the intake and discharge canals west of Route 9, and confusion of this work with additional stabilization of Oyster Creek's banks in another area further downstream which the Licensee later undertook on its own initiative as a followup to removal of trashwood in that portion of Oyster Creek.¹⁸

The adequacy of the canal bank stabilization to ameliorate observed sedimentation in Oyster Creek was challenged by Petitioners. In the Board's view, this question is more in the nature of a substantive contention than an allegation of changed circumstances. In any event, no one suggested that it would worsen the sedimentation rates in Oyster Creek. The Licensee's witness, Mr. Roome, and the Staff's witness, Mr. Hawkins, agreed that it would take several years more data before any confident assessment of the impact of bank stabilization on sedimentation rates in Oyster Creek could be made. Moreover, the Staff will require Licensee to provide periodic soundings data for the Staff's review in the future and Licensee has decided pursuant to its commitments to NJPUC to perform dredging later this year in Oyster Creek, including the areas of the Creek in the vicinity of Petitioners' properties.

The Board finds no showing of significant changed circumstances related to sedimentation in Oyster Creek which would provide good cause for Petitioners' admission.

¹⁷Roome Prepared Testimony, p. 3; Tr. 388-89 (Roome), 397-98 (Hawkins).

¹⁸Tr. 168-69 (Crisman), 200 (Wicker), 286-87 Testimony of Michael B. Roche, *incorporated into transcript following Tr. 284* (hereinafter cited as "Roche Prepared Testimony"), pp. 8-9; Roome Prepared Testimony, p. 3; Tr. 168-69 (Crisman), 200 (Wicker), 286-87, 342-45 (Roche), 388-89 (Roome).

3. Petitioners alleged as good cause that the Licensee had not fulfilled the conditions reflected in the Joint Motion which required Licensee to take all reasonable steps necessary to remove trashwood from Oyster Creek and infested wood in four marinas along Oyster Creek, and conduct a marine borer monitoring program. Licensee's trashwood removal program was commenced in April 1975 and completed in May 1975.¹⁹ The infested wood in the marinas—in fact, all the docks and associated pilings in the marinas whether or not infested—was removed by Licensee by May 1976;²⁰ none of the bulkheadings in the marinas was found to be infested. Finally, the marine borer monitoring required by the Staff was commenced in June 1975 and is continuing. The Board finds that Petitioners' allegations regarding Licensee's failure to implement the agreed upon conditions related to shipworms are baseless.

4. Petitioners asserted in their initial Petition that Licensee's marine borer monitoring program was totally inadequate and that the shipworm problem was worsening without detection and concern by Licensee. The allegation regarding the adequacy of the monitoring program appears more a substantive contention than a changed circumstance supporting good cause, but the Board need not make such a distinction for purposes of deciding Petitioners' admission since the evidence is clearly to the contrary. Licensee has engaged the Clapp Laboratories of Duxbury, Massachusetts, to conduct the monitoring program. The program described in some detail by Mrs. Beatrice Richards of Clapp in her testimony²¹ has the Staff's approval and was not questioned even by Petitioners' shipworm expert as to its adequacy, in scope or methodology. The Board finds Petitioners' allegation, that Licensee's marine borer monitoring is inadequate, is unsubstantiated and does not provide good cause for late intervention.

Petitioners' claim that the shipworm problem is worsening without detection and concern by Licensee and their assertion that shipworm populations far exceed the estimates made at the time of the Joint Motion in

¹⁹Roche Prepared Testimony, p. 8; Tr. 410 (Masnik). Petitioners questioned completion of this effort by noting that a "grove of trees" was left at one point along the Creek. Tr. 107, 155-156. Licensee's witness, Mr. Roche, explained that Licensee had been refused access to these trees by the landowner, that only some of the trees are in the water and then for rather short periods of two or three days when the water level is high in Oyster Creek, and that the trees have been inspected and found to have no evidence of shipworms probably because of the high concentration of humic material in the area due to cedar swamp runoff. Tr. 297-300.

²⁰Roche Prepared Testimony, pp. 9-10; Tr. 410. That the last of this wood was not removed until May 1976, while the condition required its removal "by October 1975 or as soon thereafter as practicable," was not regarded as significant by the shipworm expert witnesses (Tr. 118, 410-11) and does not in the Board's view constitute a failure to comply.

²¹Testimony of Beatrice Richards, *incorporated into transcript following Tr. 238* (hereinafter cited as "Richards Prepared Testimony").

November 1975 are related and can be considered together. With respect first to Oyster Creek, there was agreement that shipworm populations had decreased substantially during this period.²² With two possible exceptions, shipworm populations have decreased, although to a lesser extent, throughout Barnegat Bay, generally.²³ In this regard, Petitioners' witness, Dr. Hoagland, testified that within the last year she had found that there is a "tremendous problem" with shipworms in the South Branch of Forked River. Her preliminary conclusions are that it may be related partly to the increased dilution pumping which increases the salinity and in turn increases the number of larvae settling in this area. Therefore, she concludes that the ameliorative action in Oyster Creek could possibly increase the problem in the South Branch of Forked River so far as shipworms are concerned. Such conclusions are based on one summer's data and, in Dr. Hoagland's view, provide insufficient evidence to make strong conclusions as to the cause and potential future problem in that area. Dr. Hoagland also believes that further studies are required to answer the question of whether the shipworm larvae in the South Branch of Forked River can be transported into Oyster Creek via the cooling system for the plant. The results obtained to date and the preliminary conclusions reached are not deemed significant for purposes of deciding the question of whether Petitioners have shown good cause. The Board finds Petitioners' claim that shipworm populations far exceed estimates at the time of the Joint Motion is not substantiated by the record and that, in fact, populations, particularly in Oyster Creek, have decreased in recent years.

5. One final claim, that the wood removal effort by Licensee is not adequate to remove the danger that Oyster Creek will become a shipworm breeding ground threatening Barnegat Bay, needs to be addressed. Had the evidence at the prehearing conference shown affirmatively that the wood removal program had indeed been ineffective, the Board would give this claim serious consideration as a possible basis for good cause. All of the evidence, however, including Petitioners' testimony, was to the effect that there has been a very substantial decrease in shipworm activity in Oyster Creek since the wood removal program.²⁴ The cause of this decrease, and

²²Richards Prepared Testimony, p. 5; Roche Prepared Testimony, pp. 11-12; Tr. 95, 123, 130 (Hoagland).

²³Roche Prepared Testimony, pp. 11-12; Tr. 324-25. The possible exceptions were at a Turner station located in Cedar Creek outside any influence of the Station and at one of three Turner stations in Forked River. Turner/Hoagland Report, p. 1; Tr. 95. The Clapp data shows decreases at both these locations. Clapp Annual Report, pp. A-38 to A-41; Fifth Progress Report, pp. 9-12; Sixth Progress Report, pp. 7-12; Tr. 319-26.

²⁴Richards Prepared Testimony, p. 6; Roche Prepared Testimony, pp. 12-13; Petitioners; Exhibit No. 1, p. 1; Tr. 79, 95, 101, 252, 418-19. See also section 4, *supra*.

more particularly the degree of contribution of the wood removal program to the decrease, may indeed be, as testified by all parties, inconclusive at this point in time because of the possible contribution of other factors (e.g., weather, Station shutdown, increased dilution pumping, natural shipworm cycles, or predators).²⁵ Inconclusive results, not in themselves inconsistent with the success of the wood removal effort, do not, however, amount to good cause for a late intervention or justify the Board in deciding now that the Licensee should be subject to the time and expense of a contested hearing.

III

A. Availability of Other Means Whereby Petitioners' Interests Will Be Protected

Petitioners' interests and concerns relate to past and possible future environmental harms in Oyster Creek associated with shipworms and siltation which are connected with Oyster Creek Station operation. No questions related to radiological health and safety have been raised. In view of Petitioners' involvement in other forums raising the same concerns, the Board inquired of Petitioners the precise relief they would seek if admitted to the NRC proceeding.²⁶ Petitioners responded they would seek a variety of remedies ranging from denial of the full-term operating license to a condition of any full-term license issued that Licensee purchase Petitioners' properties or provide other financial remuneration to Petitioners.²⁷

With respect to those remedies sought by Petitioners, such as damages, which are inappropriate for consideration in an NRC licensing proceeding, the Board does not see any need for further exploring whether other forums exist in which Petitioners may adequately seek such relief. With respect to those remedies which are appropriate for consideration in NRC proceedings, such as denial of Licensee's request for a full-term license, the Board has a number of observations. First, Petitioners in late 1975 filed a claim in the Federal District Court of New Jersey alleging similar concerns to those raised in this proceeding and requesting among other remedies that operation of the Oyster Creek Station be enjoined. Although they subsequently withdrew their complaint voluntarily, Mr. Crisman in his affidavit implies they may reinstitute that action. Petitioners also are active par-

²⁵Richards Prepared Testimony, pp. 5-7; Roche Prepared Testimony, pp. 12-13; Petitioners' Exhibit No. 1, p. 1; Tr. 77-78, 95, 252, 255-56, 416.

²⁶Board Memorandum and Order of June 14, 1976, pp. 7-9.

²⁷Petitioner's Response to the Board's Memorandum and Order of June 14, 1976, dated June 30, 1976.

ticipants in the current Environmental Protection Agency's adjudicatory proceeding growing out of Section 402 permitting of Oyster Creek Station, which proceeding involves the Station's discharges and the impact of those discharges on Oyster Creek.

With respect to Petitioners' concerns over shoaling in Oyster Creek, the Board earlier observed that Licensee pursuant to an acknowledgment made in NJPUC proceedings involving this question in 1965-1966, intends to perform dredging in Oyster Creek later this year. Petitioners' concern with JCP&L's conformance with the NJPUC's orders regarding periodic shoaling surveys and maintenance dredging requirements would appear appropriate for NJPUC consideration. In short, it seems to the Board that a number of other means exist whereby Petitioners may protect the interests they seek to advance before the NRC, and they have been or are currently taking steps to advance their interests elsewhere.

Finally, denial of the present late petition to intervene will not deprive Petitioners of the opportunity to seek from the NRC at a later date such remedies as may be properly within NRC's authority to grant. Denial of the petition would presumably mean the end of the present hearing and would allow Licensee to proceed with its shipworm monitoring and dredging programs outside the arena of a contested licensing proceeding before this Board. If the results of the monitoring program or dredging operations warrant such action, the NRC Staff has the authority under Section 2.202 of the Commission's Rules of Practice to institute a proceeding to modify, suspend or revoke the Oyster Creek license. Petitioners further have the right under Section 2.206 to request the Director of Nuclear Reactor Regulation to institute such a proceeding. Thus the effect of a denial of the late petition will only be to require Petitioners to await the outcome of the monitoring and dredging programs before requiring Licensee to embark on a contested licensing proceeding which in the end may prove entirely unnecessary.

B. Extent to Which Petitioners' Participation Can Be Expected to Assist the Board in Developing a Sound Record

With respect to sedimentation in Oyster Creek, Petitioners presented at the prehearing Mr. Clarence Wicker, who has a lifetime of experience and training on this subject, as well as some knowledge of the Oyster Creek area in particular. Although Petitioners have not stated as such, the Board presumes if Petitioners were admitted that Mr. Wicker would remain available to lend his expertise to that of the Licensee and Staff in any further consideration of silting which was warranted.

Mr. Wicker observed that sedimentation has occurred in Oyster Creek and will continue to occur—which no one contests. He would require soun-

ding surveys by fathometer be conducted annually or semiannually to assess shoaling;²⁹ Licensee already is doing semiannual surveys and will be required as well by the Environmental Technical Specifications to conduct such surveys and submit the results to the NRC Staff.²⁹ Mr. Wicker would require as a solution that dredging be performed;³⁰ Licensee intends to perform maintenance dredging later this year and thereafter as further sounding surveys indicate it becomes necessary.³¹ The Board does not view Mr. Wicker's expertise as necessary to further development of a record on silting in this proceeding.

In the area of shipworms and whether Petitioners' participation could be expected to assist the Board in developing a sound record, the Board notes that Dr. Hoagland is Petitioners' expert on this subject and it would be through Dr. Hoagland's work that Petitioners could assist in developing the record. But the Board learned at the prehearing that the only work now being done by Dr. Hoagland in Oyster Creek is being conducted pursuant to a contract with NRC,³² not for Petitioners. Indeed, Petitioners' Exhibit No. 2, which was a report on work being done by Dr. Hoagland, was a report prepared for the NRC. The Board does not see how Petitioners' participation can be expected to further develop a record on the subject of shipworms, when the results of the only pertinent work being done by their expert is actually being compiled for the NRC and is therefore available to the Staff with or without Petitioners' participation.

C. The Extent to Which Petitioners' Interest Will Be Represented by Existing Parties

Petitioners' interests are divided between their own individual alleged damages and general environmental impacts. The Board's function is not to adjudicate private claims between litigants for past damages and insofar as Petitioners would seek to raise such issues here, we refuse to do so. The general environmental concerns raised by Petitioners involve the same subjects previously raised by the earlier Intervenor and shared by the Staff as evidenced in its FES. The NRC Staff represents the interests of the public in this and in all NRC proceedings. It is that interest which the Staff represented when it negotiated a proposed settlement of this proceeding in

²⁹Tr. 201-03.

³⁰Tr. 402. Licensee's witness, Mr. Roome, testified that Licensee intends to change from its current sounding pole technique to use of a fathometer for conducting bottom contour surveys. Tr. 378-79.

³¹Tr. 189.

³²Roome Prepared Testimony, pp. 4-5; Tr. 390.

³³Tr. 97.

1975. Petitioners have failed to make a good cause showing based on significant changed circumstances. Thus, as respects Petitioners' interests in environmental impacts properly cognizable by this Board, we view the Staff as having represented Petitioners' interests, even before Petitioners sought to do so for themselves in 1976.

D. Extent to Which Petitioners' Participation Will Broaden the Issues or Delay the Proceeding

Admission of Petitioners would not broaden the two subject areas placed in controversy in this proceeding in 1972. While Petitioners' contentions reflect developments in this case which have taken place in 1972 and quarrel with the disposition of the proceeding proposed by the parties in 1975, their concerns involve the relationship between Oyster Creek Station operations and shipworms and siltation in Oyster Creek—the same concerns which have been the subject of issues in this proceeding since its inception. In its current setting, however, with the prior Intervenor withdrawn and the remaining parties having mutually resolved the issues as reflected in the November 1975 Joint Motion to Terminate, there exist no matters in controversy between the parties in this proceeding. Viewed in this light, admission of Petitioners would not only broaden the issues but, indeed, would present the only issues in the proceeding.

The question of delay in the proceeding which would occur if Petitioners were admitted is significant. The existing parties to this proceeding, Licensee and the NRC Staff, agreed to conditions whose implementation in their collected view was adequate to obviate the need for any further hearing to consider the issues admitted in the proceeding. The Staff's position is that absent the late Petition the Staff would not have enlisted Board assistance on questions of the type sought now by Petitioners to be made the subject of a hearing. The Staff's own questions regarding the sufficiency of data available at this stage are of the type which the Staff normally handles in its environmental reviews without a public hearing. Thus, it appears that absent Petitioners, there would be no further public hearing,³ or conversely, that with Petitioners, a delay will result.

The extent of delay which would be occasioned by Petitioners' admission is substantial. In the NRC Staff's view Petitioners' participation would involve a period for discovery and the collection of additional data, but a hearing would not necessarily ensue, because Petitioners would be subject

³The Board always has the right in extraordinary circumstances to raise on its own issues involving serious safety or environmental matters where such matters exist; the Board has not raised such issues in this proceeding. See 10 CFR §2.760a.

o summary disposition. Licensee's view is that following discovery and the collection of additional data there would be a hearing because summary disposition would be "fruitless" in this case, since this would require that there be no factual dispute among expert opinions. On the question of additional time necessary for the collection of data to show that wood removal efforts by JCP&L accomplished their desired objectives, estimates by the experts ranged from a minimum of another year or two to four or five years.¹⁴ The Board finds based upon the periods estimated as necessary for the collection of additional data and our belief that disposition of Petitioners' contentions would require, through hearings, expert analyses and opinion on data collected over the years involving a variety of causal relationships, that admission of Petitioners would result in a delay of this proceeding of two or five years.

IV. CONCLUSIONS

In making the above findings of fact and the conclusions of law set forth below, the Board reviewed and considered the entire record of the proceedings and all of the proposed findings of fact and conclusions of law submitted by the parties. All of the proposed findings of fact and law submitted by the parties which are not incorporated directly or inferentially in this decision are rejected as being unsupported in law or fact or as being unnecessary to the rendering of this decision.

On the basis of the record in this proceeding, including the evidence taken during the Special Prehearing Conference of January 26-27, 1977, on the question of good cause for late intervention, and in accordance with the foregoing Findings of Fact, the Commission's Rules of Practice and prior Commission and Appeal Board decisions on good cause for late intervention, the Board concludes:

- a. That the burden is on Petitioners to show good cause why after three years of delay they should now be admitted as intervenors in this proceeding.
- b. That Petitioners' delay is unexcused by their asserted ignorance of the NRC proceeding or the severity of marine borer and sedimentation problems in Oyster Creek.
- c. That Petitioners have failed to show significant changed circumstances which would provide good cause for intervention at this stage in the proceeding.
- d. That other means are available whereby Petitioners may protect their interests and that Petitioners have taken steps in other forums to protect those interests.

¹⁴Tr. 108-09, 253-54, 258-59, 362, 416-18 (shipworms); Tr. 202, 389-90, 402 (siltation).

- e. That Petitioners' participation is not necessary to develop a sound record on the subject of shoaling and would not be expected to assist in developing a sound record on the subject of shipworms.
- f. That so much of Petitioners' interests as are cognizable in this proceeding are represented by the NRC Staff.
- g. That Petitioners' admission would broaden the subjects at issue in the proceeding and would result in from two to five years' delay in completion of the proceeding.

V. ORDER

WHEREFORE, in accordance with the Atomic Energy Act of 1954, as amended, and the Rules of Practice of the Commission, and based on the findings and conclusions set forth herein, IT IS ORDERED that the Petition for Leave to Intervene of Sands Point Harbor, Inc., *et al.*, dated February 12, 1976, is denied.

IT IS FURTHER ORDERED, in accordance with 10 CFR §2.714a that Petitioners may appeal this Memorandum and Order to the Atomic Safety and Licensing Appeal Board by filing a notice of appeal and accompanying supporting brief within five (5) days after service of this Memorandum and Order. Any other party may file a brief in support of or in opposition to the Appeal Board within five (5) days after service of the appeal.

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Hugh C. Paxton, Member

Paul W. Purdom, Member

Robert M. Lazo, Chairman

Issued at Bethesda, Maryland,
this 28th day of September 1977.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Sheldon J. Wolfe, Chairman
Dr. Oscar H. Paris
Dr. Hugh C. Paxton

In the Matter of

Docket No. 50-564

EXXON NUCLEAR COMPANY, INC.

(Nuclear Fuel Recovery and
Recycling Center)

September 30, 1977

Upon consideration of various petitions to intervene, the Licensing Board denies the petition of an intervenor whose interests it finds are not arguably within the zone of interest protected by the statute and who has not demonstrated that she can make a substantive contribution to the proceeding; grants the petition of Friends of the Earth on behalf of its thirty-eight members residing within twenty-five miles of the proposed site; and grants the petitions of the State of Tennessee and of the California Energy Resources Conservation and Development Commission pursuant to 10 CFR §2.715(c).

RULES OF PRACTICE: INTERVENTION BY A STATE

Interested states, other than the state or states in which activities under the license will take place, may also intervene under 10 CFR §2.715(c). *Vermont Yankee Nuclear Power Corporation*, LBP-73-8, 6 AEC 130 (1973).

**ORDER RULING ON PETITIONS
FOR LEAVE TO INTERVENE**

On February 10, 1977, the Nuclear Regulatory Commission (NRC) published in the *Federal Register* (42 Fed. Reg. 8439) a Notice of Hearing on Application for Construction Permit. The Notice stated that a hearing would be held before an Atomic Safety and Licensing Board to consider the application by the Exxon Nuclear Company, Inc., for a permit to construct

a reprocessing plant in Roane County, (Oak Ridge) Tennessee, which would have the capacity to store up to approximately 7,000 tons of irradiated nuclear fuel and to process 2,100 tons of fuel per year. Said Notice also stated, among other things, that any person, whose interest might be affected by the proceeding and who wished to participate as a party, must file by March 14, 1977, a petition under oath and affirmation for leave to intervene in accordance with the provisions of 10 CFR §2.714.

As hereinafter discussed, three timely petitions for leave to intervene were filed,¹ and, on April 28, 1977, a special prehearing conference was held in Knoxville, Tennessee, pursuant to 10 CFR §2.751a. The Board heard oral argument upon the aforementioned petitions presented by the NRC Staff, by counsel for Applicant, by counsel for Friends of the Earth, Inc. (FOE), and by Ms. Jeannine Honicker, appearing *pro se*.² Counsel for the State of Tennessee also attended the conference.

Honicker Petition

Ms. Honicker, a resident of Nashville, Tennessee, which is over one hundred miles from the proposed facility, asserts that, if the reprocessing plant is constructed, it is likely that spent fuel rods will be shipped from the south over the rails of the L and N railroad which are very near to her home and rental property, and that, if an accident occurred in that vicinity, it could cause her bodily harm, loss of life or loss of income. She also asserts that, under the Constitution and as a Federal and state taxpayer, she has a right to intervene in the instant proceeding.

In ruling upon petitions to intervene, we are governed by §2.714 of our Rules of Practice which requires that a petition must set forth with par-

¹The Board received a one page so-called letter of intervention dated March 12, 1977, from Ms. Zelia M. Jensen of Grandview, Tennessee. During the course of the special prehearing conference (Tr. 27), we stated that, if Ms. Jensen so desired, she could present a limited appearance statement at the beginning of the hearing pursuant to Section 2.715(a) of our Rules of Practice but that we could not consider the letter as being a petition to intervene because, contrary to Section 2.714, it was not filed under oath and affirmation, it failed to show standing and because it failed to specify contentions and the bases therefor.

The Board also received a Notice of Participation dated May 23, 1977, submitted by the California Energy Resources Conservation and Development Commission which is discussed, *infra*.

²On September 7, 1977, the Commission denied FOE's petition for review of the Appeal Board's decision, ALAB-425, rendered on August 3, 1977, which responded negatively to a question certified by us. In its Order the Commission stated, however, that the time for review of ALAB-425 on its own motion under 10 CFR §2.786(a) was extended to October 19, 1977. Since the Commission's Order did not stay the effectiveness of the Appeal Board's decision, we are proceeding to rule upon the petitions to intervene.

ticularity the petitioner's interest, how that interest may be affected by the results of the proceeding, and the factual basis for the connections with regard to each aspect on which the petitioner desires to intervene. We have reviewed Ms. Honicker's petition and the Staff's and Applicant's answers in opposition thereto and have read the transcript of the special prehearing conference, and conclude that the petitioner has failed to meet these requirements. We so conclude because in *Portland General Electric Company, et. al.* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610, 613, decided December 23, 1976, the Commission stated that, to have standing, a petitioner must satisfy two tests—one, some injury must be alleged that has occurred or will probably result from the action involved, and, second, an interest must be alleged that is "arguably within the zone of interest" protected by the statute. Ms. Honicker has failed to satisfy these tests. Her allegations of possible physical and/or economic injury are entirely speculative in nature, being predicated on the tenuous assumptions that the spent fuel will be shipped by the named carrier and that an accident might occur in the area proximate either to her residence or to her rental property. Consequently, we do not deem that Ms. Honicker's interests are arguably within the zone of interest protected by statute. Moreover, in light of *United States v. Richardson*, 418 U.S. 166 (1974), and *Frothingham v. Mellon*, 262 U.S. 447 (1923), we conclude that her allegations of interest under the Constitution or as a taxpayer do not confer standing.

While Ms. Honicker has no standing to intervene as a matter of right, nevertheless we have considered whether in our discretion, pursuant to *Portland General Electric Company, supra*, at pages 614-617, we should allow her intervention. At page 617 of that opinion, the Commission stated:

. . . As a general matter, however, we would expect practice to develop, not through precedent, but through attention to the concrete facts of particular situations. Permission to intervene should prove more readily available where petitioners show significant ability to contribute on substantial issues of law or fact which will not otherwise be properly raised or presented, set forth these matters with suitable specificity to allow evaluation, and demonstrate their importance and immediacy, justifying the time necessary to consider them.

After assessing all the facts and circumstances in the instant case, we have determined not to permit intervention, because, in the first place, Ms. Honicker has neither showed in her petition nor during the special prehearing conference (Tr. 28-45) that she has a substantial contribution to make on a safety or environmental issue appropriate for consideration at the construction permit stage. We concur with the Licensing Board's assessment in its Order denying Ms. Honicker's petition for leave to intervene in the

Watts Bar proceeding. In *Tennessee Valley Authority* (Watts Bar Nuclear Plant, Units 1 and 2), LBP-77-36, 5 NRC 1292, 1297 (1977), the Board observed that:

. . . While the Petitioner is an intelligent person who takes a commendable interest in civic matters, she is not a lawyer nor possessed of scientific or technical training. She does not have available to her some type of professional assistance in connection with the evidentiary presentation. . . .

Second, Ms. Honicker has not set forth her contentions with suitable specificity to allow evaluation, nor demonstrated their importance and immediacy. Her petition merely consists of quotations from an ERDA draft environmental statement (paragraphs 1 and 2), of an argument that proceedings should be suspended herein pending ERDA's filing of an environmental impact statement on its proposed sale of land to the Applicant (paragraph 3),³ of questions (paragraph 4), of an excerpt from a resolution adopted by the governing board of the National Council of Churches (paragraph 6), of an excerpt from a newspaper article (paragraph 7), and of an allegation that any cost-benefit analysis is inadequate if it does not address certain problems (paragraph 8).

Accordingly, Ms. Honicker's petition to intervene in this proceeding is denied.⁴ However, pursuant to §2.715(a), Ms. Honicker may make a limited appearance statement at the beginning of the forthcoming hearing.

Petition of State of Tennessee

Under date of March 11, 1977, the State of Tennessee petitioned to intervene as an interested state pursuant to 10 CFR §2.715(c), and both the Applicant and Staff support said state's admission as a participating state.

³This legal argument is without merit. Under these circumstances, we are not legally precluded from proceeding to take evidence on environmental issues which are within our domain pursuant to 10 CFR Part 51. See *Public Service Company of New Hampshire, et. al.* (Seabrook Station, Units 1 and 2), ALAB-293, 2 NRC 660 (1975). See also *Concerned Citizens of Rhode Island, et. al. v. NRC, et. al.*, 430 F. Supp. 627 (1977), wherein the District Court held that it would not block the NRC's docketing and processing of the New England Power Company's application for a construction permit despite the fact that the General Services Administration, which owned the land for the proposed facility, had not complied with a court imposed duty to prepare an Environmental Impact Statement.

⁴During the special prehearing conference, based upon a hearsay statement by an unidentified person, Ms. Honicker questioned whether Roane County has been and is still designated as a county in which there is to be no further releases of radioactivity (Tr. 31). At the forthcoming hearing, the Applicant and Staff should present evidence in response to this question.

We confirm our ruling made during the special prehearing conference (Tr. 20) wherein we permitted Tennessee to participate as an interested state.

Friends of the Earth, Inc., Petition

In its petition submitted on March 14, 1977, FOE asserts that its national membership is comprised of approximately 20,000 individuals, including 28 members living in Knoxville, Tennessee, (approximately 20-25 miles from the proposed site) and 10 members living in Oak Ridge, Tennessee (approximately 8-10 miles from the proposed site). (Acting upon the Board direction (Tr. 53), on May 10, 1977, said petitioner submitted affidavits of two of its members residing within 25 miles of the proposed reprocessing plant who deposed that they had authorized FOE to represent their interests in the instant licensing proceeding.) FOE further asserts, among other things, that the health and safety and the environment of its thirty-eight members may be adversely affected by the radioactive gaseous and liquid effluents associated with the operation of the facility and/or by the accidental or willful release of high level radioactive liquids, solid wastes or plutonium. The NRC Staff supports the admission of FOE as a party-intervenor. Applicant opposes FOE's admission on the ground that the petition fails to specify the contentions or the bases therefor with the particularity required by 10 CFR §2.714.

We conclude that FOE has satisfied the Commission's two tests to establish standing as prescribed in the *Pebble Springs* decision, *supra*. FOE has alleged a direct connection between that which is at issue in the instant proceeding, *i.e.*, whether a construction permit shall be granted, and the possible adverse results therefrom. Further, FOE's interests are within the zone of interests protected by both the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 *et. seq.* (1970), and the National Environmental Policy Act of 1969, 42 U.S.C. 4321 *et. seq.* (1970).

Further, we find that FOE's petition presents at least one contention (as clarified during the special prehearing conference at transcript 92-95) with suitable specificity and, in explaining the basis for it, has evidenced its importance and immediacy.¹ However, it should be noted that in admitting this contention as an issue in controversy, it is not our function to reach the merits thereof at this stage of the proceeding. *Mississippi Power and Light*

¹FOE's Contention 8, as clarified, reads as follows:

Applicant has failed to establish an adequate seismic design basis for the facility. The seismic design is based on a peak acceleration of 0.25g, which is the mean value correlated with a Safe Shutdown Earthquake having a Modified Mercalli Intensity of VIII. FOE contends that Applicant should have used a more conservative acceleration of 0.4g, which is the mean plus one standard deviation from the mean.

Company (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-130, 6 AEC 423, 426 (1973).

Accordingly, FOE's petition to intervene is granted.⁶

Notice of Participation of the California Energy Resources Conservation and Development Commission

On May 23, 1977, the California Energy Resources Conservation and Development Commission (Energy Commission) submitted a Notice of Participation pursuant to 10 CFR §2.715(c).⁷ The Energy Commission asserts that, as established by the California legislature in 1974, it was exclusively authorized to certify proposed thermal power plants, transmission lines and related facilities in California and must also compile and adopt standards to be met in designing and operating such facilities. It asserts that it is prohibited by California law from certifying a new nuclear power plant in California until the United States has identified and approved, and there exists a technology for the construction and operation of nuclear fuel rod reprocessing plants. Accordingly, it states that it has a vital interest in the instant proceedings because, through its participation, it will secure valuable information relevant to its determinations required by California law.

The Staff urges that the Energy Commission be admitted pursuant to §2.715(c). Applicant opposes admission because 42 U.S.C. §2021(l)(1970) evidences that only the state or states in which an activity will be conducted and thus having a direct or immediate interest will be admitted to participate. However, we construe that section of the Act to require that the NRC give prompt notice to the state or states in which an activity will be conducted of the filing of the license application, and to require that a reasonable opportunity be afforded for state representatives to participate. Further, in passing, we note that there is precedent for permitting a state to participate pursuant to §2.715(c) despite the fact that it was not the site of the proposed activity—see *Vermont Yankee Nuclear Power Corporation*

⁶In its petition FOE states an intention to request financial reimbursement for its participation. However, the NRC lacks statutory authority to provide funding. *Nuclear Regulatory Commission* (Financial Assistance To Participants in Commission Proceedings), CLI-76-23, 4 NRC 494 (November 12, 1976).

⁷We do not reach and decide the Staff's assertion that the March 14, 1977, deadline for filing petitions for leave to intervene under 10 CFR §2.714 is not applicable to the 10 CFR §2.715(c) participation by an interested state. In the instant case, the proceedings are in a preliminary stage and will not be delayed by the participation of the Energy Commission.

(Vermont Yankee Nuclear Power Station), 6 AEC 130 (1973), wherein the State of Kansas was permitted to participate as an interested state.

Accordingly, we permit the California Energy Resources Conservation and Development Commission to participate pursuant to 10 CFR §2.715(c).

FOE upon receipt of the instant Order, will informally consult with the Applicant and with the Staff in an effort to stipulate with regard to admissible contentions and the parties will informally initiate and promptly complete discovery with respect thereto. Within thirty days after the receipt of this Order, the parties will notify the Board whether such a stipulation has been executed and/or whether there has been disagreement as to the admissibility of certain contentions.

In accordance with 10 CFR §2.714a, this Order may be appealed to the Atomic Safety and Licensing Appeal Board within five (5) days after service thereof. The appeal shall be asserted by the filing of a notice of appeal and accompanying supporting brief. Any other party may file a brief in support of or in opposition to the appeal within five (5) days after the service of the appeal. No other appeals from rulings on petitions and/or requests for hearing shall be allowed.

Dr. Paxton concurs but was not available to sign the instant Order.
IT IS SO ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Dr. Oscar H. Paris, Member

Sheldon J. Wolfe, Esq., Chairman

Dated at Bethesda, Maryland- . .
this 30th day of September 1977.

CASE NAME INDEX

CLEVELAND ELECTRIC ILLUMINATING COMPANY, et al.
 Antitrust; Memorandum and Order; Dockets 50346A;50500A;50501A/50440A;50441A;
 ALAB-430 (6 NRC 457 (1977))

CONSUMERS POWER COMPANY
 Construction Permit; Order; Dockets 50329;50330; LBP-77-057 (6 NRC 482
 (1977))

DUKE POWER COMPANY
 Construction Permit; Decision; Dockets STN 50488;STN 50489;STN 50490;
 ALAB-431 (6 NRC 460 (1977))
 Construction Permit; Memorandum and Order; Dockets STN 50488;STN 50489;STN
 50490; ALAB-433 (6 NRC 469 (1977))
 Construction Permit; Partial Initial Decision, Supplemental; Dockets STN
 50491;STN 50492;STN 50493; LBP-77-047 (6 NRC 191 (1977))
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272;
 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387;
 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN
 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

DUQUESNE LIGHT COMPANY, et al.
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272;
 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387;
 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN
 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

EXXON NUCLEAR COMPANY, INC.
 Construction Permit; Memorandum and Order; Docket 50564; ALAB-425 (6 NRC 199
 (1977))
 Construction Permit; Order; 50564; LBP-77-059 (6 NRC 518 (1977))

FLORIDA POWER AND LIGHT COMPANY
 Construction Permit; Decision; Docket 50349A; ALAB-420 (6 NRC 8 (1977))
 Operating License, Antitrust Review; Decision; Dockets 50335A/50250A/50251A;
 ALAB-428 (6 NRC 221 (1977))
 Operating License, Antitrust Review; Decision; Dockets 50335A/50250A/50251A;
 ALAB-428 (6 NRC 221 (1977))

GEORGIA POWER COMPANY
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272;
 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387;
 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN
 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

JERSEY CENTRAL POWER AND LIGHT COMPANY
 Operating License; Memorandum and Order; 50219; LBP-77-058 (6 NRC 500
 (1977))

KANSAS GAS AND ELECTRIC COMPANY;KANSAS CITY POWER AND LIGHT COMPANY
 Construction Permit; Memorandum and Order; Docket STN 50482; ALAB-424 (6 NRC
 122 (1977))

LONG ISLAND LIGHTING COMPANY
 Operating License; Memorandum and Order; Docket 50322; LBP-77-050 (6 NRC 261
 (1977))

METROPOLITAN EDISON COMPANY, et al.
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272;
 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387;
 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN
 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

NORTHERN STATES POWER COMPANY

CASE NAME INDEX

Operating License, Amendments; Dockets 50282;50306; LBP-77-042 (6 NRC 131 (1977))
 Operating License; Initial Decision; Dockets 50282;50306; LBP-77-051 (6 NRC 265 (1977))
 Operating License; Memorandum and Order; Dockets 50282;50306; ALAB-419 (6 NRC 3 (1977))
 Operating License; Memorandum; Dockets 50282;50306; ALAB-427 (6 NRC 212 (1977))
 Operating License (Spent Fuel Pool Modification); Order; Dockets 50282;50306; LBP-77-055 (6 NRC 473 (1977))

OFFSHORE POWER SYSTEMS
 Manufacturing License; Memorandum and Order; Docket STN 50437; LBP-77-048 (6 NRC 249 (1977))

PACIFIC GAS AND ELECTRIC COMPANY
 Construction Permit, Antitrust; Order; Docket 50564A; LBP-77-045 (6 NRC 159 (1977))
 Operating License; Order; Dockets 50275 OL;50323 OL; CLI-77-023 (6 NRC 455 (1977))

PENNSYLVANIA POWER AND LIGHT COMPANY
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272; 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387; 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

PHILADELPHIA ELECTRIC COMPANY
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272; 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387; 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272; 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387; 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

POWER AUTHORITY OF THE STATE OF NEW YORK
 Construction Permit; Memorandum and Order; Docket 50549; ALAB-434 (6 NRC 471 (1977))

PUBLIC SERVICE COMPANY OF INDIANA
 Construction Permit; Partial Initial Decision, LWA; Dockets STN 50546;STN 50547; LBP-77-052 (6 NRC 294 (1977))

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE;UNITED ILLUMINATING COMPANY
 Construction Permit; Decision; Dockets 50443;50444; ALAB-422 (6 NRC 33 (1977))
 Construction Permit; Initial Decision, Supplemental; Dockets 50443;50444; LBP-77-043 (6 NRC 134 (1977))
 Construction Permit; Memorandum and Order; Dockets 50443;50444; ALAB-423 (6 NRC 115 (1977))
 Construction Permit; Order; Dockets 50443;50444; CLI-77-022 (6 NRC 451 (1977))
 Uranium-Fuel-Cycle-Rule Effects; Memorandum and Order; Dockets 50271/50443; 50444; ALAB-421 (6 NRC 25 (1977))

PUBLIC SERVICE COMPANY OF OKLAHOMA;ASSOCIATED ELECTRIC COOPERATIVE, INC.; WESTERN FARMERS ELECTRIC COOPERATIVE, INC.
 Construction Permit; Order; Dockets STN 50556;STN 50557; LBP-77-046 (6 NRC 167 (1977))

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272; 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387; 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

PUBLIC SERVICE ELECTRIC AND GAS COMPANY;ATLANTIC CITY ELECTRIC COMPANY
 Construction Permit; Decision; Dockets 50354;50355; ALAB-429 (6 NRC 229 (1977))
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272; 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387; 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

PUGET SOUND POWER AND LIGHT COMPANY;PACIFIC POWER AND LIGHT COMPANY;PORTLAND

CASE NAME INDEX

GENERAL ELECTRIC COMPANY
 Construction Permit; Order; Dockets STN 50522;STN 50523; LBP-77-056 (6 NRC 478 (1977))

PUGET SOUND POWER AND LIGHT COMPANY;PORTLAND GENERAL ELECTRIC COMPANY;PACIFIC POWER AND LIGHT COMPANY;WASHINGTON WATER POWER COMPANY
 Construction Permit; Initial Decision, Pre-LWA Authority for Road
 Construction; Dockets STN 50522;STN 50523; LBP-77-044 (6 NRC 141 (1977))

ROCHESTER GAS AND ELECTRIC CORPORATION
 Construction Permit; Initial Decision; Docket 50485; LBP-77-053 (6 NRC 350 (1977))

SOUTHERN CALIFORNIA EDISON COMPANY;SAN DIEGO GAS AND ELECTRIC COMPANY
 Construction Permit; Decision; Dockets 50361;50362; ALAB-432 (6 NRC 465 (1977))

TENNESSEE VALLEY AUTHORITY
 Construction Permit; Memorandum and Order; Dockets STN 50518;STN 50519;STN 50520;STN 50521; ALAB-418 (6 NRC 1 (1977))
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272; 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387; 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

TOLEDO EDISON COMPANY;CLEVELAND ELECTRIC ILLUMINATING COMPANY
 Antitrust; Memorandum and Order; Dockets 50346A;50500A;50501A/50440A;50441A; ALAB-430 (6 NRC 457 (1977))

UNION ELECTRIC COMPANY
 Licensing-(uranium fuel cycle effects); Memorandum and Order; Dockets 50272; 50311/50277;50278/50289;50320/50334;50412/50352;50353/50354;50355/50387; 50388/50413;50414/50424;50425/STN 50483;STN 50486/STN 50518;STN 50519;STN 50520;STN 50521; ALAB-426 (6 NRC 206 (1977))

VERMONT YANKEE NUCLEAR POWER CORPORATION
 Operating License; Initial Decision; Docket 50271; LBP-77-054 (6 NRC 436 (1977))
 Uranium-Fuel-Cycle-Rule Effects; Memorandum and Order; Dockets 50271/50443; 50444; ALAB-421 (6 NRC 25 (1977))

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
 Construction Permit; Memorandum and Order; Dockets STN 50508;STN 50509; LBP-77-049 (6 NRC 257 (1977))

LEGAL CITATIONS INDEX

CASES

- Adlickes v. Kress and Co., 398 U.S. 144, 157 (1970)
weight of counsel arguments as evidence; ALAB-420, E, (6 NRC 8, 14 (1977))
- Aeschliman v. N.R.C., 547 F.2d 622 (D.C. Cir. 1976)
intervention standing, contentions adequacy; LBP-77-048, B, (6 NRC 249, 250 (1977))
Midland construction permit continuance pending court-ordered remand; LBP-77-057, A, (6 NRC 482 (1977))
- Aeschliman v. N.R.C., 547 F.2d 622 (D.C. Cir. 1976), cert. granted sub nom., Consumers Power Co. v. Aeschliman, 45 U.S.L.W. 3570 (February 22, 1977)
NEPA evaluation of alternatives, energy conservation; ALAB-422, U, (6 NRC 33, 100 (1977))
- Alabama Power Co. (Farley), ALAB-182, 7 AEC 210, 217 (1974)
rules of practice for summary disposition; LBP-77-045, B, (6 NRC 159, 162 (1977))
- American Manufacturers Mutual v. American Broadcasting-Paramount Theaters, 388 F.2d 272, 280 (2nd Cir. 1967)
rules of practice for summary disposition; LBP-77-045, B, (6 NRC 159, 162 (1977))
- Appalachian Power Co. v. Train, 545 F.2d 1351 (4th Cir. 1976)
untimely intervention denial affirmed for Perkins; ALAB-431, A, (6 NRC 460 (1977))
- BPI v. A.E.C., 502 F.2d 424, 429 (1974)
intervention standing, contentions adequacy; LBP-77-048, B, (6 NRC 249, 250 (1977))
- Braniff Airways v. C.A.B., 379 F.2d 453 (1967)
rules of practice for pre-LWA activity; LBP-77-044, B, (6 NRC 141, 145 (1977))
- Burlington Trucklines v. U.S., 371 U.S. 116 (1962)
rules of practice for pre-LWA activity; LBP-77-044, B, (6 NRC 141, 145 (1977))
- Calvert Cliffs Coordinating Committee v. A.E.C., 449 F.2d 1109 (1972)
NEPA review scope for spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
- Carlson v. Coca-Cola Co., 483 F.2d 279 (9th Cir. 1973)
untimely antitrust intervention affirmed for St. Lucie 2; ALAB-420, A, (6 NRC 8 (1977))
- Cities of Statesville v. A.E.C., 441 F.2d 962 (D.C. Cir. 1969)
NRC antitrust jurisdiction; ALAB-428, C, (6 NRC 221, 224 (1977))
- Commonwealth Edison Co. (Zion Station), ALAB-226, 8 AEC 381, 406 (1974)
intervention standing, contentions adequacy; LBP-77-048, B, (6 NRC 249, 250 (1977))
- Concerned Citizens of Rhode Island v. N.R.C., 430 F.Supp. 627 (1977)
standing for intervention; LBP-77-059, A, (6 NRC 518 (1977))
- Consolidated Edison Co. of New York (Indian Point), ALAB-186, 7 AEC 245, 246 (1974)
appellate practice for certification issues; ALAB-421, B, (6 NRC 25, 27 (1977))
- Consolidated Edison Co. of New York (Indian Point), CLI-74-023, 7 AEC 947 (1974)
disclosure of physical security plans for nuclear facilities; CLI-77-023, A, (6 NRC 455 (1977))
- Dafilon, Inc. v. Allied Chemical Corp., 514 F.2d 221, 226 (10th Cir. 1976)

LEGAL CITATIONS INDEX

CASES

- weight of counsel arguments as evidence; ALAB-420, E, (6 NRC 8, 14 (1977))
- Davis v. Morton, 469 F.2d 593 (1972)
- NEPA review scope for spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
- Detroit Edison Co. (Greenwood), ALAB-247, 8 AEC 936 (1974)
- NRC jurisdiction over offsite transmission lines; ALAB-422, Q, (6 NRC 33, 82 (1977))
- Duke Power Co. (Catawba), ALAB-355, 4 NRC 397, 402 (1976)
- scope of ASLAB review of initial decision, resolution of new issues; ALAB-422, D, (6 NRC 33, 41 (1977))
- Duke Power Co. (Catawba), ALAB-355, 4 NRC 397, 405 (1976)
- need-for-power considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
- Duke Power Co. (Catawba), ALAB-355, 4 NRC 397, 417 (1976)
- fuel-cycle jurisdiction terminated and construction permit affirmed in totality; ALAB-426, B, (6 NRC 206, 210 (1977))
- Energy Research and Development Administration (Clinch River Breeder), CLI-76-013, 4 NRC 67, 76 (1976)
- need-for-power considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
- Environmental Effects of the Uranium Fuel Cycle, Docket RM-503, 41 F.R. 34707 (August 16, 1976)
- Midland construction permit continuance pending court-ordered remand; LBP-77-057, A, (6 NRC 482 (1977))
- Federal Power Commission v. Hope Natural Gas Co., 320 U.S. 591, 603 (1944)
- financial qualifications may rely on potential future rate increases; ALAB-422, D, (6 NRC 33, 77 (1977))
- Florida Power and Light Co. (St. Lucie), ALAB-415, 5 NRC 1435, 1436 (1977)
- reinstatement of Seabrook construction permits; ALAB-423, A, (6 NRC 115 (1977))
- Fortner Enterprises v. U.S., 394 U.S. 495 (1969)
- rules of practice for summary disposition; LBP-77-045, B, (6 NRC 159, 162 (1977))
- Frothingham v. Mellon, 262 U.S. 447 (1923)
- standing for intervention as taxpayer; LBP-77-059, A, (6 NRC 518 (1977))
- Generic Environmental Statement-Mixed Oxide Fuel (GESMO), 40 Fed. Reg. 53056, November 14, 1975, modified at 40 Fed. Reg. 59497 (December 24, 1975)
- construction permit proceedings continuation pending NRC reassessment of policy statement; ALAB-425, A, (6 NRC 199 (1977))
- George C. Fray Ready-Mixed Concrete Co. v. Pine Hill Concrete Mix Corp., No. 75-7698 (2nd Cir. May 6, 1977), Antitrust and Trade Reg. Rep. (BNA) No. 814, pp A-6,7.
- LBP-77-045, B, (6 NRC 159, 162 (1977))
- Georgia Power Co. (Vogtle), ALAB-285, 2 NRC 209 (1975)
- scope of inquiry for financial qualifications; ALAB-422, P, (6 NRC 33, 79 (1977))
- Georgia Power Co. (Vogtle), ALAB-291, 2 NRC 404, 411 (1975)
- Midland construction permit continuance pending court-ordered remand; LBP-77-057, A, (6 NRC 482 (1977))
- Georgia Power Co. (Vogtle), ALAB-375, 5 NRC 423, 424 (1977)
- fuel-cycle jurisdiction terminated and construction permit affirmed in totality; ALAB-426, B, (6 NRC 206, 210 (1977))
- Greater Boston Television Corp. v. F.C.C., 444 F.2d 841, 851 (D.C. Cir. 1970)
- ASLB responsibilities for decision format; ALAB-422, B, (6 NRC 33, 41 (1977))
- Greene Co. Planning Board v. F.P.C., 455 F.2d 412 (1972)
- NEPA review scope for spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
- Gulf States Utilities Co. (River Bend), ALAB-317, 3 NRC 175, 176-180 (1976)
- nonparty standing to appeal; ALAB-433, B, (6 NRC 469 (1977))
- Gulf States Utilities Co. v. F.P.C., 411 U.S. 747, 759 (1973)
- NRC antitrust jurisdiction; ALAB-428, C, (6 NRC 221, 224 (1977))
- Hanly v. Kleindienst, 471 F.2d 823, 830 (1972)
- NEPA review scope for spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
- Holloway v. Bristol-Myers Corp., 485 F.2d 986 (D.C. Cir. 1973)
- untimely antitrust intervention affirmed for St. Lucie 2; ALAB-420, A, (6 NRC 8 (1977))

LEGAL CITATIONS INDEX

CASES

- Houston Lighting and Power Co. (South Texas), ALAB-381, 5 NRC 582, 592 (1977)
 antitrust intervention denial affirmed for three fully licensed plants;
 ALAB-428, A, (6 NRC 221 (1977))
- Houston Lighting and Power Co. (South Texas), ALAB-381, 5 NRC 582, review
 declined, Houston Lighting and Power Co. (South Texas), March 31, 1977
 (unpublished)
 rules of practice for untimely antitrust intervention petitions; ALAB-420,
 C, (6 NRC 8, 11 (1977))
- Houston Lighting and Power Co. (South Texas), CLI-77-013, 5 NRC 1303 (1977)
 NRC antitrust jurisdiction; ALAB-428, C, (6 NRC 221, 224 (1977))
- Illinois Power Co. (Clinton), ALAB-340, 4 NRC 27, 36 (1976)
 NEPA evaluation of alternatives, energy conservation; ALAB-422, U, (6 NRC
 33, 100 (1977))
- Kansas City Gas and Electric Co. (Wolf Creek), ALAB-279, 1 NRC 559, 568 (1975)
 NRC antitrust jurisdiction; ALAB-428, C, (6 NRC 221, 224 (1977))
- Kansas Gas and Electric Co. (Wolf Creek), ALAB-279, 1 NRC 559 (1975)
 NRC antitrust jurisdiction; ALAB-420, B, (6 NRC 8, 10 (1977))
- Kansas Gas and Electric Co. (Wolf Creek), ALAB-331, 3 NRC 771, 777, affirmed, 5
 NRC 1 (1977)
 rules of practice for pre-LWA activity; LBP-77-044, B, (6 NRC 141, 145
 (1977))
- Kansas Gas and Electric Co. (Wolf Creek), ALAB-331, 3 NRC 771, affirmed,
 CLI-77-001, 5 NRC 1, 12 (1977)
 pre-LWA activity restrictions; LBP-77-054, (6 NRC 478 (1977))
- Kansas Gas and Electric Co. (Wolf Creek), ALAB-379, 1 NRC 559, 565 (1975)
 NRC antitrust jurisdiction; LBP-77-045, C, (6 NRC 159, 166 (1977))
 summary disposition denied for Stanislaus antitrust allegations; LBP-77-045,
 A, (6 NRC 159 (1977))
- Kansas Gas and Electric Co. (Wolf Creek), CLI-77-001, 5 NRC 1 (1977)
 NRC jurisdiction over offsite transmission lines; ALAB-422, Q, (6 NRC 33, 82
 (1977))
- Long Island Lighting Co. (Jamesport), ALAB-292, 2 NRC 631 (1975)
 untimely intervention denial for Oyster Creek; LBP-77-058, (6 NRC 500
 (1977))
- Long Island Lighting Co. (Jamesport), ALAB-292, 2 NRC 631, 647 (1975)
 adequacy of Federal Register notice of hearing; LBP-77-058, (6 NRC 500
 (1977))
- Long Island Lighting Co. (Shoreham), ALAB-156, 6 AEC 831, 847 (1973)
 flexibility of rules for population center evaluation; ALAB-422, J, (6 NRC
 33, 51 (1977))
- Long Island Lighting Co. (Shoreham), ALAB-156, 6 AEC 831, 848 (1973)
 population growth forecasts, rules of practice for exclusion area
 determinations; ALAB-422, I, (6 NRC 33, 46 (1977))
- Louisiana Power and Light Co. (Waterford), CLI-73-007, 6 AEC 48, 50 fn. 2
 (1973)
 pending antitrust completion, construction permit may be issued by party
 agreement; ALAB-420, B, (6 NRC 8, 10 (1977))
- Maine Yankee Atomic Power Co. (Maine Yankee), ALAB-161, 6 AEC 1003, 1006
 (1973), remanded on other grounds, CLI-74-002, 7 AEC 2 (1974), further
 statement of Appeal Board views, ALAB-175, 7 AEC 62 (1974), affirmed sub
 nom., Citizens for Safe Power v. N.R.C., 524 F.2d 1291 (D.C. Cir. 1975)
 adequacy of NRC safety standards for construction licensing; ALAB-422, E, (6
 NRC 33, 42 (1977))
- Metropolitan Edison Co. (Three Mile Island), ALAB-384, 5 NRC 612, 615 (1977)
 untimely intervention petition rules of practice; ALAB-431, B, (6 NRC 460
 (1977))
- Metropolitan Edison Co. (Three Mile Island), ALAB-384, 5 NRC 612, 616 (1977)
 untimely antitrust intervention affirmed for St. Lucie 2; ALAB-420, A, (6
 NRC 8 (1977))
- Metropolitan Edison Co. (Three Mile Island), ALAB-384, 5 NRC 612, 617 (1977)
 NEPA evaluation of alternatives, energy conservation; ALAB-422, U, (6 NRC
 33, 100 (1977))
- Metropolitan Edison Co. (Three Mile Island), ALAB-384, 5 NRC 612, 618 (1977)
 intervention standing, contentions adequacy; LBP-77-048, B, (6 NRC 249, 250
 (1977))
- Mississippi Power and Light Co. (Grand Gulf), ALAB-130, 6 AEC 423, 426 (1976)

LEGAL CITATIONS INDEX

CASES

- standing for intervention; LBP-77-059, A, (6 NRC 518 (1977))
- N.R.D.C. v. N.R.C., 539 F.2d 824, 845 (2d Cir. 1976)
construction permit proceedings continuation pending NRC reassessment of
policy statement; ALAB-425, A, (6 NRC 199 (1977))
- N.R.D.C. v. N.R.C., 547 F.2d 633 (D.C. Cir. 1976)
Midland construction permit continuance pending court-ordered remand;
LBP-77-057, A, (6 NRC 482 (1977))
- Niagara Mohawk Power Corp. (Nine Mile Point), ALAB-264, 1 NRC 347, 352 (1975)
need-for-power considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
- Niagara Mohawk Power Corp. (Nine Mile Point), ALAB-264, 1 NRC 347, 354 (1975)
scope of ASLAB review of initial decision, resolution of new issues;
ALAB-422, D, (6 NRC 33, 41 (1977))
- North States Power Co. (Prairie Island), ALAB-104, 6 AEC 179 (1973)
ASLB responsibilities for decision format; ALAB-422, B, (6 NRC 33, 41
(1977))
- Northeast Nuclear Energy Co. (Millstone 3), LBP-74-058, 8 AEC 187, 193,
affirmed, ALAB-234, 8 AEC 643 (1974)
need-for-power considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
- Northern California Power Agency v. F.P.C., 514 F.2d 184 (D.C. Cir.), cert.
denied, 423 U.S. 863 (1975)
untimely antitrust intervention affirmed for St. Lucia 2; ALAB-420, A, (6
NRC 8 (1977))
- Northern States Power Co. (Prairie Island), ALAB-343, 4 NRC 169 (1976)
steam generator tube integrity, ASLAB jurisdiction retained for Seabrook;
ALAB-422, A, (6 NRC 33 (1977))
- Northern States Power Co. v. Minnesota, 447 F.2d 1143 (8th Cir. 1971), affd.
405 U.S. 1035 (1972)
State authority under FWPCA relative to health and safety matters;
LBP-77-052, D, (6 NRC 294, 339 (1977))
- Nuclear Fuel Services, Inc. (West Valley Reprocessing), CLI-75-004, 1 NRC 273
(1975)
untimely intervention denial; LBP-77-050, (6 NRC 261 (1977))
untimely intervention petition rules of practice; ALAB-431, B, (6 NRC 460
(1977))
- Nuclear Fuel Services, Inc. (West Valley Reprocessing), CLI-75-004, 1 NRC 273
(1975), reversing ALAB-263, 1 NRC 208 (1975)
untimely intervention denial for Oyster Creek; LBP-77-058, (6 NRC 500
(1977))
- Nuclear Fuel Services, Inc. (West Valley Reprocessing), CLI-75-004, 1 NRC 273,
275 (1975)
rules of practice for untimely antitrust intervention petitions; ALAB-420,
C, (6 NRC 8, 11 (1977))
- Otter Tail Power Co. v. U.S., 410 U.S. 363 (1973)
untimely antitrust intervention affirmed for St. Lucia 2; ALAB-420, A, (6
NRC 8 (1977))
- P.R.D.C. v. Electric Workers, 367 U.S. 396 (1961)
scope of inquiry for financial qualifications; ALAB-422, P, (6 NRC 33, 79
(1977))
- P.R.D.C. v. Electrical Workers, 367 U.S. 396 (1961)
weight accorded agency's interpretation of its Act; LBP-77-044, C, (6 NRC
141, 152 (1977))
- Pacific Gas and Electric Co. (Diablo Canyon), ALAB-410, 5 NRC 1398 (1977)
disclosure of physical security plans for nuclear facilities; CLI-77-023, A,
(6 NRC 455 (1977))
- Pacific Gas and Electric Co. (Stanislaus), LBP-77-026, 5 NRC 1017, affirmed,
ALAB-400, 5 NRC 1175 (1977)
rules of practice for untimely antitrust intervention petitions; ALAB-420,
C, (6 NRC 8, 11 (1977))
- Permian Basin Area Rate Cases, 390 U.S. 747, 792 (1968)
ASLB responsibilities for decision format; ALAB-422, B, (6 NRC 33, 41
(1977))
- Philadelphia Electric Co. (Peach Bottom), CLI-74-032, 8 AEC 217 (1974)
applicability of adjoining state laws over NRC proceedings and licenses;
LBP-77-052, B, (6 NRC 294, 337 (1977))
- Phoenix Savings and Loan v. Aetna Casualty and Surety Co., 381 F.2d 245, 249
(4th Cir. 1967)

LEGAL CITATIONS INDEX

CASES

- summary disposition denied for Stanislaus antitrust allegations; LBP-77-045, A, (6 NRC 159 (1977))
- Poller v. C.B.S., 368 U.S.464, 473 (1962)
- rules of practice for summary disposition; LBP-77-045, B, (6 NRC 159, 162 (1977))
- Portland General Electric Co. (Pebble Springs), CLI-76-027, 4 NRC 610, 613 (1976)
- intervention matters for Exxon Reprocessing construction permit; LBP-77-059, A, (6 NRC 518 (1977))
- Portland General Electric Co. (Pebble Springs), CLI-76-027, 4 NRC 610, 614 (1976)
- standing for intervention on ratepayer status; ALAB-424, A, (6 NRC 122 (1977))
- Power Reactor Development Co., 1 AEC 128, 153 (1959)
- scope of inquiry for financial qualifications; ALAB-422, P, (6 NRC 33, 79 (1977))
- Project Management Corp. (Clinch River Breeder), ALAB-354, 4 NRC 383, 389 (1976)
- untimely intervention petition rules of practice; ALAB-431, B, (6 NRC 460 (1977))
- Public Service Co. of Indiana (Marble Hill), ALAB-316, 3 NRC 167, 170 (1976)
- NRC antitrust jurisdiction; ALAB-420, B, (6 NRC 8, 10 (1977))
- Public Service Co. of New Hampshire (Seabrook), ALAB-271, 1 NRC 478 (1975)
- ASLAB authority to direct certification of interlocutory legal rulings; ALAB-419, B, (6 NRC 3 (1977))
- Public Service Co. of New Hampshire (Seabrook), ALAB-293, 2 NRC 660 (1975)
- standing for intervention; LBP-77-059, A, (6 NRC 518 (1977))
- Public Service Co. of New Hampshire (Seabrook), ALAB-390, 5 NRC 733, 736 (1977)
- rules of practice for LP2 evaluation; ALAB-422, G, (6 NRC 33, 43 (1977))
- Public Service Co. of New Hampshire (Seabrook), ALAB-422, 6 NRC 33, 102, 113 (1977)
- interim fuel-cycle-rule effects on pending license applications; ALAB-426, A, (6 NRC 206 (1977))
- Public Service Co. of New Hampshire (Seabrook), ALAB-422, 6 NRC 33, 104 (1977)
- cost-benefit balance weights assigned to revised Table S-3; ALAB-426, C, (6 NRC 206, 209 (1977))
- Public Service Co. of New Hampshire (Seabrook), ALAB-422, 6 NRC 33, 41, 76 (1977)
- ASLB resolution of contested issues; ALAB-429, D, (6 NRC 229, 237 (1977))
- Public Service Co. of New Hampshire (Seabrook), CLI-77-008, 5 NRC 503, 514 (1977)
- alternate site considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
- Public Service Co. of New Hampshire (Seabrook), CLI-77-008, 5 NRC 503, 521 (1977)
- standard for granting construction permit suspension during remand proceeding; LBP-77-057, B, (6 NRC 482 (1977))
- Public Service Co. of New Hampshire (Seabrook), LBP-74-036, 7 AEC 877, 878 (1974)
- rules of practice for summary disposition; LBP-77-045, B, (6 NRC 159, 162 (1977))
- Public Service Co. of Oklahoma (Black Fox), ALAB-370, 5 NRC 131 (1977)
- rules of practice for interlocutory appeals; ALAB-433, C, (6 NRC 469 (1977))
- Public Service of New Hampshire (Seabrook), CLI-77-008, 5 NRC 503, 540 (1977)
- NEPA evaluation of alternatives, energy conservation; ALAB-422, U, (6 NRC 33, 100 (1977))
- Puerto Rico Water Resources Authority (North Coast), ALAB-286, 2 NRC 213 (1975)
- interlocutory appeals from ASLB rulings on contentions; ALAB-434, A, (6 NRC 471 (1977))
- S.E.C. v. Chenery Corp., 318 U.S. 80, 94 (1943)
- ASLB responsibilities for decision format; ALAB-422, B, (6 NRC 33, 41 (1977))
- Sartor v. Arkansas Natural Gas Co., 321 U.S. 620, 627 (1944)
- rules of practice for summary disposition; LBP-77-045, B, (6 NRC 159, 162 (1977))
- Southern California Edison Co. (San Onofre), ALAB 171, 7 AEC 37, 39 (1974)
- applicability of adjoining state laws over NRC proceedings and licenses;

LEGAL CITATIONS INDEX

CASES

- LBP-77-052, B, (6 NRC 294, 337 (1977))
- Southern California Edison Co. (San Onofre), ALAB-248, 8 AEC 957, 959 (1974)
population growth forecasts, rules of practice for exclusion area
determinations; ALAB-422, I, (6 NRC 33, 46 (1977))
- Southern California Edison Co. (San Onofre), ALAB-248, 8 AEC 957, 960 fn. 7
(1974)
flexibility of rules for population center evaluation; ALAB-422, J, (6 NRC
33, 51 (1977))
- Southern California Edison Co. (San Onofre), ALAB-248, 8 AEC 957, 961 (1974)
rules of practice for LPZ evaluation; ALAB-422, G, (6 NRC 33, 43 (1977))
- Southern California Edison Co. (San Onofre), ALAB-268, 1 NRC 383 (1975)
rules of practice for LPZ evaluation; ALAB-422, G, (6 NRC 33, 43 (1977))
- Southern California Edison Co. (San Onofre), ALAB-268, 1 NRC 383, 400 (1975)
validity of Commission regulations may not be challenged in adjudicatory
hearings; LBP-77-046, A, (6 NRC 167 (1977))
- Southern California Edison Co. (San Onofre), ALAB-308, 3 NRC 20 (1976)
rules of practice for LPZ evaluation; ALAB-422, G, (6 NRC 33, 43 (1977))
- Southern California Edison Co. (San Onofre), ALAB-308, 3 NRC 20, 28 n. 9 (1976)
operational maintenance costs for Black Fox; LBP-77-046, B, (6 NRC 167
(1977))
- Tennessee Valley Authority (Bellefonte), ALAB-237, 8 AEC 654 (1974)
nonparty standing to appeal; ALAB-433, B, (6 NRC 469 (1977))
- Tennessee Valley Authority (Browns Ferry), 3 NRC 209, 212 (1976)
intervention standing, contentions adequacy; LBP-77-046, B, (6 NRC 249, 250
(1977))
- Tennessee Valley Authority (Hartsville), ALAB-367, 5 NRC 92, 105 (1977)
fuel-cycle jurisdiction terminated and construction permit affirmed in
totality; ALAB-426, B, (6 NRC 206, 210 (1977))
- Tennessee Valley Authority (Hartsville), ALAB-367, 5 NRC 92, 94 (1977)
need-for-power considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
- Tennessee Valley Authority (Hartsville), ALAB-409, 5 NRC 1391, 1397, fn. 8
(1977)
rules of practice for motion to strike exceptions, substantial compliance
standard; ALAB-424, D, (6 NRC 122, 125 (1977))
- Tennessee Valley Authority (Watts Bar), ALAB-413, 5 NRC 1418, 1420 (1977)
standing for intervention on ratepayer status; ALAB-424, A, (6 NRC 122
(1977))
- Tennessee Valley Authority (Watts Bar), LBP-77-036, 5 NRC 1292, 1297 (1977)
standing for intervention; LBP-77-059, A, (6 NRC 518 (1977))
- Toledo Edison Co. (Davis-Besse), ALAB-323, 3 NRC 331 (1976)
NRC antitrust jurisdiction; ALAB-428, C, (6 NRC 221, 224 (1977))
pending antitrust completion, construction permit may be issued by party
agreement; ALAB-420, B, (6 NRC 8, 10 (1977))
- Toledo Edison Co. (Davis-Besse), ALAB-378, 5 NRC 557, 561 (1977)
res judicata policy for disputed jurisdiction; ALAB-422, M, (6 NRC 33, 70
(1977))
- Train v. Colorado PIRG, 426 U.S. 1 (1976)
State authority under FWPCA relative to health and safety matters;
LBP-77-052, D, (6 NRC 294, 339 (1977))
- Trustees of Columbia University in the City of New York, ALAB-062, 5 AEC 266,
267 (1972)
ASLB responsibility for resolution of contentions in initial decision;
ALAB-422, C, (6 NRC 33, 41 (1977))
- U.S. v. Diebold, 369 U.S. 654 (1962)
rules of practice for summary disposition; LBP-77-045, B, (6 NRC 159, 162
(1977))
- U.S. v. Gazda, 499 F.2d 161, 164 (3rd Cir. 1974)
weight of counsel arguments as evidence; ALAB-420, E, (6 NRC 8, 14 (1977))
- U.S. v. Richardson, 418 U.S. 166 (1974)
standing for intervention as taxpayer; LBP-77-059, A, (6 NRC 518 (1977))
- U.S. v. Utah Construction and Mining Co., 384 U.S. 394, 421 (1966)
res judicata policy for disputed jurisdiction; ALAB-422, M, (6 NRC 33, 70
(1977))
- Union Electric Co. (Callaway), ALAB-347, 4 NRC 216, 219 (1976)
fuel-cycle jurisdiction terminated and construction permit affirmed in
totality; ALAB-426, B, (6 NRC 206, 210 (1977))

LEGAL CITATIONS INDEX

CASES

- Union of Concerned Scientists v. A.E.C., 498 F.2d 1069, 1094 (D.C. Cir. 1974), affirming this point, Boston Edison Co. (Pilgrim), ALAB-083, 5 AEC 354, 371 (1972)
- ASLB responsibility for resolution of contentions in initial decision; ALAB-422, C, (6 NRC 33, 41 (1977))
- United Church of Christ v. F.C.C., 359 F.2d 94 (D.C. Cir. 1966), opinion after remand, 425 F.2d 543 (D.C. Cir. 1969)
- cross-examination reliance for factual support of contentions; LBP-77-054, (6 NRC 436 (1977))
- Vermont Yankee Nuclear Power Corp. (Vermont Yankee), ALAB-073, 5 AEC 297, 298 (1972)
- scope of ASLB review of initial decision, resolution of new issues; ALAB-422, D, (6 NRC 33, 41 (1977))
- Vermont Yankee Nuclear Power Corp. (Vermont Yankee), ALAB-124, 6 AEC 358, 362 (1973)
- ASLB resolution of contested issues; ALAB-429, D, (6 NRC 229, 237 (1977))
- Vermont Yankee Nuclear Power Corp. (Vermont Yankee), ALAB-138, 6 AEC 520, 523 (1973)
- rules of practice for reopening proceedings; ALAB-422, L, (6 NRC 33, 64 fn. 35 (1977))
- Vermont Yankee Nuclear Power Corp. (Vermont Yankee), ALAB-211, 7 AEC 982, 984 (1974)
- appellate practice for certification issues; ALAB-421, B, (6 NRC 25, 27 (1977))
- Vermont Yankee Nuclear Power Corp. (Vermont Yankee), ALAB-421, 6 NRC 25, 28 (1977)
- interim fuel-cycle-rule effects on pending license applications; ALAB-426, A, (6 NRC 206 (1977))
- Vermont Yankee Nuclear Power Corp. (Vermont Yankee), LBP 73-008, 6 AEC 130 (1973)
- intervention standing of non-site specific states; LBP-77-059, B, (6 NRC 518, 521 (1977))
- Virginia Electric and Power Co. (North Anna), ALAB-289, 2 NRC 395 (1975)
- untimely intervention denial for Oyster Creek; LBP-77-058, (6 NRC 500 (1977))
- Virginia Petroleum Jobbers Assn. v. F.P.C., 259 F.2d 921, 925 (D.C. Cir. 1958)
- rules of practice for stay pending appeal; ALAB-424, F, (6 NRC 122, 127 (1977))
- standard for granting construction permit suspension during remand proceeding; LBP-77-057, B, (6 NRC 482 (1977))
- WAIT Radio v. F.C.C., 418 F.2d 1153 (D.C. Cir. 1969)
- scope of ASLB review of initial decision, resolution of new issues; ALAB-422, D, (6 NRC 33, 41 (1977))
- WAIT Radio v. F.C.C., 418 F.2d 1153, 1156 (D.C. Cir. 1969)
- ASLB responsibilities for decision format; ALAB-422, B, (6 NRC 33, 41 (1977))
- Wingo v. Washington, 395 F.2d 633, 636 (D.C. Cir. 1968)
- ASLB resolution of contested issues; ALAB-429, D, (6 NRC 229, 237 (1977))
- ASLB responsibilities for decision format; ALAB-422, B, (6 NRC 33, 41 (1977))
- Wisconsin Electric Power Co. (Koshkonong), CLI-74-045, 8 AEC 928, 930 (1975)
- applicability of adjoining state laws over NRC proceedings and licenses; LBP-77-052, B, (6 NRC 294, 337 (1977))
- Wisconsin Electric Power Co. (Point Beach), ALAB-078, 5 AEC 319, 321 (1972)
- ASLB responsibility for resolution of contentions in initial decision; ALAB-422, C, (6 NRC 33, 41 (1977))
- Wisconsin Electric Power Co. (Point Beach), ALAB-078, 5 AEC 319, 322 fn. 14 (1972)
- scope of ASLB review of initial decision, resolution of new issues; ALAB-422, D, (6 NRC 33, 41 (1977))

LEGAL CITATIONS INDEX

REGULATIONS

- 10 CFR 2.104(d)
NRC antitrust jurisdiction; ALAB-420, B, (6 NRC 8, 10 (1977))
- 10 CFR 2.704(d)
presiding officer resignation, administrative effects; ALAB-422, V, (6 NRC 33, 101 (1977))
- 10 CFR 2.710
reopening to consider alternatives, briefs requested; ALAB-424, A, (6 NRC 122 (1977))
- 10 CFR 2.714
intervention grant for Exxon Reprocessing; LBP-77-059, A, (6 NRC 518 (1977))
issue delineation for licensing floating nuclear power plants; LBP-77-048, A, (6 NRC 249 (1977))
specificity and particularization requirements for contentions; LBP-77-048, B, (6 NRC 249, 250 (1977))
untimely intervention petition for appeal, rules of practice; ALAB-429, B, (6 NRC 229, 233 fn. 20 (1977))
- 10 CFR 2.714a
antitrust intervention denial affirmed for three fully licensed plants; ALAB-428, A, (6 NRC 221 (1977))
- 10 CFR 2.714(a)
appellate review policy for untimely intervention grant, quantum of proof; ALAB-420, D, (6 NRC 8, 13 (1977))
rules of practice for untimely intervention petitions; ALAB-431, B, (6 NRC 460 (1977))
specificity and particularization requirements for intervention contentions; LBP-77-050, (6 NRC 261 (1977))
untimely antitrust intervention grant affirmed for St. Lucie 2; ALAB-420, A, (6 NRC 8 (1977))
untimely intervention considerations for Shoreham operating proceeding; LBP-77-050, (6 NRC 261 (1977))
- 10 CFR 2.714a
untimely intervention denial affirmed for Parkins; ALAB-431, A, (6 NRC 460 (1977))
- 10 CFR 2.714(a)
untimely intervention denial for Oyster Creek full-term operating license proceeding; LBP-77-058, (6 NRC 500 (1977))
- 10 CFR 2.715
adequacy of participation for County petitioner; LBP-77-050, (6 NRC 261 (1977))
- 10 CFR 2.715(c)
intervention grant for Exxon Reprocessing; LBP-77-059, A, (6 NRC 518 (1977))
intervention standing of states other than site specific; LBP-77-059, B, (6 NRC 518, 521 (1977))
- 10 CFR 2.717(a)
applicability to granting late antitrust petition for fully licensed facility; ALAB-428, A, (6 NRC 221 (1977))
- 10 CFR 2.718(i)
appellate authority to direct certification of legal interlocutory matters; ALAB-419, B, (6 NRC 3 (1977))
appellate procedure for directed certification of academic issue; ALAB-419, C, (6 NRC 3 (1977))
ASLAB authority on NRC policy questions; ALAB-425, B, (6 NRC 199, 204

LEGAL CITATIONS INDEX

LEGAL CITATIONS INDEX

REGULATIONS

- (1977))
- 10 CFR 2.720(a)
 - rules of practice for declining subpoena issuance; ALAB-422, S, (6 NRC 33, 93 (1977))
- 10 CFR 2.730(f)
 - rules of practice for appeals from partial contentions' denial; ALAB-434, B, (6 NRC 471 (1977))
 - rules of practice for interlocutory ASLB appeals; ALAB-433, C, (6 NRC 469 (1977))
- 10 CFR 2.743(a)
 - rules of practice for intervenors' cross-examination rights; ALAB-422, T, (6 NRC 33, 94 (1977))
- 10 CFR 2.749
 - rules of practice for antitrust summary disposition; LBP-77-045, B, (6 NRC 159, 162 (1977))
 - summary disposition of Stanislaus antitrust matters denied; LBP-77-045, A, (6 NRC 159 (1977))
- 10 CFR 2.752
 - delineation of issues for Black Fox 1 and 2; LBP-77-046, A, (6 NRC 167 (1977))
- 10 CFR 2.760(a)
 - spent fuel pool modification for Prairie Island; LBP-77-051, A, (6 NRC 265 (1977))
- 10 CFR 2.762(a)
 - briefing of exceptions, record references filed with ASLB; ALAB-424, E, (6 NRC 122, 126 (1977))
 - nonparty standing to appeal; ALAB-433, B, (6 NRC 469 (1977))
 - reconsideration denied for motion to strike exceptions to initial decision; ALAB-418, (6 NRC 1 (1977))
 - reopening to consider alternatives, briefs requested; ALAB-424, A, (6 NRC 122 (1977))
 - rules of practice for untimely briefs submission; ALAB-424, C, (6 NRC 122, 125 (1977))
 - rules of practice, time limits on supporting briefs for exceptions; ALAB-424, B, (6 NRC 122, 125 (1977))
- 10 CFR 2.762(e)
 - standard for substantial compliance, motion to strike exceptions; ALAB-424, D, (6 NRC 122, 125 (1977))
- 10 CFR 2.785(b)(1)
 - ASLAB authority on NRC policy questions; ALAB-425, B, (6 NRC 199, 204 (1977))
- 10 CFR 2.785(d)
 - rules of practice for Commission certification of appellate issues; ALAB-421, B, (6 NRC 25, 27 (1977))
- 10 CFR 2.786(b)
 - scope of review of ALAB certified questions; CLI-77-023, B, (6 NRC 455 (1977))
- 10 CFR 2.786(b)(6)
 - CLI-77-022, (6 NRC 451 (1977))
- 10 CFR 2.788
 - standard for granting construction permit suspension during remand proceeding; LBP-77-057, B, (6 NRC 482 (1977))
- 10 CFR 2.788(e)
 - reinstatement of Seabrook construction permits; ALAB-423, A, (6 NRC 115 (1977))
 - rules of practice for stay pending appeal; ALAB-424, F, (6 NRC 122, 127 (1977))
 - rules of practice, immediate effectiveness of decisions; ALAB-423, B, (6 NRC 115 (1977))
 - stay pending appeal, effective date of appellate decisions; ALAB-423, B, (6 NRC 115 (1977))
- 10 CFR 2 App. A(X)(e)
 - NRC antitrust jurisdiction; ALAB-420, B, (6 NRC 8, 10 (1977))
- 10 CFR 2B
 - civil fine assessment for Marble Hill LWA violation; LBP-77-052, E, (6 NRC 294, 301 (1977))

LEGAL CITATIONS INDEX

REGULATIONS

- 10 CFR 20
 - rules of practice for occupational radiation-dose protection; LBP-77-055, B, (6 NRC 473, 476 (1977))
 - spent fuel pool modification for Prairie Island; LBP-77-055, A, (6 NRC 473 (1977))
- 10 CFR 20.1
 - spent fuel pool modification for Prairie Island; LBP-77-051, A, (6 NRC 265 (1977))
- 10 CFR 50.10(c)
 - LWA issuance after civil fine for violation; LBP-77-052, A, (6 NRC 294 (1977))
 - violation, effect on subsequent LWA issuance; LBP-77-052, E, (6 NRC 294, 301 (1977))
- 10 CFR 50.10(e)(1)
 - LWA issuance for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
- 10 CFR 50.10(e)(3)(i)
 - LWA-2 grant for Cherokee; LBP-77-047, A, (6 NRC 191 (1977))
 - subsurface work only may be authorized by LWA-2; LBP-77-047, B, (6 NRC 191, 194 (1977))
- 10 CFR 50.20(e)
 - uranium fuel cycle effects on Seabrook; ALAB-422, W, (6 NRC 33, 102 (1977))
- 10 CFR 50.33(f)
 - financial qualifications required of applicant; ALAB-422, N, (6 NRC 33, 73 (1977))
- 10 CFR 50.34a(a)
 - standards for radiation protection, spent fuel storage; LBP-77-055, B, (6 NRC 473, 476 (1977))
- 10 CFR 50.34(c)
 - disclosure of physical security plans for nuclear facilities; CLI-77-023, A, (6 NRC 455 (1977))
- 10 CFR 50.35(a)
 - construction permit issuance for Sterling; LBP-77-053, (6 NRC 350 (1977))
- 10 CFR 50.57(a)(2)
 - spent fuel pool modification for Prairie Island; LBP-77-051, A, (6 NRC 265 (1977))
- 10 CFR 50.91
 - spent fuel pool modification for Prairie Island; LBP-77-051, A, (6 NRC 265 (1977))
- 10 CFR 50 App. C
 - financial qualifications required of applicant; ALAB-422, N, (6 NRC 33, 73 (1977))
- 10 CFR 50 App. I
 - NEPA cost benefit must include somatic and genetic effects from low-level releases; LBP-77-046, B, (6 NRC 167, 171 (1977))
 - radiation exposures to general public, \$100 per man-rem value; LBP-77-055, B, (6 NRC 473, 476 (1977))
 - spent fuel pool modification for Prairie Island; LBP-77-055, A, (6 NRC 473 (1977))
- 10 CFR 51
 - construction permit issuance for Sterling; LBP-77-053, (6 NRC 350 (1977))
- 10 CFR 51.5(c)
 - NEPA requirements for EIS of spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
- 10 CFR 73.55
 - disclosure of physical security plans for nuclear facilities; CLI-77-023, A, (6 NRC 455 (1977))
- 10 CFR 100
 - construction permit issuance for Sterling; LBP-77-053, (6 NRC 350 (1977))
 - flexibility for exclusion-area, LPZ, and population-center determinations; ALAB-422, J, (6 NRC 33, 51 (1977))
 - site suitability, population-center determinations; ALAB-422, I, (6 NRC 33, 46 (1977))
- 10 CFR 100.3(a)
 - exclusion area size; ALAB-422, H, (6 NRC 33, 43 (1977))
- 10 CFR 100.3(b)
 - low-population-zone size for Seabrook; ALAB-422, G, (6 NRC 33, 43 (1977))

LEGAL CITATIONS INDEX
REGULATIONS

- 10 CFR 100.3(c)
 - low-population-zone size for Seabrook; ALAB-422, G, (6 NRC 33, 43 (1977))
- 10 CFR 100.10(c)
 - seismic and geological inquiry scope for construction licensing; ALAB-422, K, (6 NRC 33, 54 (1977))
- 10 CFR 100.11
 - delineation of issues for Black Fox 1 and 2; LBP-77-046, A, (6 NRC 167 (1977))
 - emergency plans for evacuation of persons outside exclusion area; ALAB-432, B, (6 NRC 465 (1977))
- 10 CFR 100.11(a)(1)
 - exclusion area size; ALAB-422, H, (6 NRC 33, 43 (1977))
- 10 CFR 100.11(a)(2)
 - low-population-zone size for Seabrook; ALAB-422, G, (6 NRC 33, 43 (1977))
- 10 CFR 100.11(a)(3)
 - low-population-zone for Seabrook; ALAB-422, G, (6 NRC 33, 43 (1977))
- 10 CFR 100.11(f). 2)
 - exclusion area size; ALAB-422, H, (6 NRC 33, 43 (1977))
- 10 CFR 100 App. A(III)(c)
 - seismic and geological inquiry scope for construction licensing; ALAB-422, K, (6 NRC 33, 54 (1977))
- 10 CFR 100 App. A(V)(a)
 - seismic and geological inquiry scope for construction licensing; ALAB-422, K, (6 NRC 33, 54 (1977))
- 40 CFR 1500.6
 - NEPA requirements for EIS of spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
- Federal Rules of Civil Procedure 56
 - relation to 10 CFR 2.749 for summary disposition in antitrust matters; LBP-77-045, B, (6 NRC 159, 162 (1977))

LEGAL CITATIONS INDEX

STATUTES

- Administrative Procedure Act, 5 U.S.C. 554(d)
presiding officer resignation, administrative effects; ALAB-422, V, (6 NRC 33, 101 (1977))
- Atomic Energy Act
NRC safety regulations establish basic standard for construction permit;
ALAB-422, E, (6 NRC 33, 42 (1977))
scope of information required, financial qualifications; ALAB-422, N, (6 NRC 33, 73 (1977))
scope of information required, financial qualifications; ALAB-422, O, (6 NRC 33, 77 (1977))
scope of information required for financial qualifications findings;
ALAB-422, P, (6 NRC 33, 79 (1977))
- Atomic Energy Act 103
NRC antitrust jurisdictional responsibilities; ALAB-428, C, (6 NRC 221, 224 (1977))
- Atomic Energy Act 104(b)
DWA issuance for Marble Hill 1 and 2 construction permits; LBP-77-052, A, (6 NRC 294 (1977))
NRC antitrust jurisdictional responsibilities; ALAB-428, C, (6 NRC 221, 224 (1977))
- Atomic Energy Act 105
antitrust intervention denial affirmed for three fully licensed plants;
ALAB-428, A, (6 NRC 221 (1977))
NRC jurisdictional scope over fully licensed facilities; ALAB-428, B, (6 NRC 221, 223 (1977))
- Atomic Energy Act 105(c)
NRC antitrust jurisdiction; ALAB-420, B, (6 NRC 8, 10 (1977))
NRC antitrust jurisdiction; LBP-77-045, C, (6 NRC 159, 166 (1977))
NRC antitrust jurisdictional responsibilities; ALAB-428, C, (6 NRC 221, 224 (1977))
summary disposition of antitrust matters denied for Stanislaus; LBP-77-045, A, (6 NRC 159 (1977))
- Atomic Energy Act 105(c)(5)
untimely antitrust intervention petition considerations; ALAB-420, C, (6 NRC 8, 11 (1977))
- Atomic Energy Act 186
NRC antitrust jurisdictional responsibilities; ALAB-428, C, (6 NRC 221, 224 (1977))
- Energy Reorganization Act
alternative fuel substitution, national energy policy; ALAB-422, R, (6 NRC 33, 90 (1977))
- Federal Non-Nuclear Energy Research and Development Act of 1974
alternative fuel substitution, national energy policy; ALAB-422, R, (6 NRC 33, 90 (1977))
- Federal Water Pollution Control Act
State's authority under; LBP-77-052, B, (6 NRC 294, 337 (1977))
- Federal Water Pollution Control Act 401
State authority under, relative to radiological health and safety matters;
LBP-77-052, D, (6 NRC 294, 339 (1977))
- Federal Water Pollution Control Act 401(a)(1)
state's failure to grant public hearing prior to certification held
unnecessary, reopening request denied; LBP-77-052, C, (6 NRC 294, 338 (1977))

LEGAL CITATIONS INDEX

STATUTES

- (1977))
Federal Water Pollution Control Act 511(c)(2)(A)
state's failure to grant public hearing prior to certification held unnecessary, reopening request denied; LBP-77-052, C, (6 NRC 294, 338 (1977))
Geothermal Energy Research and Development and Demonstration Act of 1974
alternative fuel substitution, national energy policy; ALAB-422, R, (6 NRC 33, 90 (1977))
National Environmental Policy Act 102(2)(C)
scope of review for spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
National Environmental Policy Act (NEPA)
alternative site considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
applicability to pre-LWA activities; LBP-77-044, C, (6 NRC 141, 152 (1977))
construction permit issuance for Sterling; LBP-77-053, (6 NRC 350 (1977))
minimal standards required by cost-benefit analysis; ALAB-422, F, (6 NRC 33, 43 (1977))
need-for-power considerations; ALAB-422, R, (6 NRC 33, 90 (1977))
NRC jurisdiction over offsite transmission line routes; ALAB-422, Q, (6 NRC 33, 82 (1977))
standard for evaluation of alternatives, energy conservation; ALAB-422, U, (6 NRC 33, 100 (1977))
sunk-costs consideration in remand cost-benefit; LBP-77-057, C, (6 NRC 482, 485 (1977))
Solar Energy Research, Development and Demonstration Act of 1974
alternative fuel substitution, national energy policy; ALAB-422, R, (6 NRC 33, 90 (1977))
Solar Heating and Cooling Demonstration Act of 1974
alternative fuel substitution, national energy policy; ALAB-422, R, (6 NRC 33, 90 (1977))
Wild and Scenic Rivers Act 7(b)
applicability to pre-LWA activities; LBP-77-044, C, (6 NRC 141, 152 (1977))
pre-LWA activity reconsideration denied for Skagit_pre-LWA activity
reconsideration denied for Skagit; LBP-77-056, (6 NRC 478 (1977))

SUBJECT INDEX

ACCESS ROADS

- construction commencement prior to LWA or CP requires ASLB approval; LBP-77-052, E, (6 NRC 294, 301 (1977))
- pre-LWA activity allowable for Skagit 1 and 2; LBP-77-044, A, (6 NRC 141 (1977))
- pre-LWA activity not approved for Skagit; LBP-77-056, (6 NRC 478 (1977))

ACCIDENT

- probability assessment, validity of analogous data and theoretical analyses; ALAB-429, C, (6 NRC 229, 234 (1977))

ACCIDENTS, DESIGN BASIS

- liquefied natural gas tanker findings resanded for Hope Creek; ALAB-429, A, (6 NRC 229 (1977))

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

- Midland construction permit continuance during remand; LBP-77-057, A, (6 NRC 482 (1977))

AIR POLLUTION

- issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))

ALTERNATE ENERGY SOURCES

- considerations for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))

ALVIN W. VOGTLE NUCLEAR PLANT, Units 1 and 2

- construction permit authorization affirmed in totality; ALAB-426, B, (6 NRC 206, 210 (1977))
- construction permit, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))

ANTITRUST PROCEEDINGS

- construction permit issuance pending completion, must be by party consent; ALAB-420, B, (6 NRC 8, 10 (1977))
- NRC jurisdiction for initiating in absence of Attorney General's recommendations; LBP-77-045, C, (6 NRC 159, 166 (1977))
- NRC jurisdiction under Atomic Energy Act 105(c); ALAB-420, B, (6 NRC 8, 10 (1977))
- summary disposition denied for Stanislaus; LBP-77-045, A, (6 NRC 159 (1977))
- summary disposition rules of practice; LBP-77-045, B, (6 NRC 159, 162 (1977))
- untimely initiation affirmed for St. Lucie; ALAB-420, A, (6 NRC 8 (1977))
- untimely intervention grant, appellate consideration; ALAB-420, D, (6 NRC 8, 13 (1977))

ANTITRUST REVIEW

- initiation for three fully licensed facilities denied for jurisdictional lack; ALAB-428, A, (6 NRC 221 (1977))
- NRC jurisdiction over fully licensed facilities, role of Nuclear Reactor Regulation Director; ALAB-428, B, (6 NRC 221, 223 (1977))
- NRC responsibilities and jurisdiction; ALAB-428, C, (6 NRC 221, 224 (1977))
- rules of practice for appellate briefs; ALAB-430, (6 NRC 457 (1977))

APPEAL BOARD

- see Atomic Safety and Licensing Appeal Board

APPEALS

- nonparty standing in NRC proceedings; ALAB-433, B, (6 NRC 469 (1977))

APPEALS, INTERLOCUTORY

- authority of ASLAB to direct certification of legal rulings; ALAB-419, B, (6 NRC 3 (1977))

SUBJECT INDEX

SUBJECT INDEX

- rules of practice for ASLB procedural rulings; ALAB-433, C, (6 NRC 469 (1977))
- rules of practice for partial contentions' denial; ALAB-434, B, (6 NRC 471 (1977))
- APPELLATE REVIEW**
 - briefs format for record references filed with ASLB; ALAB-424, E, (6 NRC 122, 126 (1977))
 - certification to Commission, rules of practice for invoking; ALAB-421, B, (6 NRC 25, 27 (1977))
 - rules of practice for direct certification of issues rendered academic; ALAB-419, C, (6 NRC 3 (1977))
 - rules of practice for interlocutory legal rulings; ALAB-419, B, (6 NRC 3 (1977))
 - rules of practice for untimely petitions; ALAB-429, B, (6 NRC 229, 233 fn. 20 (1977))
 - scope of ASLB authority over supplementary or different findings; ALAB-422, D, (6 NRC 33, 41 (1977))
 - untimely intervention grant, antitrust; ALAB-420, D, (6 NRC 8, 13 (1977))
 - weight accorded arguments of counsel; ALAB-420, E, (6 NRC 8, 14 (1977))
- APPLICANT**
 - includes Licensees
 - financial qualifications for construction permit stage; ALAB-422, N, (6 NRC 33, 73 (1977))
 - financial qualifications, rules of practice for state-regulated bodies; ALAB-422, O, (6 NRC 33, 77 (1977))
- ASBESTOS**
 - issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
- ATOMIC SAFETY AND LICENSING APPEAL BOARD**
 - authority on policy decisions; ALAB-425, B, (6 NRC 199, 204 (1977))
 - authority to direct certification of interlocutory legal rulings; ALAB-419, B, (6 NRC 3 (1977))
 - effective date for decisions pending appeal, rules of practice; ALAB-423, B, (6 NRC 115 (1977))
 - finality of decisions, rules of practice for Commission review of certified questions; CLI-77-023, B, (6 NRC 455 (1977))
 - jurisdiction retained over Seabrook steam generator tube integrity; ALAB-422, A, (6 NRC 33 (1977))
 - scope of initial-decision review, supplementary or different findings; ALAB-422, D, (6 NRC 33, 41 (1977))
 - termination of retained fuel-cycle jurisdiction over Callaway, Catawba, Hartsville and Vogtle construction permit proceedings; ALAB-426, B, (6 NRC 206, 210 (1977))
- ATOMIC SAFETY AND LICENSING BOARD**
 - accident risk assessment, validity of evidence; ALAB-429, C, (6 NRC 229, 234 (1977))
 - admissibility of evidence, scope of subpoena inquiry; ALAB-422, S, (6 NRC 33, 93 (1977))
 - discretionary powers for granting untimely antitrust petitions; ALAB-420, C, (6 NRC 8, 11 (1977))
 - effective date for decisions pending appeal, rules of practice; ALAB-423, B, (6 NRC 115 (1977))
 - obligations for rationale of evidence rejection or acceptance; ALAB-429, D, (6 NRC 229, 237 (1977))
 - responsibility for disposition of contested issues; ALAB-422, C, (6 NRC 33, 41 (1977))
 - responsibility for issuance of subpoenas; ALAB-422, S, (6 NRC 33, 93 (1977))
 - responsibility for resolution of issues; ALAB-422, B, (6 NRC 33, 41 (1977))
- ATOMIC SAFETY AND LICENSING BOARDS**
 - interlocutory appeals from rulings; ALAB-433, C, (6 NRC 469 (1977))
- ATTORNEY**
 - conduct of TVA counsel, reconsideration denied; ALAB-418, (6 NRC 1 (1977))
 - weight accorded arguments as evidence in appellate review; ALAB-420, E, (6 NRC 8, 14 (1977))
- BEACHES**
 - exclusion area control requirements, San Onofre; ALAB-432, B, (6 NRC 465

SUBJECT INDEX

(1977))
BEAVER VALLEY POWER STATION, Units 1 and 2:
construction permit, operating license, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))
BLACK FOX NUCLEAR GENERATING STATION, Units 1 and 2
construction permits, issues delineation; LBP-77-046, A, (6 NRC 167 (1977))
BRIEFS
admissibility of appellate brief of Justice Department findings required for initial antitrust hearing; ALAB-430, (6 NRC 457 (1977))
appellate format, record references filed with ASLB; ALAB-424, E, (6 NRC 122, 126 (1977))
rules of practice for untimely submission; ALAB-424, C, (6 NRC 122, 125 (1977))
rules of practice, time limits for supporting exceptions; ALAB-424, B, (6 NRC 122, 125 (1977))
size limitation enforcement; ALAB-430, (6 NRC 457 (1977))
CALLAWAY PLANT, Units 1 and 2
construction permit authorization affirmed in totality; ALAB-426, B, (6 NRC 206, 210 (1977))
construction permit, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))
CATAWBA NUCLEAR STATION, Units 1 and 2
construction permit authorization affirmed in totality; ALAB-426, B, (6 NRC 206, 210 (1977))
construction permit, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))
CERTIFICATION
appellate rules of practice for invoking; ALAB-421, B, (6 NRC 25, 27 (1977))
rules of practice for Commission review of ASLB rulings; CLI-77-023, B, (6 NRC 455 (1977))
scope of Commission review of ALAB rulings on ASLB questions; CLI-77-023, B, (6 NRC 455 (1977))
CHEMICAL EFFLUENTS
see EFFLUENTS, CHEMICAL
CHEROKEE NUCLEAR STATION, Units 1, 2 and 3
construction permits LWA-2 activity plus health effects of alternative fuels and revised Table S-3; LBP-77-047, A, (6 NRC 191 (1977))
COLLATERAL ESTOPPEL
see Res Judicata
COMMISSION
see Nuclear Regulatory Commission
CONSTRUCTION
commencement prior to LWA, CP or ASLB approvals; LBP-77-052, E, (6 NRC 294, 301 (1977))
CONSTRUCTION PERMITS
activity continuation pending remand on safety issues; ALAB-429, E, (6 NRC 229, 247 (1977))
affirmation by sua sponte review for San Onofre; ALAB-432, A, (6 NRC 465 (1977))
affirmation in totality for Callaway, Catawba, Hartsville and Vogtle; ALAB-426, B, (6 NRC 206, 210 (1977))
appellate review of Wolf Creek, procedural rulings; ALAB-424, A, (6 NRC 122 (1977))
continuance of Midland, pending court-ordered NEPA remand; LBP-77-057, A, (6 NRC 482 (1977))
issuance affirmed by sua sponte review for Seabrook 1 and 2; ALAB-422, A, (6 NRC 33 (1977))
issuance for Sterling 1; LBP-77-053, (6 NRC 350 (1977))
reinstatement of suspended Seabrook, by majority opinion; ALAB-423, A, (6 NRC 115 (1977))
status during remand, sunk cost considerations; LBP-77-057, C, (6 NRC 482, 485 (1977))
status pending court-ordered NEPA remand proceeding; LBP-77-057, B, (6 NRC 482 (1977))
CONSTRUCTION PERMITS, PROCEEDINGS
alternate site evaluations for Seabrook 1 and 2; LBP-77-043, (6 NRC 134

SUBJECT INDEX

(1977))
 appeal from ASLB contentions' denial dismissed for Greene County; ALAB-434, A, (6 NRC 471 (1977))
 continuation of recycle-related license applications pending possible policy change; ALAB-425, C, (6 NRC 199, 204 (1977))
 cost-benefit analysis of uranium fuel cycle effects, stage of proceeding on weight accorded; ALAB-426, C, (6 NRC 206, 209 (1977))
 dismissal of interlocutory appeal questioning validity of Perkins proceedings for want of jurisdiction; ALAB-433, A, (6 NRC 469 (1977))
 emergency planning for persons outside LPZ; CLI-77-022, (6 NRC 451 (1977))
 exclusion area control requirements, tidal benches; ALAB-432, B, (6 NRC 465 (1977))
 interim fuel-cycle-rule effects on 11 pending license applications; ALAB-426, A, (6 NRC 206 (1977))
 intervention grant for Nuclear Fuel Recovery; LBP-77-059, A, (6 NRC 518 (1977))
 issues delineation for Black Fox 1 and 2; LBP-77-046, A, (6 NRC 167 (1977))
 LNG tanker accident probability findings for Hope Creek remanded for technical findings; ALAB-429, A, (6 NRC 229 (1977))
 LWA findings and issuance for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
 LWA-2 authorization for Cherokee; LBP-77-047, A, (6 NRC 191 (1977))
 reconsideration denied for motion to strike exceptions to Hartsville initial decision; ALAB-418, (6 NRC 1 (1977))
 reopening of Wolf Creek for alternative considerations, briefs requested; ALAB-424, A, (6 NRC 122 (1977))
 reopening of WPPSS 3 and 5 for safe shutdown earthquake fire protection; LBP-77-049, (6 NRC 257 (1977))
 res judicata applicability for jurisdiction over disputed areas; ALAB-422, H, (6 NRC 33, 70 (1977))
 rules of practice for determining permit status during court-ordered NEPA remand; LBP-77-057, B, (6 NRC 482 (1977))
 status of permit issuance pending antitrust completion; ALAB-420, B, (6 NRC 8, 10 (1977))
 sufficiency of NRC regulations for safety considerations; ALAB-422, E, (6 NRC 33, 42 (1977))
 suspension lifted for Nuclear Fuel Recovery and Recycling Center; ALAB-425, A, (6 NRC 199 (1977))
 untimely antitrust intervention affirmed for St. Lucie; ALAB-420, A, (6 NRC 8 (1977))
 untimely intervention denial affirmed for Perkins; ALAB-431, A, (6 NRC 460 (1977))

CONTENTIONS
 see also EXCEPTIONS
 admissibility requirements for specificity and particularization; LBP-77-048, B, (6 NRC 249, 250 (1977))
 denial of some intervention, held interlocutory; ALAB-434, B, (6 NRC 471 (1977))
 leave to amend deficient, untimely intervention petition for Shoreham; LBP-77-050, (6 NRC 261 (1977))
 validity of unsupported, based on cross-examination facts; LBP-77-054, (6 NRC 436 (1977))

COOLING TOWERS
 design conditions for intake structures of Sterling 1; LBP-77-053, (6 NRC 350 (1977))
 environmental effects on Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))

CRITICALITY
 excursions in spent fuel pools; LBP-77-051, A, (6 NRC 265 (1977))

CROSS EXAMINATION
 intervenors' rights under rules of practice for reopened hearings; ALAB-422, T, (6 NRC 33, 94 (1977))
 validity for elicitation of facts supportive of contentions; LBP-77-054, (6 NRC 436 (1977))

DAVIS-BESSE NUCLEAR POWER STATION, Units 1, 2 and 3
 antitrust, appendices to reply briefs struck; ALAB-430, (6 NRC 457 (1977))

SUBJECT INDEX

- DECISIONS, FINAL
rules of practice for immediate effectiveness pending appeal; ALAB-423, B, (6 NRC 115 (1977))
- DECISIONS, INITIAL
appellate remedy for deficient; ALAB-423, D, (6 NRC 33, 41 (1977))
format must sufficiently inform a party of the disposition of contested issues; ALAB-422, C, (6 NRC 33, 41 (1977))
rules of practice for immediate effectiveness pending appeal; ALAB-423, B, (6 NRC 115 (1977))
- DESIGN BASIS ACCIDENT
see Accident, Design Basis
- DIABLO CANYON NUCLEAR POWER PLANT, Units 1 and 2
operating license, access to physical security plans; CLI-77-023, A, (6 NRC 455 (1977))
- DIRECTED CERTIFICATION
ASLB authority for appellate consideration of interlocutory legal rulings; ALAB-419, B, (6 NRC 3 (1977))
- EARTHQUAKES
fire protection for WPPSS 3 and 5 in safe shutdown; LBP-77-049, (6 NRC 257 (1977))
issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
safe shutdown plans, intensity and resulting vibratory ground motion for Seabrook; ALAB-422, A, (6 NRC 33 (1977))
safe-shutdown plans for Seabrook; ALAB-422, K, (6 NRC 33, 54 (1977))
- ECONOMICS
sunk cost considerations in suspension during remand considerations; LBP-77-057, C, (6 NRC 482, 485 (1977))
- EFFLUENTS, CHEMICAL
impacts of chlorinated organics and heavy metals from Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
somatic and genetic effects of low-level chronic exposures as construction permit issues; LBP-77-046, B, (6 NRC 167, 170 (1977))
- EFFLUENTS, RADIOACTIVE
agricultural impact from accidental Sterling releases; LBP-77-053, (6 NRC 350 (1977))
bioaccumulation in aquatic organisms from Sterling 1; LBP-77-053, (6 NRC 350 (1977))
deposition in aquatic sediments; LBP-77-053, (6 NRC 350 (1977))
issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
LWA issuance on findings for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
occupational hazard from expansion of spent fuel pool capacity; LBP-77-051, A, (6 NRC 265 (1977))
rules of practice for occupational protection; LBP-77-055, B, (6 NRC 473, 476 (1977))
somatic and genetic effects of low-level chronic exposures as construction permit issues; LBP-77-046, B, (6 NRC 167, 170 (1977))
- EFFLUENTS, THERMAL
cooling tower plumes, LWA issuances on findings for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
simple and cumulative biological effects from Sterling 1; LBP-77-053, (6 NRC 350 (1977))
- ELECTRICITY
see also Energy Conservation
need for power, reliability and substitution; ALAB-422, A, (6 NRC 33 (1977))
need for, LWA issuance on findings for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
need-for-power considerations, Seabrook; ALAB-422, R, (6 NRC 33, 90 (1977))
- EMERGENCY PLANS
evacuation of persons outside exclusion area (tidal beach); ALAB-432, B, (6 NRC 465 (1977))
evacuation planning for persons outside low-population zone; CLI-77-022, (6

SUBJECT INDEX

- NRC 451 (1977)
- operating licensing access to physical security plans; CLI-77-023, A, (6 NRC 455 (1977))
- ENERGY CONSERVATION
 - fuel substitution policy in light of national energy policy; ALAB-422, R, (6 NRC 33, 90 (1977))
 - issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
 - NEPA alternative consideration standards; ALAB-422, U, (6 NRC 33, 100 (1977))
- ENERGY POLICY
 - fuel substitution considerations in light of national policy; ALAB-422, R, (6 NRC 33, 90 (1977))
- ENVIRONMENTAL CONSIDERATIONS
 - alternatives standards under NEPA, energy conservation; ALAB-422, U, (6 NRC 33, 100 (1977))
 - conditions imposed for Sterling 1 construction; LBP-77-053, (6 NRC 350 (1977))
 - cost-benefit analysis reconsideration for Cherokee, effects of alternative fuels and revised Table S-3; LBP-77-047, A, (6 NRC 191 (1977))
 - cost-benefit analysis update for fuel cycle effects of Seabrook; ALAB-422, W, (6 NRC 33, 102 (1977))
 - court-ordered remand for Midland, cp continuance pending; LBP-77-057, A, (6 NRC 482 (1977))
 - interim fuel cycle rule effect on Seabrook and Vermont Yankee; ALAB-421, A, (6 NRC 25 (1977))
 - issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
 - LNG tanker accident probability, remand for technical findings; ALAB-429, A, (6 NRC 229 (1977))
 - need-for-power considerations for Seabrook; ALAB-422, R, (6 NRC 33, 90 (1977))
 - NEPA and LWA findings for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
 - NEPA cost benefit rebalance, fuel cycle effects on 11 pending license applications; ALAB-426, A, (6 NRC 206 (1977))
 - NEPA cost-benefit analysis must consider somatic and genetic effects of low-level chemical and radioactive effluents; LBP-77-046, B, (6 NRC 167, 170 (1977))
 - NEPA cost-benefit analysis, minimal standards; ALAB-422, F, (6 NRC 33, 43 (1977))
 - NRC jurisdiction over offsite transmission routes; ALAB-422, Q, (6 NRC 33, 82 (1977))
 - pre-LWA activity relation with Wild and Scenic Rivers Act and NEPA; LBP-77-044, C, (6 NRC 141, 152 (1977))
 - pre-LWA activity, trivial impact; LBP-77-044, B, (6 NRC 141, 145 (1977))
 - scope of NEPA review for spent fuel pool modification; LBP-77-051, B, (6 NRC 265, 267 (1977))
 - state's authority under FWPCA relative to radiological health and safety matters; LBP-77-052, D, (6 NRC 294, 339 (1977))
 - sunk cost considerations in remand balancing; LBP-77-057, C, (6 NRC 482, 485 (1977))
 - untimely allegations for Dyster Creek, shipworms and siltation; LBP-77-058, (6 NRC 500 (1977))
 - uranium fuel cycle effects, revised Table S-3 considerations; ALAB-426, C, (6 NRC 206, 209 (1977))
 - water quality monitoring stations deleted for Cherokee; LBP-77-047, A, (6 NRC 191 (1977))
- ENVIRONMENTAL STATEMENT
 - adequacy for floating nuclear power plants; LBP-77-048, A, (6 NRC 249 (1977))
- EVIDENCE
 - acceptance or rejection, ASLB obligation to give rationale; ALAB-429, D, (6 NRC 229, 237 (1977))
 - admissibility determination relative to subpoena request; ALAB-422, S, (6 NRC 33, 93 (1977))

SUBJECT INDEX

- analogous data and theoretical analyses; ALAB-429, C, (6 NRC 229, 234 (1977))
- arguments of counsel, weight accorded in appellate review; ALAB-420, E, (6 NRC 8, 14 (1977))
- quantum of proof, untimely antitrust intervention; ALAB-420, D, (6 NRC 8, 13 (1977))
- EXCEPTIONS
 - see also Contentions
 - rules of practice for motion to strike; ALAB-424, D, (6 NRC 122, 125 (1977))
 - supporting briefs, time limits in rules of practice; ALAB-424, B, (6 NRC 122, 125 (1977))
- EXCLUSION AREA
 - control requirements for licensing, tidal beach; ALAB-432, B, (6 NRC 465 (1977))
 - flexibility of 10 CFR 100 for determination; ALAB-422, J, (6 NRC 33, 51 (1977))
 - safety consequence of tidal beach for San Onofre; ALAB-432, A, (6 NRC 465 (1977))
 - size considerations for Seabrook; ALAB-421, H, (6 NRC 33, 43 (1977))
- EXTENSION OF TIME
 - see Time, Extension
- FACILITY
 - see specific facilities
- FEDERAL PREEMPTION
 - limitation of state's authority under FWP; LBP-77-052, D, (6 NRC 294, 339 (1977))
 - state's authority over NRC licensing activity, FWPCA and LWA activity; LBP-77-052, B, (6 NRC 294, 337 (1977))
- FEDERAL REGISTER
 - adequacy for notice of hearings; LBP-77-058, (6 NRC 500 (1977))
- FINANCIAL QUALIFICATIONS
 - rules of practice for applicant; ALAB-422, N, (6 NRC 33, 73 (1977))
 - rules of practice for state-regulated bodies; ALAB-422, O, (6 NRC 33, 77 (1977))
 - scope of licensing information needed, funds availability; ALAB-422, P, (6 NRC 33, 79 (1977))
- FINDINGS OF FACT
 - ASLB obligations to give rationale for resolution of evidence; ALAB-429, D, (6 NRC 229, 237 (1977))
- FIRES
 - protection plans for WPPSS 3 and 5 safe shutdown earthquake design; LBP-77-049, (6 NRC 257 (1977))
- FISHES
 - population dynamics, issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
- FLOATING NUCLEAR POWER PLANTS
 - manufacturing licensing, contentions admissibility; LBP-77-048, A, (6 NRC 249 (1977))
- FUEL
 - see Reactor Fuels
- FUEL CYCLE
 - cost-benefit analysis update for Seabrook; ALAB-422, W, (6 NRC 33, 102 (1977))
- GEOLOGICAL PROPERTIES
 - scope of ASLB inquiry for site suitability; ALAB-422, K, (6 NRC 33, 54 (1977))
- GOVERNMENT AGENCIES
 - see specific agencies
- GREENE COUNTY NUCLEAR POWER PLANT
 - construction permit, interlocutory appeal dismissal for denial of some contentions; ALAB-434, A, (6 NRC 471 (1977))
- HARTSVILLE NUCLEAR PLANT, Units 1A, 2A, 1B and 2B
 - construction permit authorization affirmed in totality; ALAB-426, B, (6 NRC 206, 210 (1977))
 - construction permit, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))

SUBJECT INDEX

- construction permit, reconsideration of motion to strike exceptions denied;
ALAB-418, (6 NRC 1 (1977))
- HEALTH AND SAFETY
 - see also Emergency Plans
 - limitation of state's authority under FWPCA; LBP-77-052, D, (6 NRC 294, 339 (1977))
- HEARINGS
 - see also Construction Permits, Proceedings
 - see also Licensing Proceedings
 - see also Operating Licenses, Proceedings
 - failure to grant public 401-certification, reopening of record request denied for State's; LBP-77-052, C, (6 NRC 294, 338 (1977))
- HEARINGS, NOTICE OF
 - adequacy of Federal Register announcement; LBP-77-058, (6 NRC 500 (1977))
- HERBICIDES
 - impacts from Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
- HOPE CREEK GENERATING STATION, Units 1 and 2
 - construction permit continuance during remand of LNG tanker accident findings; ALAB-429, A, (6 NRC 229 (1977))
 - construction permit, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))
 - construction permit, LNG tanker accident findings remanded for technical findings; ALAB-429, A, (6 NRC 229 (1977))
- INITIAL DECISION
 - see Decisions, Initial
- INTERLOCUTORY APPEALS
 - see Appeals, Interlocutory
- INTERVENORS
 - cross-examination rights in reopened hearings; ALAB-422, T, (6 NRC 33, 94 (1977))
 - potential value to remand proceedings, party status directed; ALAB-429, B, (6 NRC 229, 233 fn. 20 (1977))
 - right to have contested issues resolved in initial decision; ALAB-422, C, (6 NRC 33, 41 (1977))
 - Springer (David) untimely appeal denial affirmed for Perkins construction permit proceeding; ALAB-431, A, (6 NRC 460 (1977))
 - technical expertise held necessary where unrepresented by counsel; LBP-77-059, A, (6 NRC 518 (1977))
- INTERVENTION
 - appellate consideration of untimely antitrust grant; ALAB-420, D, (6 NRC 8, 13 (1977))
 - contentions requirements for specificity and particularization; LBP-77-048, B, (6 NRC 249, 250 (1977))
 - contentions requirements for specificity and particularization; LBP-77-050, (6 NRC 261 (1977))
 - denial of untimely, for Oyster Creek full-term operating license proceeding; LBP-77-058, (6 NRC 500 (1977))
 - grant for Nuclear Fuel Recovery construction permit proceeding; LBP-77-059, A, (6 NRC 518 (1977))
 - nonparty standing to appeal; ALAB-433, B, (6 NRC 469 (1977))
 - rights of states other than those in which activities under the license will occur; LBP-77-059, B, (6 NRC 518, 521 (1977))
 - rules of practice for untimely; ALAB-431, B, (6 NRC 460 (1977))
 - rules of practice for untimely appellate petitions; ALAB-429, B, (6 NRC 229, 233 fn. 20 (1977))
 - rules of practice for untimely petition considerations; LBP-77-050, (6 NRC 261 (1977))
 - standing for, as taxpayer and resident near possible rail transport route; LBP-77-059, A, (6 NRC 518 (1977))
 - untimely petitions handling, ASLB broad discretion; ALAB-420, C, (6 NRC 8, 11 (1977))
- ISSUES
 - ASLB responsibility for disposition of contested, in initial decision; ALAB-422, C, (6 NRC 33, 41 (1977))
 - ASLB responsibility for resolution of contested; ALAB-422, B, (6 NRC 33, 41 (1977))

SUBJECT INDEX

- delineation for floating nuclear power plants manufacturing license;
LBP-77-048, A, (6 NRC 249 (1977))
 - resolution of contested, ASLB obligation to give record rationale; ALAB-429,
D, (6 NRC 229, 237 (1977))
 - JURISDICTION
 - see Atomic Safety and Licensing Appeal Board, Jurisdiction
 - see Atomic Safety and Licensing Board, Jurisdiction
 - see Nuclear Regulatory Commission, Jurisdiction
 - LAND USE
 - loss of farmland from Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
 - LICENSE TO OPERATE
 - see Operating Licenses
 - LICENSEE
 - see Applicant
 - LICENSING BOARD
 - see Atomic Safety and Licensing Board
 - LICENSING PROCEEDINGS
 - see also Construction Permits, Proceedings
 - see also Hearings
 - see also Operating Licenses, Proceedings
 - LIMERICK GENERATING STATION, Units 1 and 2
 - rules of practice for reopening; ALAB-422, L, (6 NRC 33, 64 fn. 35 (1977))
 - construction permit, operating license, interim-fuel-cycle rule effects on
NEPA balance; ALAB-426, A, (6 NRC 206 (1977))
 - LIMITED WORK AUTHORIZATION
 - issuance for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
 - LWA-2 authorizes only subsurface activity; LBP-77-047, B, (6 NRC 191, 194
(1977))
 - pre-issuance activity relationship with Wild and Scenic Rivers Act and NEPA;
LBP-77-044, C, (6 NRC 141, 152 (1977))
 - pre-issuance activity requests for road and sewer preparation; LBP-77-044,
A, (6 NRC 141 (1977))
 - pre-issuance activity rules of practice; LBP-77-044, B, (6 NRC 141, 145
(1977))
 - reconsideration denied for pre-LWA approval of land clearing for Skagit;
LBP-77-056, (6 NRC 478 (1977))
 - reopening denied for lack of public hearing on FWPCA 401 certification;
LBP-77-052, C, (6 NRC 294, 338 (1977))
 - rules of practice for issuance after violations; LBP-77-052, E, (6 NRC 294,
301 (1977))
 - sanctions for construction commencement prior to issuance; LBP-77-052, E, (6
NRC 294, 301 (1977))
 - scope of LWA-2; LBP-77-047, B, (6 NRC 191, 194 (1977))
 - state v. NRC authority over issuance; LBP-77-052, B, (6 NRC 294, 337 (1977))
 - trivial impacts, staff v. ASLB interpretations; LBP-77-044, B, (6 NRC 141,
145 (1977))
- LIQUEFIED NATURAL GAS
 - formation and dispersion of vapor clouds; ALAB-429, A, (6 NRC 229 (1977))
 - marine tanker accidents, probability and prevention; ALAB-429, A, (6 NRC 229
(1977))
- LOCAL GOVERNMENT SERVICES
 - impacts from Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
- LOW POPULATION ZONE
 - flexibility of 10 CFR 100 for determination; ALAB-422, J, (6 NRC 33, 51
(1977))
 - population density projections must cover early operating years; ALAB-422,
I, (6 NRC 33, 46 (1977))
 - rules of practice for site evaluation; ALAB-422, G, (6 NRC 33, 43 (1977))
 - site suitability evaluation for Seabrook; ALAB-422, G, (6 NRC 33, 43 (1977))
- MANUFACTURING LICENSES, PROCEEDINGS
 - delineation of issues for floating nuclear power plants; LBP-77-048, A, (6
NRC 249 (1977))
- MARBLE HILL NUCLEAR GENERATING STATION, Units 1 and 2
 - construction permit LWA, civil fines effects on issuance; LBP-77-052, E, (6
NRC 294, 301 (1977))
 - construction permits, LWA issuance on NEPA findings; LBP-77-052, A, (6 NRC

SUBJECT INDEX

294 (1977))
MARITIME TRANSPORT
 issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
MIDLAND PLANT, Units 1 and 2
 construction permit suspension pending court-ordered remand on NEPA review; LBP-77-057, A, (6 NRC 482 (1977))
MOTION TO STRIKE
 rules of practice, substantial compliance ruling; ALAB-424, D, (6 NRC 122, 125 (1977))
NOISE POLLUTION
 issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
NRC REGULATIONS
 see Nuclear Regulatory Commission
 see Rules and Regulations
NUCLEAR FUEL RECOVERY AND RECYCLING CENTER
 construction permit proceedings, intervention considerations; LBP-77-059, A, (6 NRC 518 (1977))
 construction permit suspension pending nuclear power policy reassessment lifted; ALAB-425, A, (6 NRC 199 (1977))
NUCLEAR POWER POLICY
 pending NRC reassessment, construction proceedings for fuel recovery and recycling continued; ALAB-425, A, (6 NRC 199 (1977))
 pending possible policy change, recycle-related licensing hearings may continue; ALAB-425, C, (6 NRC 199, 204 (1977))
NUCLEAR REACTOR REGULATION DIRECTOR
 jurisdiction over antitrust review for fully licensed facilities; ALAB-428, B, (6 NRC 221, 223 (1977))
NUCLEAR REGULATORY COMMISSION
 antitrust jurisdiction in absence of Attorney General's recommendations; LBP-77-045, C, (6 NRC 159, 166 (1977))
 authority to condition transmission routes; ALAB-422, Q, (6 NRC 33, 82 (1977))
 authority to reopen record for State's failure to hold public hearing on FWPCA 401 certification; LBP-77-052, C, (6 NRC 294, 338 (1977))
 jurisdiction and responsibilities under Atomic Energy Act 103, 104(b), 105(c), and 186 for antitrust review; ALAB-428, C, (6 NRC 221, 224 (1977))
 jurisdiction over antitrust matters; ALAB-420, B, (6 NRC 8, 10 (1977))
 jurisdictional scope for antitrust review of fully licensed facilities; ALAB-428, B, (6 NRC 221, 223 (1977))
 regulations governing pre-LWA activity, weight of Regulatory staff in interpreting; LBP-77-044, B, (6 NRC 141, 145 (1977))
 res judicata policy over issues of disputed jurisdiction; ALAB-422, M, (6 NRC 33, 70 (1977))
NUCLEAR REGULATORY STAFF
 weight of regulations' interpretations, pre-LWA activity; LBP-77-044, B, (6 NRC 141, 145 (1977))
OPERATING LICENSES
 amendment to Prairie Island for fuel rack disposal alternative denied; LBP-77-055, A, (6 NRC 473 (1977))
OPERATING LICENSES, AMENDMENTS
 ASLB authority to approve uncontested portions of request, directed certification declined; ALAB-419, A, (6 NRC 3 (1977))
 authorization for Prairie Island spent-fuel-pool modification; LBP-77-051, A, (6 NRC 265 (1977))
 spent fuel pool modification for Prairie Island, bifurcation of amendment denied; LBP-77-042, (6 NRC 131 (1977))
 spent fuel storage modification for Vermont Yankee; LBP-77-054, (6 NRC 436 (1977))
OPERATING LICENSES, PROCEEDINGS
 access to physical security plans; CLI-77-023, A, (6 NRC 455 (1977))
 cost-benefit analysis of uranium fuel cycle effects, stage of proceeding on weight accorded; ALAB-426, C, (6 NRC 206, 209 (1977))
 interim fuel-cycle-rule effects on 11 pending license applications; ALAB-426, A, (6 NRC 206 (1977))

SUBJECT INDEX

reopening of Prairie Island on steam generator tube integrity unwarranted;
ALAB-427, (6 NRC 212 (1977))
untimely intervention denial for Oyster Creek full-term; LBP-77-058, (6 NRC
500 (1977))
OYSTER CREEK NUCLEAR GENERATING STATION, Unit 1
full-term operating license proceeding, untimely intervention denial;
LBP-77-058, (6 NRC 500 (1977))
PEACH BOTTOM ATOMIC POWER STATION, Units 2 and 3
construction permit, operating license, interim-fuel-cycle rule effects on
NEPA balance; ALAB-426, A, (6 NRC 206 (1977))
PERKINS NUCLEAR STATION, Units 1, 2 and 3
construction permits, interlocutory appeal for proceeding dismissal
dismissed; ALAB-433, A, (6 NRC 469 (1977))
construction permits, untimely intervention denial affirmed; ALAB-431, A, (6
NRC 460 (1977))
PERRY NUCLEAR POWER PLANT, Units 1 and 2
antitrust, appendices to reply briefs struck; ALAB-430, (6 NRC 457 (1977))
POLICY STATEMENTS
nuclear power policy, pending NRC reassessment construction permit
proceedings may continue; ALAB-425, A, (6 NRC 199 (1977))
POPULATION DENSITY
construction permit affirmed for Seabrook 1 and 2; ALAB-422, A, (6 NRC 33
(1977))
emergency planning for evacuation of persons outside LPZ; CLI-77-022, (6 NRC
451 (1977))
flexibility of 10 CFR 100 for determination; ALAB-422, J, (6 NRC 33, 51
(1977))
issue delineation for Black Fox construction permit proceeding; LBP-77-046,
A, (6 NRC 167 (1977))
LPZ considerations for Seabrook; ALAB-422, G, (6 NRC 33, 43 (1977))
POWER NEEDS
see Electricity
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, Units 1 and 2
operating license amendments, authorization to increase spent fuel capacity
from 198 to 687; LBP-77-051, A, (6 NRC 165 (1977))
operating license amendments, directed certification on ASLB authority
declined; ALAB-419, A, (6 NRC 3 (1977))
operating license amendments, motion to divide application denied;
LBP-77-042, (6 NRC 131 (1977))
operating license, reopening unwarranted on steam generator tube integrity;
ALAB-427, (6 NRC 212 (1977))
operating license amendment, fuel rack disposal alternative denied;
LBP-77-055, A, (6 NRC 473 (1977))
PRESIDING OFFICER
resignation pending completion of hearing; ALAB-422, V, (6 NRC 33, 101
(1977))
RADIATION DOSES
occupational hazard from expansion of spent fuel pool capacity; LBP-77-051,
A, (6 NRC 265 (1977))
rules of practice for occupational consideration, monetary cost-benefit;
LBP-77-055, B, (6 NRC 473, 476 (1977))
RADIOACTIVE EFFLUENTS
see Effluents, Radioactive
REACTOR COMPONENTS
steam generator tube integrity issue for Seabrook, ASLB jurisdiction
retained; ALAB-422, A, (6 NRC 33 (1977))
REACTOR FUEL CYCLE
environmental effects from interim rule on Seabrook and Vermont Yankee;
ALAB-421, A, (6 NRC 25 (1977))
interim Table S-3 effects on NEPA cost-benefit balance for pending license
applications; ALAB-426, A, (6 NRC 206 (1977))
numerical values of revised Table S-3, weight in cost-benefit analysis for
various licensing stages; ALAB-426, C, (6 NRC 206, 209 (1977))
retained appellate jurisdiction terminated for Callaway, Catawba, Hartsville
and Vogtle; ALAB-426, B, (6 NRC 206, 210 (1977))

SUBJECT INDEX

REACTOR FUELS

- environmental effects from Seabrook, updated cost-benefit analysis; ALAB-422, W, (6 NRC 33, 102 (1977))
- fuel rack disposal, radiation dose limitations for personnel handling; LBP-77-055, B, (6 NRC 473, 476 (1977))
- reprocessing and waste disposal, interim fuel-cycle-rule effects on 11 pending licensing applications; ALAB-426, A, (6 NRC 206 (1977))
- spent fuel pool modification for Prairie Island, bifurcation of amendment application denied; LBP-77-042, (6 NRC 131 (1977))
- spent fuel pool modification, fuel rack disposal for Prairie Island; LBP-77-055, B, (6 NRC 473, 476 (1977))
- spent pool modification, scope of NEPA review for; LBP-77-051, B, (6 NRC 265, 267 (1977))
- spent storage capacity increase authorized for Vermont Yankee; LBP-77-054, (6 NRC 436 (1977))
- spent-fuel-pool modification authorized for Prairie Island; LBP-77-051, A, (6 NRC 265 (1977))
- technical and health aspects of spent fuel pool expansion; LBP-77-051, A, (6 NRC 265 (1977))

REGULATORY STAFF

- see Nuclear Regulatory Commission, Personnel

RELEASES, LIQUID

- see Effluents, Radioactive
- see Effluents, Thermal

REMAND PROCEEDINGS

- party status directed for unsuccessful appellate petitioner; ALAB-429, B, (6 NRC 229, 233 fn. 20 (1977))
- permit status pending completion must include sunk costs; LBP-77-057, C, (6 NRC 482, 485 (1977))

REPROCESSING AND FUEL STORAGE FACILITIES

- status of licensing activities pending possible policy change; ALAB-425, C, (6 NRC 199, 204 (1977))

RES JUDICATA

- applicability in Commission proceedings; ALAB-422, M, (6 NRC 33, 70 (1977))

RULES AND REGULATIONS

- pre-LWA activity, weight of NRC staff interpretations; LBP-77-044, B, (6 NRC 141, 145 (1977))

RULES OF PRACTICE

- see also Licensing, Procedure
- antitrust appellate briefs content and size; ALAB-430, (6 NRC 457 (1977))
- appellate briefs, format for record references filed with ASLB; ALAB-424, E, (6 NRC 122, 126 (1977))
- appellate procedure for interlocutory review of legal rulings; ALAB-419, B, (6 NRC 3 (1977))
- appellate review weight accorded counsel arguments; ALAB-420, E, (6 NRC 8, 14 (1977))
- appellate rules for invoking certification to Commission; ALAB-421, B, (6 NRC 25, 27 (1977))
- authority of Appeal Board; ALAB-425, B, (6 NRC 199, 204 (1977))
- construction permit status pending court-ordered NEPA remand; LBP-77-057, B, (6 NRC 482 (1977))
- contentions requirements for specificity and particularization; LBP-77-048, B, (6 NRC 249, 250 (1977))
- contentions validity based on cross-examination facts; LBP-77-054, (6 NRC 436 (1977))
- cross-examination rights of intervenors in reopened hearings; ALAB-422, T, (6 NRC 33, 94 (1977))
- directed certification for academic issues; ALAB-419, C, (6 NRC 3 (1977))
- exclusion area size, Seabrook site suitability; ALAB-422, H, (6 NRC 33, 43 (1977))
- financial qualifications for construction permit applicant; ALAB-422, N, (6 NRC 33, 73 (1977))
- interlocutory appeals from ASLB rulings; ALAB-433, C, (6 NRC 469 (1977))
- interlocutory nature of partial contentions' denial; ALAB-434, B, (6 NRC 471 (1977))
- intervention standing of states other than site specific; LBP-77-059, B, (6

SUBJECT INDEX

NRC 518, 521 (1977))
 issuance of LWA subsequent to civil fine for violations; LBP-77-052, E, (6 NRC 294, 301 (1977))
 low-population-zone evaluation; ALAB-422, G, (6 NRC 33, 43 (1977))
 motion to strike exceptions; ALAB-424, D, (6 NRC 122, 125 (1977))
 permit suspension pending remand; LBP-77-057, C, (6 NRC 482, 485 (1977))
 population density projections for exclusion area consideration; ALAB-422, I, (6 NRC 33, 46 (1977))
 pre-LWA activity; LBP-77-044, B, (6 NRC 141, 145 (1977))
 presiding officer resignation pending completion of hearing; ALAB-422, V, (6 NRC 33, 101 (1977))
 reopening of proceedings; ALAB-422, L, (6 NRC 33, 64 fn. 35 (1977))
 res judicata applicability in Commission proceedings; ALAB-422, M, (6 NRC 33, 70 (1977))
 scope of Commission review of ASLAB rulings on certified questions; CLI-77-023, B, (6 NRC 455 (1977))
 scope of inquiry required for financial qualifications; ALAB-422, P, (6 NRC 33, 79 (1977))
 scope of LWA-2 under 10 CFR 50.10(e)(3)(1); LBP-77-047, B, (6 NRC 191, 194 (1977))
 seismic and geological criteria for site suitability findings; ALAB-422, K, (6 NRC 33, 54 (1977))
 standing to appeal by nonparty; ALAB-433, E, (6 NRC 469 (1977))
 stay pending appeal; ALAB-424, F, (6 NRC 122, 127 (1977))
 stay pending appeal, effective date of challenged decisions; ALAB-423, B, (6 NRC 115 (1977))
 subpoena issuance; ALAB-422, S, (6 NRC 33, 93 (1977))
 summary disposition of antitrust matters; LBP-77-045, B, (6 NRC 159, 162 (1977))
 time limits for filing support briefs; ALAB-424, C, (6 NRC 122, 125 (1977))
 time limits for supporting exceptions briefs; ALAB-424, B, (6 NRC 122, 125 (1977))
 untimely appellate intervention petitions; ALAB-429, B, (6 NRC 229, 233 fn. 20 (1977))
 untimely intervention petitions, antitrust; ALAB-420, C, (6 NRC 8, 11 (1977))
 untimely intervention petitions, appellate consideration; ALAB-420, D, (6 NRC 8, 13 (1977))
 untimely intervention substantiation; ALAB-431, B, (6 NRC 460 (1977))

SAFETY
 see Emergency Plans
 see Environmental Considerations
 see Health and Safety
 construction permit activity continuation pending resolution of remanded issues; ALAB-429, E, (6 NRC 229, 247 (1977))
 issue delineation for Black Fox construction permit proceeding; LBP-77-046, A, (6 NRC 167 (1977))
 sufficiency of NRC regulations for safety consideration prior to construction permit grant; ALAB-422, E, (6 NRC 33, 42 (1977))

SALEM NUCLEAR GENERATING STATION, Units 1 and 2
 construction permit, operating license, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))

SAN ONOFRE NUCLEAR GENERATING STATION, Units 2 and 3
 construction permit affirmed by sua sponte review; ALAB-432, A, (6 NRC 465 (1977))

SEABROOK NUCLEAR STATION, Units 1 and 2
 construction permits, alternate-site evaluation; LBP-77-043, (6 NRC 134 (1977))
 construction permits, emergency planning for persons outside LPZ; CLI-77-022, (6 NRC 451 (1977))
 construction permits, environmental effects of interim fuel cycle rule; ALAB-421, A, (6 NRC 25 (1977))
 construction permits, issuance affirmed by sua sponte review; ALAB-422, A, (6 NRC 33 (1977))
 construction permits, reinstatement by majority opinion; ALAB-423, A, (6 NRC

SUBJECT INDEX

- 115 (1977))
- SECURITY PLANS
 - operating licensing access to physical; CLI-77-023, A, (6 NRC 455 (1977))
- SEISMIC PROPERTIES
 - scope of ASLB inquiry for site suitability; ALAB-422, K, (6 NRC 33, 54 (1977))
- SEWER LINES
 - pre-LWA activity allowable for Skagit 1 and 2; LBP-77-044, A, (6 NRC 141 (1977))
 - pre-LWA activity not approved for Skagit; LBP-77-056, (6 NRC 478 (1977))
- SHIPWORMS
 - infestation damage, adequacy for untimely intervention for Oyster Creek; LBP-77-058, (6 NRC 500 (1977))
- SHOREHAM NUCLEAR POWER STATION, Unit 1
 - operating license, untimely intervention considerations with deficient contentions; LBP-77-050, (6 NRC 261 (1977))
- SILTATION
 - adequacy for untimely Oyster Creek intervention; LBP-77-058, (6 NRC 500 (1977))
- SITE EVALUATION
 - alternate considerations for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
 - alternate considerations for Seabrook 1 and 2; ALAB-422, A, (6 NRC 33 (1977))
 - alternatives for Seabrook ruled inferior; LBP-77-043, (6 NRC 134 (1977))
 - exclusion area size; ALAB-422, H, (6 NRC 33, 43 (1977))
 - flexibility of 10 CFR 100 for exclusion area, LPZ, and population center distance; ALAB-422, J, (6 NRC 33, 51 (1977))
 - low-population-zone size for Seabrook; ALAB-422, G, (6 NRC 33, 43 (1977))
 - population center, projected density considerations; ALAB-422, I, (6 NRC 33, 46 (1977))
 - radiological health and safety findings for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))
 - scope of seismic and geological inquiry for construction licensing; ALAB-422, K, (6 NRC 33, 54 (1977))
- SKAGIT NUCLEAR POWER PROJECT, Units 1 and 2
 - construction permits, pre-LWA activity requests for road and sewer preparation; LBP-77-044, A, (6 NRC 141 (1977))
 - construction permits, pre-LWA reconsideration denied for tree clearing, roadwork, and sewers; LBP-77-056, (6 NRC 478 (1977))
- SPENT FUEL STORAGE
 - see Reactor Fuels
- ST. LUCIE NUCLEAR POWER PLANT, Unit 1
 - operating license, antitrust initiation denied for lack of jurisdiction; ALAB-428, A, (6 NRC 221 (1977))
- ST. LUCIE NUCLEAR POWER PLANT, Unit 2
 - construction permit, untimely antitrust intervention grant affirmed; ALAB-420, A, (6 NRC 8 (1977))
- STANISLAUS NUCLEAR PROJECT, Unit 1
 - construction permit, summary disposition of antitrust allegations denied; LBP-77-045, A, (6 NRC 159 (1977))
- STATES
 - authority of adjoining, over NRC licensing power; LBP-77-052, B, (6 NRC 294, 337 (1977))
 - authority under FWPCA relative to radiological health and safety matters; LBP-77-052, D, (6 NRC 294, 339 (1977))
 - effects of regulation of financial qualifications of applicant; ALAB-422, D, (6 NRC 33, 77 (1977))
 - intervention standing of those other than in which activities under the license will occur; LBP-77-059, B, (6 NRC 518, 521 (1977))
 - obligation to offer public hearings on FWPCA 401 certification issues; LBP-77-052, C, (6 NRC 294, 338 (1977))
- STAY
 - construction activity pending resolution of remanded safety issues; ALAB-429, E, (6 NRC 229, 247 (1977))
 - pending appeal, rules of practice; ALAB-424, F, (6 NRC 122, 127 (1977))

SUBJECT INDEX

pending appeal, rules of practice for immediate effectiveness of both ASLB and ASLAB decisions; ALAB-423, B, (6 NRC 115 (1977))

STEAM GENERATOR TUBES

denting phenomena, generic considerations and technical aspects; ALAB-427, (6 NRC 212 (1977))

findings for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))

integrity considerations for Prairie Island; ALAB-427, (6 NRC 212 (1977))

STEAM GENERATORS

tube integrity resolution problems for Seabrook, ASLAB jurisdiction retained; ALAB-422, A, (6 NRC 33 (1977))

STERLING POWER PROJECT, Nuclear 1

construction permit issuance with conditions; LBP-77-053, (6 NRC 350 (1977))

SUBPOENAS

rules of practice for issuance or denial; ALAB-422, S, (6 NRC 33, 93 (1977))

SUMMARY DISPOSITION

rules of practice for antitrust matters; LBP-77-045, B, (6 NRC 159, 162 (1977))

SUSQUEHANNA STEAM ELECTRIC STATION, Units 1 and 2

construction permit, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))

TAXPAYER

standing conferred for intervention; LBP-77-059, A, (6 NRC 518 (1977))

TECHNICAL QUALIFICATIONS

intervenor considerations for construction permit proceedings; LBP-77-059, A, (6 NRC 518 (1977))

TESTIMONY

see also Witnesses

THERMAL EFFLUENTS

see Effluents, Thermal

THREE MILE ISLAND NUCLEAR STATION, Units 1 and 2

construction permit, operating license, interim-fuel-cycle rule effects on NEPA balance; ALAB-426, A, (6 NRC 206 (1977))

TIME, EXTENSION OF

rules of practice for untimely briefs submission; ALAB-424, C, (6 NRC 122, 125 (1977))

TIMELINESS

good cause considerations for three-year delay in intervention petition; LBP-77-058, (6 NRC 500 (1977))

rules of practice for supporting exceptions briefs; ALAB-424, B, (6 NRC 122, 125 (1977))

rules of practice for untimely supporting briefs filing; ALAB-424, C, (6 NRC 122, 125 (1977))

TORNADOES

findings for Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))

TRANSMISSION LINES

electrical hazards from Sterling 1; LBP-77-053, (6 NRC 350 (1977))

environmental impacts and costs for Seabrook 1 and 2; ALAB-422, A, (6 NRC 33 (1977))

impacts from Marble Hill 1 and 2; LBP-77-052, A, (6 NRC 294 (1977))

NRC jurisdiction over offsite routes; ALAB-422, Q, (6 NRC 33, 82 (1977))

routes affirmed for Seabrook; ALAB-422, Q, (6 NRC 33, 82 (1977))

TRANSPORTATION OF RADIOACTIVE MATERIALS

see Radioactive Materials Transportation

TREES

removal activity not approved for pre-LWA activity; LBP-77-056, (6 NRC 478 (1977))

TURKEY POINT, Units 3 and 4

operating license, antitrust initiation denied for lack of jurisdiction; ALAB-428, A, (6 NRC 221 (1977))

UNTIMELINESS

rules of practice for considering late intervention petitions; ALAB-431, B, (6 NRC 460 (1977))

URANIUM

fuel cycle effects of Seabrook, NEPA cost-benefit update; ALAB-422, W, (6 NRC 33, 102 (1977))

interim fuel cycle rule effects on Seabrook and Vermont Yankee; ALAB-421, A,

SUBJECT INDEX

(6 NRC 25 (1977))
numerical fuel cycle values of revised Table S-3, decisive weight in
cost-benefit balance; ALAB-426, C, (6 NRC 206, 209 (1977))
numerical values for fuel cycle effects on 11 pending license applications;
ALAB-426, A, (6 NRC 206 (1977))
VERMONT YANKEE NUCLEAR POWER STATION
operating license amendment, authorization to increase spent fuel storage;
LBP-77-054, (6 NRC 436 (1977))
operating license, environmental effects of interim fuel cycle rule;
ALAB-421, A, (6 NRC 25 (1977))
VIOLATIONS
effects on future authorization of LWA or CP; LBP-77-052, E, (6 NRC 294, 301
(1977))
WASTE
see also Effluents, Radioactive
see also Radioactive Waste
WATER QUALITY
groundwater contamination probability for Marble Hill 1 and 2; LBP-77-052,
A, (6 NRC 294 (1977))
WOLF CREEK GENERATING STATION, Unit 1
construction permits, procedural rulings for initial decision appellate
review; ALAB-424, A, (6 NRC 122 (1977))
WPPSS NUCLEAR PROJECT, Units 3 and 5
construction permit record reopened for safe shutdown earthquake fire
protection; LBP-77-049, (6 NRC 257 (1977))

FACILITY INDEX

ALVIN W. VOGTLE NUCLEAR PLANT, Units 1 and 2; Docket 50424;50425
 Licensing-(uranium fuel cycle effects); (9-08-77; Memorandum and Order;
 ALAB-426 (6 NRC 206 (1977))

BEAVER VALLEY POWER STATION, Units 1 and 2; Docket 50334;50412
 Licensing-(uranium fuel cycle effects); (9-08-77; Memorandum and Order;
 ALAB-426 (6 NRC 206 (1977))

BLACK FOX NUCLEAR GENERATING STATION, Units 1 and 2; Dockets STN 50556;STN
 50557
 Construction Permit; 07-20-77; Order; LBI-77-046 (6 NRC 167 (1977))

CALLAWAY PLANT, Units 1 and 2; Docket STN 50483;STN 50486
 Licensing-(uranium fuel cycle effects); (9-08-77; Memorandum and Order;
 ALAB-426 (6 NRC 206 (1977))

CATAWBA NUCLEAR STATION, Units 1 and 2; Docket 50413;50414
 Licensing-(uranium fuel cycle effects); (9-08-77; Memorandum and Order;
 ALAB-426 (6 NRC 206 (1977))

CHEROKEE NUCLEAR STATION, Units 1, 2 and 3; Dockets STN 50491;STN 50492;STN
 50493
 Construction Permit; 07-26-77; Partial Initial Decision, Supplemental;
 LBP-77-047 (6 NRC 191 (1977))

DAVIS-BESSE NUCLEAR POWER STATION, Units 1, 2 and 3; Dockets
 50346A;50500A;50501A
 Antitrust; 09-02-77; Memorandum and Order; ALAB-430 (6 NRC 457 (1977))

DIABLO CANYON NUCLEAR POWER PLANT, Units 1 and 2; Dockets 50275 OL;50323 OL
 Operating License; 09-15-77; Order; CLI-77-023 (6 NRC 455 (1977))

FLOATING NUCLEAR POWER PLANTS; Docket STN 50437
 Manufacturing License; 08-01-77; Memorandum and Order; LBP-77-048 (6 NRC 249
 (1977))

GREENE COUNTY NUCLEAR POWER PLANT; Docket 50549
 Construction Permit; 09-16-77; Memorandum and Order; ALAB-434 (6 NRC 471
 (1977))

HARTSVILLE NUCLEAR PLANT, Units 1A, 2A, 1B and 2B ; Docket STN 50518;STN
 50519;STN 50520;STN 50521
 Licensing-(uranium fuel cycle effects); (9-08-77; Memorandum and Order;
 ALAB-426 (6 NRC 206 (1977))

HARTSVILLE NUCLEAR PLANT, Units 1A, 2A, 1B and 2B; Dockets STN 50518;STN
 50519;STN 50520;STN 50521
 Construction Permit; 07-11-77; Memorandum and Order; ALAB-418 (6 NRC 1
 (1977))

HOPE CREEK GENERATING STATION, Units 1 and 2; Dockets 50354;50355
 Construction Permit; 08-24-77; Decision; ALAB-429 (6 NRC 229 (1977))
 Licensing-(uranium fuel cycle effects); (9-08-77; Memorandum and Order;
 ALAB-426 (6 NRC 206 (1977))

LIMERICK GENERATING STATION, Units 1 and 2; Docket 50352;50353
 Licensing-(uranium fuel cycle effects); (9-08-77; Memorandum and Order;
 ALAB-426 (6 NRC 206 (1977))

MARBLE HILL NUCLEAR GENERATING STATION, Units 1 and 2; Dockets STN 50546;STN
 50547
 Construction Permit; 08-22-77; Partial Initial Decision, LWA; LBP-77-052 (6
 NRC 294 (1977))

MIDLAND PLANT, Units 1 and 2; Dockets 50323;50330
 Construction Permit; 09-23-77; Order; LBP-77-057 (6 NRC 482 (1977))

NUCLEAR FUEL RECOVERY AND RECYCLING CENTER; Docket 50564

FACILITY INDEX

FACILITY INDEX

Construction Permit; 08-03-77; Memorandum and Order; ALAB-425 (6 NRC 199 (1977))
 Construction Permit; 09-30-77; Order; LBP-77-059 (6 NRC 518 (1977))
 OYSTER CREEK NUCLEAR GENERATING STATION; 50219
 Operating License; 09-28-77; Memorandum and Order; LBP-77-058 (6 NRC 500 (1977))
 PEACH BOTTOM ATOMIC POWER STATION, Units 2 and 3; Docket 50277;50278
 Licensing-(uranium fuel cycle effects); 09-08-77; Memorandum and Order; ALAB-426 (6 NRC 206 (1977))
 PERKINS NUCLEAR STATION, Units 1, 2 and 3; Dockets STN 50488;STN 50489;STN 50490
 Construction Permit; 09-08-77; Decision; ALAB-431 (6 NRC 460 (1977))
 Construction Permit; 09-16-77; Memorandum and Order; ALAB-433 (6 NRC 469 (1977))
 PERRY NUCLEAR POWER PLANT, Units 1 and 2; Docket 50440A;50441A
 Antitrust; 09-02-77; Memorandum and Order; ALAB-430 (6 NRC 457 (1977))
 PRAIRIE ISLAND NUCLEAR GENERATING PLANT, Units 1 and 2; Dockets 50282;50306
 Operating License; 07-12-77; Memorandum and Order; ALAB-419 (6 NRC 3 (1977))
 Operating License; 08-12-77; Initial Decision; LBP-77-051 (6 NRC 265 (1977))
 Operating License; 08-15-77; Memorandum; ALAB-427 (6 NRC 212 (1977))
 Operating License (Spent Fuel Pool Modification); 09-08-77; Order; LBP-77-055 (6 NRC 473 (1977))
 Operating License, Amendments; 07-05-77; LBP-77-042 (6 NRC 131 (1977))
 SALEM NUCLEAR GENERATING STATION, Units 1 and 2; Dockets 50272;50311
 Licensing-(uranium fuel cycle effects); 09-08-77; Memorandum and Order; ALAB-426 (6 NRC 206 (1977))
 SAN ONOFRE NUCLEAR GENERATING STATION, Units 2 and 3; Dockets 50361;50362
 Construction Permit; 09-14-77; Decision; ALAB-432 (6 NRC 465 (1977))
 SEABROOK NUCLEAR STATION, Units 1 and 2; Dockets 50443;50444
 Construction Permit; 07-07-77; Initial Decision, Supplemental; LBP-77-043 (6 NRC 134 (1977))
 Construction Permit; 07-26-77; Decision; ALAB-422 (6 NRC 33 (1977))
 Construction Permit; 09-15-77; Order; CLI-77-022 (6 NRC 451 (1977))
 Construction Permit; 07-26-78; Memorandum and Order; ALAB-423 (6 NRC 115 (1977))
 Uranium-Fuel-Cycle-Rule Effects; 07-18-77; Memorandum and Order; ALAB-421 (6 NRC 25 (1977))
 SHOREHAM NUCLEAR POWER STATION, Unit 1; Docket 50322
 Operating License; 08-01-77; Memorandum and Order; LBP-77-050 (6 NRC 261 (1977))
 SKAGIT NUCLEAR POWER PROJECT, Units 1 and 2; Dockets STN 50522;STN 50523
 Construction Permit; 07-07-77; Initial Decision, Pre-LWA Authority for Road Construction; LBP-77-044 (6 NRC 141 (1977))
 Construction Permit; 09-15-77; Order; LBP-77-056 (6 NRC 478 (1977))
 ST. LUCIE NUCLEAR POWER PLANT, Unit 1; Dockets 50335A
 Operating License, Antitrust Review; 08-23-77; Decision; ALAB-428 (6 NRC 221 (1977))
 ST. LUCIE NUCLEAR POWER PLANT, Unit 2; Docket 50389A
 Construction Permit; 07-12-77; Decision; ALAB-420 (6 NRC 8 (1977))
 STANISLAUS NUCLEAR PROJECT, Unit 1; Docket 50564A
 Construction Permit, Antitrust; 07-08-77; Order; LBP-77-045 (6 NRC 159 (1977))
 STERLING POWER PROJECT, Nuclear 1; Docket 50485
 Construction Permit; 08-26-77; Initial Decision; LBP-77-053 (6 NRC 350 (1977))
 SUSQUEHANNA STEAM ELECTRIC STATION, Units 1 and 2; Docket 50387;50388
 Licensing-(uranium fuel cycle effects); 09-08-77; Memorandum and Order; ALAB-426 (6 NRC 206 (1977))
 THREE MILE ISLAND NUCLEAR STATION, Units 1 and 2; Docket 50289;50320
 Licensing-(uranium fuel cycle effects); 09-08-77; Memorandum and Order; ALAB-426 (6 NRC 206 (1977))
 TURKEY POINT, Units 3 and 4; Docket 50250A
 Operating License, Antitrust Review; 08-23-77; Decision; ALAB-428 (6 NRC 221 (1977))
 VERMONT YANKEE NUCLEAR POWER STATION; Docket 50271
 Operating License; 08-30-78; Initial Decision; LBP-77-054 (6 NRC 436 (1977))

FACILITY INDEX

Uranium-Fuel-Cycle-Rule Effects; 07-18-77; Memorandum and Order; ALAB-421 (6 NRC 25 (1977))
WOLF CREEK GENERATING STATION, Unit 1; Docket STN 50482
Construction Permit; 07-29-77; Memorandum and Order; ALAB-424 (6 NRC 122 (1977))
WPPSS NUCLEAR PROJECT, Units 3 and 5; Dockets STN 50508; STN 50509
Construction Permit; 08-01-77; Memorandum and Order; LBP-77-049 (6 NRC 257 (1977))

