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NUCLEAR REGULATORY COMMISSION ISSUANCES

October 1984

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NUCLEAR REGULATORY COMMISSION ISSUANCES

October 1984

This report includes the issuances received during the specified period from the Commission (CLI), the Atomic Safety and Licensing Appeal Boards (ALAB), the Atomic Safety and Licensing Boards (LBP), the Administrative Law Judge (ALJ), the Directors' Decisions (DD), and the Denials of Petitions for Rulemaking (DPRM).

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

U.S. NUCLEAR REGULATORY COMMISSION

Prepared by the Division of Technical Information and Document Control,
Office of Administration, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555
(301/492-8925)

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Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

Alan S. Rosenthal, Chairman, Atomic Safety and Licensing Appeal Panel
B. Paul Cotter, Chairman, Atomic Safety and Licensing Board Panel

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COMMISSION

Cite as 20 NRC 1055 (1984) CLI-84-19

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

In the Matter of

MISSISSIPPI POWER & LIGHT COMPANY
MIDDLE SOUTH ENERGY, INC., and
SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION
(Grand Gulf Nuclear Station, Unit 1)

Docket No. 50-416

October 25, 1984

To avoid giving the erroneous impression that by designating its full-power authorization for the Grand Gulf facility a "license amendment" (to a previously issued facility license authorizing low-power operation) it intended to create new hearing rights under § 189a of the Atomic Energy Act of 1954, as amended, the Commission orders the Staff to replace the "license amendment" with a separate full-power license.

ORDER

On June 16, 1982, the Nuclear Regulatory Commission (NRC or Commission) issued a Facility Operating License authorizing operation of the Grand Gulf Nuclear Station, Unit 1, at up to 5% power. On August 31, 1984, the NRC authorized that facility to operate at full

power by issuing what was entitled "Amendment No. 13 to Facility Operating License." Jacksonians United for Livable Energy Policies (JULEP) on October 1, 1984, challenged issuance of that amendment in the United States Court of Appeals for the District of Columbia Circuit. That challenge has brought to the Commission's attention the semantic problem created by labelling the authorization to operate at full power as a "license amendment."

Mississippi Power & Light Company applied for an operating license in 1978, and the NRC at that time noticed the application and the opportunity for interested persons to request a hearing. 43 Fed. Reg. 32,903 (July 28, 1978). The Commission in authorizing operation at full power did not intend to issue a license amendment which could be viewed as creating new hearing rights under § 189a of the Atomic Energy Act. Rather, the Commission in authorizing full-power operation intended no more than final issuance of the operating license originally requested and noticed in 1978. To avoid potential confusion in this area, the Commission has decided to direct the NRC Staff to replace the prior document entitled "Amendment No. 13 to Facility Operating License" with a separate full-power operating license.[1] This Order explains the basis for the Commission's action.

I. BACKGROUND

The NRC published notice of receipt of an application from Mississippi Power & Light Company for full-power operating licenses for the Grand Gulf Nuclear Station, Units 1 and 2, on July 28, 1978. In that notice, the Commission stated that it would consider issuance of the operating licenses upon, among other things, "a finding by the Commission that the application for the facility licenses, *as amended,* complies with the requirements of the Atomic Energy Act of 1954 . . . and the Commission's regulations . . . ," and that "any person whose interest may be affected by this proceeding may file a petition for leave to intervene." 43 Fed. Reg. 32,903, 32,904 (emphasis added).

No hearing was requested, and the application was processed in accord with the procedures for handling uncontested cases. The NRC Staff reviewed the application and provided regulatory guidance to the Applicant. Moreover, necessary changes were made to the application to ensure that the regulatory requirements were met. On June 16, 1982,

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[1] The full-power license changes none of the technical requirements in the amended low-power license, except that it incorporates the regulatory exemptions which were granted separately. *See* note 7, *infra.*

the NRC determined that the necessary requirements for low-power operation had been satisfied, and accordingly issued Facility Operating License NPF-13, authorizing operation of Unit 1 up to and including 5% of full power (the so-called "low power" license). The NRC at the time it issued that license was still reviewing the application for operation above 5% of power, i.e., the uncontested proceeding initiated by the original application was still under way.

After receiving this low-power license the Licensee commenced fuel loading and achieved initial criticality in August 1982. Numerous problems, including discrepancies in the surveillance procedures and technical specifications, were subsequently identified. This led to a series of inspections and reviews extending over a period of 2 years. *See* DD-84-21, 20 NRC 788 (1984), for a general background discussion of these events. It became apparent during this time period that changes to the low-power license were required.[2] Some of those changes were required solely to continue operation and testing at low power, while others were required for later full-power operation. The NRC determined that those changes required solely for low-power operation were in fact amendments to the existing low-power license that required notice and an opportunity for hearing under § 189 of the Atomic Energy Act.[3] However, those required only for later full-power operation were considered to be changes to the original application, and as such covered by the 1978 notice.[4] Hence, those latter changes, although termed "li-

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[2] The low-power license was not suspended or revoked during this time period, although the plant remained shut down for much of the time.

[3] Two amendments were noticed. Specifically, License Amendment 10 involved substantive changes to the technical specifications to redefine the operability requirements for high pressure core spray, to reflect a post-low-power license design change on RHR jockey pumps, and to permit one-time exceptions to certain surveillance requirements so that the plant could start up and operate at low power before performing certain required tests. These changes were necessary to permit restart and operation under the low-power license.

License Amendment 12 involved technical specification changes which were simply corrections of errors, changes for nomenclature consistency, and changes to conform erroneous technical specifications to the approved facility design. In retrospect, these changes were encompassed by the original full-power operating license application notice, and this amendment need not have been noticed.

[4] Four amendments were not noticed because they related to the full-power application. Specifically, Amendments 7, 8, and 9 involved simple corrections to typographical errors, changes to make nomenclature consistent, and changes to conform erroneous technical specifications to the actual facilities' design as proposed in the operating license application and as reviewed and approved by the NRC Staff. These changes to correct inadvertent and unintended errors or ambiguities in the license were covered by the original 1978 notice.

Amendment 11 modified a license condition involving control room leakage so as to approve an initial control room leakage test, but required further testing and analysis to support or establish a proper allowable control room leak rate for operation under a full-power license. Because this modified license condition and the information required by it resulted from, was a part of, and was necessary for completion of, the review for a full-power license, it was encompassed by the original 1978 notice.

cense amendments" and made to the low-power license, rather than the full-power application, were not noticed.[5]

The Commission on July 31, 1984, determined that Mississippi Power & Light's application for a full-power license met the applicable statutory and regulatory requirements, and therefore authorized issuance of a full-power license. Since a low-power license had been issued 2 years earlier, however, the NRC followed the earlier pattern established in this case and amended that low-power license to authorize full-power operation, rather than issuing a separate full-power license. It is that act which is the focus of this Order and to which the Commission will now turn.

II. AUTHORIZATION TO OPERATE AT FULL POWER

It is apparent from the above discussion that the Commission's action in authorizing full-power operation did no more than culminate the process begun on July 28, 1978, by issuance of the notice of receipt of an operating license application (43 Fed. Reg. at 32,903). That notice had informed all interested persons that the Commission would consider issuance of a full-power operating license if it found that the application, as amended in the review process, complied with the statutory and regulatory requirements. Hence interested persons were on notice that the final license would differ from the original application, and changes to the application did not create new hearing rights.

The Commission, once it determined the regulatory requirements had been met, could, therefore, have granted the application as amended simply by issuing a full-power license. Indeed, issuing a separate full-power license would have been consistent with past Commission practice in this area. For the 2 years following the Three Mile Island accident, the Commission, rather than amending existing low-power licenses, issued separate full-power licenses. However, after several such cases it was decided that there was no need to issue two separate licenses. Accordingly, the Commission for the past few years has simply "amended" the existing license by dropping the low-power limitation and authorizing full-power operation.

In the present case, in accordance with that process, once the review of the application for a full-power license was completed, the Commis-

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[5] Amendments 1-6 to the low-power license were issued prior to the enactment of the notice requirements imposed by the Sholly Amendments of the Atomic Energy Act. In accordance with the practices in effect at the time, since the amendments involved "no significant hazards consideration" they were issued without pre-notice and without regard to whether they were required for low-power or full-power operation.

sion dropped the low-power limitation and authorized full-power operation by "amending" the existing low-power license. However, in neither this case nor any other similar case was there a need for, or an intent to, issue a license amendment as such which might arguably create new hearing rights under § 189. All that was necessary, and all that was intended, was to end the ongoing uncontested proceeding for a full-power license by granting the application, as amended, for that license.

The Commission now recognizes that the prior practice of first issuing a low-power license and then a separate full-power license may have been the better and less confusing practice. While the language of § 189a requires an appropriate notice and opportunity for hearing on an actual amendment to a power reactor operating license, designation of the authorization to operate at full power as a "license amendment" could needlessly create confusion by giving the erroneous impression that new hearing rights were created when full-power operation was authorized. To avoid any such confusion, the Commission has decided to direct the NRC Staff to issue the full-power license for Grand Gulf, Unit 1, as an entirely separate matter from issuance of the low-power license. This should make it clear that the authorization to operate at full power is simply the culmination of the uncontested proceeding begun and noticed in 1978.[6] As a generic matter the Commission intends to develop a policy statement to further clarify the treatment to be given the relationship between low-power and full-power licenses.

The Commission therefore directs the NRC Staff to replace Amendment No. 13 to the low-power license with a separate full-power license containing the same terms and conditions as Amendment 13 and the existing underlying license.[7] The separate full-power license, upon issuance, will supersede the low-power license.

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[6] The same rationale applies to the earlier amendments which were not noticed because they were part of the full-power application. Those amendments are now part of the full-power operating license, however, and hence need not be further addressed.

[7] The Commission, on the same day it issued Amendment No. 13, granted Mississippi Power & Light Company several exemptions from regulatory requirements. 49 Fed. Reg. 35,448 (September 7, 1984). Those exemptions were also granted as part of the review of the initial application for a full-power license. The NRC Staff, having already made the necessary findings justifying the grant of these exemptions, should therefore simply incorporate those exemptions into the full-power license, and issuance of that license will supersede the order granting the exemptions.

The Commission notes in this regard that it recently issued a decision which departed from past Staff practice both with regard to the standards for granting exemptions and the circumstances where exemptions are required. *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), CLI-84-8, 19 NRC 1154 (1984). However, the Commission subsequently stated that the *Shoreham* decision for the near term was only to apply to the particular circumstances of that case, and that the NRC Staff should develop a comprehensive exemption policy as a generic matter. Thus while this generic reexamination is under way, the Staff should continue its practice of granting exemptions only after making the findings required by 10 C.F.R. § 50.12 and documenting the information supporting its determination.

Commissioners Roberts and Zech dissent from this decision. Their dissenting views are attached.

It is so ORDERED.

For the Commission

SAMUEL J. CHILK
Secretary of the Commission

Dated at Washington, D.C.,
this 25th day of October 1984.

DISSENTING VIEWS OF COMMISSIONERS ROBERTS AND ZECH

We have disapproved issuance of this Order only because we view the action that it directs the Staff to take to be totally unnecessary. Issuance of a replacement license that does not alter, in any way, the licensee's authority to operate the facility is to assign greater importance to form than to regulatory substance. There is absolutely nothing involved in this Order which even remotely relates to the protection of the public health and safety.

The full-power operating authorization which was issued on August 31, 1984, was the culmination of the overall licensing action which was initiated by a notice of opportunity for hearing given on July 28, 1978 (43 Fed. Reg. 32,903). Neither JULEP nor any other person sought to invoke in a timely manner the administrative remedies which were provided by that notice.

Issuance of the full-power authorization under these circumstances, regardless of the form of the authorization, did not provide, and need not have provided, an additional opportunity for hearing.

Cite as 20 NRC 1061 (1984) CLI-84-20*

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Nunzio J. Palladino, Chairman

In the Matter of **Docket No. 50-322-OL-4**

LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Station, Unit 1)

September 21, 1984

The Chairman of the NRC, finding that the standards for disqualification have not been met, denies on the merits and as untimely a motion filed by intervenors to the Shoreham licensing proceeding that sought his recusal.

MEMORANDUM

I. INTRODUCTION

On June 5, 1984, counsel for Suffolk County and the State of New York, parties to the Shoreham operating license proceeding, filed a "Request for Recusal and, Alternatively, Motion for Disqualification" in which they alleged improper intervention on my part in the conduct of that proceeding. The request asked that I recuse myself from participating in the Shoreham proceeding. The events which underlie the Suffolk/New York request I described in detail on May 17, 1984, in congressional testimony,[1] a copy of which I appended to my June 20 Memorandum to the Parties, and which I incorporate by reference here. I shall discuss those events further in § II.B of this Memorandum.

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*Decided too late to be published in the September Issuances.

[1] *Hearings Before the Subcomm. on Energy and Environment of the House Comm. on Interior and Insular Affairs*, 98 Cong., 2d Sess., May 17, 1984.

On June 18, 1984, the Applicant, Long Island Lighting Company (LILCO), filed a response to the Suffolk/New York request. On June 20, in my Memorandum to the Parties, I requested the comments of the NRC Staff on the request, and I also stated my decision not to participate in any Commission deliberations on adjudicatory matters in the Shoreham proceeding until such time as I made a decision on the recusal request. The NRC Staff filed its response on July 12, 1984.[2]

I have studied all the filings and have given them careful consideration. I have also had the benefit of the accounts of underlying events provided by Judges Miller, Bright, Johnson and Cotter in their responses to recusal requests. Those responses are part of the public record of this proceeding.

My conclusion is that I see nothing in the filings of the parties, or in the underlying facts, which demonstrates that I should take myself out of the proceeding. I therefore consider it my obligation to resume my adjudicatory functions in this case.

I recognize that I could have decided to recuse myself from this proceeding as a matter of discretion. I cannot deny that the preparation of a detailed response to the recusal request has been a time-consuming burden, at a time when the Commission's health and safety responsibilities have demanded continuing attention. Moreover, it may be argued that to recuse myself would remove the shadow of doubt in some persons' minds about the propriety of the Shoreham proceeding, and perhaps thereby obviate some legal challenges to the ultimate outcome of the proceeding, whatever that outcome may be.

To my mind, such considerations could not justify my recusing myself from this case. First of all, I believe firmly that the responsibilities of a Commissioner are not optional. On the contrary, they are duties owed to the public in thorny and time-consuming cases as well as in easy ones. Indeed, it is in controversial cases in which it is most incumbent on Commissioners to take a stand and make the difficult decisions that are the essence of a Commissioner's job.

Second, once the facts are set forth, and various misstatements of fact in the recusal request are pointed out, as is done in § II.B, I do not believe that a reasonable observer would continue to entertain doubts about my impartiality. Moreover, under the present circumstances, for me to recuse myself would not relieve public doubt but rather increase it, by appearing to give credence to an accusation that aims baseless charges of impropriety not just at me, but also at a variety of licensing

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[2] I have also received the *amicus curiae* brief of the Atomic Industrial Forum.

board judges, NRC Staff members, Commission lawyers, and other public servants, who have earned no such aspersions on their integrity.

Finally, for me to recuse myself would set a precedent that could seriously damage the ability of any NRC Chairman, now or in the future, to stay on top of the Commission's work, to monitor the agency's activities, and assure that the Staff and the Commission discharge their responsibilities in an efficient and timely fashion. My recusal could be seen as support for a position I consider unsound and destructive of the agency's effectiveness — namely, that for a Chairman to exercise the managerial functions mandated under the Energy Reorganization Act and the NRC Reorganization Plan of 1980 is both illegal and improper.

In § II of this Memorandum, I describe my reasons for finding that the Suffolk County/New York State disqualification request fails on its merits to demonstrate that I have committed any impropriety in this proceeding, either in reality or appearance. In § III, I describe my reasons for finding that the disqualification request, in addition to being devoid of merit, is so flagrantly untimely and so barren of any excuse for its untimeliness as to warrant its rejection on that basis as well.

II. SUMMARY AND ANALYSIS OF THE SUFFOLK COUNTY/NEW YORK STATE DISQUALIFICATION REQUEST

The June 5, 1984 disqualification request filed by Suffolk County and New York State bases its claim of impropriety on a number of allegations, strung together into what purports to be a chain of cause and effect. The gist of Suffolk/New York's claim is that as of March 16, 1984, it was entirely settled, as a result of a February 22 Licensing Board decision, that no low-power license could be issued to Shoreham until hearings had been completed on the contentions related to diesel generators. According to Suffolk/New York, I then intervened personally (apparently in response to an approach by LILCO's Chairman) to bring about the following: major violations of the rules against *ex parte* contacts; a complete reversal of position by the NRC Staff on the diesel issue; the replacement of the Licensing Board with a new, more pliant Licensing Board, with "scheduling conflicts" cited as a pretext; and finally, a decision favoring LILCO from the new Licensing Board.

The Suffolk County/New York State filing paints a lurid picture of a large number of public servants, including licensing board judges, the General Counsel and his deputy, and a variety of NRC Staff officials, all seemingly ready and willing at my behest to violate solemn obligations under the law. Read superficially, or by one without knowledge of the facts, the indictment may seem damning indeed; but closer reading, and

a review of the facts, reveal that inaccuracies and misrepresentations permeate the Suffolk/New York filing. It is appropriate, therefore, to look at Suffolk/New York's claims in some detail, for on examination it becomes apparent that the claimed "chain of impropriety"[3] is a fiction, founded on a seriously distorted account of the status of the proceeding as it stood in mid-March 1984.

A. Summary of the Suffolk County/New York State Allegations

The Suffolk County/New York State allegations may be summarized as follows:

(1) that as of March 16, 1984, the issue of the Shoreham TDI diesels had been "settled"[4] by a February 22, 1984 Licensing Board Order holding that litigation of the diesel issue must precede any grant of a license to operate Shoreham at low power; the NRC Staff had taken the "unequivocal position"[5] that the diesel issue had to be resolved prior to any low-power licensing of Shoreham; LILCO "had not appealed from or sought reconsideration of" the Board's February 22 ruling;[6] and "nothing in the public record suggested"[7] that LILCO would propose any other avenue for obtaining a low-power license short of full litigation of the diesel generator issue.

(2) that on February 24, *Newsday* reported that LILCO's Chairman, William J. Catacosinos, had met with the Commissioners; on March 9, in a letter to LILCO shareholders, Dr. Catacosinos stated his belief that "there now seems a greater understanding among federal, state and county officials of the crisis the company faces"; the notes taken by Judge Cotter at the March 16 meeting include the statement "[s]ays will go bankrupt if 12/84 I.D. [Initial Decision of Licensing Board]"; and the "greater understanding" of federal officials to which Dr. Catacosinos referred was thus making itself felt in the March 16 meeting through the office of the NRC Chairman.[8]

(3) that on March 16, 1984, I met with the Executive Director for Operations, the General Counsel, the Deputy General Counsel, the Atomic Safety and Licensing Board Panel Chairman, the Executive Legal Director, other Staff officials, and my own personal staff, and in

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[3] Request at 32.
[4] *Id.* at 4.
[5] *Id.* at 8.
[6] *Id.* at 11.
[7] *Id.* at 14.
[8] *Id.* at 10-11.

violation of the NRC's *ex parte* rules, discussed the merits of the Shoreham licensing proceeding.

(4) that after March 16, I had further discussions with my staff and the Executive Director for Operations on the subject of licensing delays at Shoreham.[9]

(5) that on March 20, 1984, I circulated to the other Commissioners a memorandum which (a) "purported to report"[10] on the March 16 meeting, but failed to mention that ideas for expediting the Shoreham proceeding were discussed; (b) proposed that the Commission consider a proposal, which I had asked the Office of General Counsel to develop, for expedited hearings on the diesel issue or other proposals for low-power operation of Shoreham; (c) included a projected Licensing Board decision date of December 1984 (absent Commission intervention), while failing to report "that the 'delay' estimate for Shoreham was based on LILCO's estimate, not the NRC's, and that the staff disagreed with LILCO's estimate";[11] and (d) specifically requested that the NRC Staff, a party in the Shoreham proceeding, respond to the memorandum and prepare a paper outlining steps to deal with the supposed delays.

(6) that on the same day, March 20, LILCO filed an "unprecedented proposal" making "essentially the same arguments for a low power license that the Brenner Board had previously rejected,"[12] and asking neither for a waiver of, nor an exemption from, General Design Criterion 17.

(7) that on March 22, my legal assistant read to Judge Cotter over the telephone a "working paper," prepared in my office, which dealt with LILCO's March 20 request and inaccurately represented that it was *the Commission's* wish to have the matter litigated and decided by May 9, 1984.[13]

(8) that Judge Cotter responded on the following day, March 23, with a proposed Commission order which: (a) provided for expedited consideration of LILCO's motion and a decision on the merits, and thus "prejudged the very question at issue: whether LILCO's proposal was a challenge to GDC 17 that had to be rejected outright";[14] (b) proposed to replace the Brenner Board, "which on February 22, 1984, had dealt LILCO a setback, . . . four days *before* the Brenner Board advised Judge

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[9] *Id.* at 17.
[10] *Id.* at 15.
[11] *Id.* at 16.
[12] *Id.*
[13] *Id.* at 17-18.
[14] *Id.* at 19.

Cotter that it had a potential schedule conflict due to the judges' involvement in the *Limerick* proceeding";[15] and (c) proposed, in light of LILCO's "enormous financial investment," a schedule for Board action which Judge Cotter himself described as "brutally tight" and "definitely not recommended."[16]

(9) that the NRC Staff responded to LILCO's motion with an "abrupt and *complete reversal*"[17] (emphasis in the original) of its prior position on low-power operation.

(10) that even if Judge Cotter's March 30 appointment of a new Licensing Board (chaired by Judge Miller) to "hear and decide" LILCO's low-power motion was, as claimed, his own idea, that idea was developed at my request, I was informed prior to the appointment, and moreover, Judge Cotter's notes "reveal that there was 'concern' with Judge Brenner" expressed at the March 16 meeting.[18]

(11) that on March 30, the same day that the Miller Licensing Board was established, it "decided to expedite the proceeding"[19] — before it had had time to review the pleadings and the record and make a "reasoned and independent judgment"[20] whether to expedite the proceeding.

(12) that after oral argument on April 4 on the LILCO motion (including argument on the issue of "whether there was a basis to expedite the proceeding"),[21] the Miller Board on April 6 "adopted the position urged by the Staff in its March 30 filing and by Judge Cotter in his March 23 draft order,"[22] by ruling that LILCO could operate Shoreham without onsite power, provided that safety findings suggested by the NRC Staff were made. The Miller Board's April 6 decision (unpublished), according to Suffolk/New York thus "provided the final link in the chain which began at the Chairman's March 16 meeting";[23] moreover, in deciding to expedite consideration of LILCO's motion, it took a position consistent with that of my office's working paper, the Staff, and Judge Cotter's draft order of March 23, and it adopted time frames with a "striking similarity" to those in Judge Cotter's draft order. The foregoing demonstrates, according to Suffolk/New York, that the March 16 meeting was:

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[15] *Id.* (Emphasis in original.)
[16] *Id.*
[17] *Id.* at 22.
[18] *Id.* at 24.
[19] *Id.* at 25.
[20] *Id.*
[21] *Id.* at 27.
[22] *Id.*
[23] *Id.*

[a] planning session to figure out how to get around the lawful rulings of the Brenner Board. Its purpose was improper; its discussion was improper; and the actions of NRC personnel that followed it were improper. Each of these personnel acted as a link in a chain of impropriety that commenced in the Chairman's office on March 16.[24]

B. Analysis of the Suffolk County/New York State Allegations

In the preceding section of this Memorandum, I described in a twelve-paragraph summary the essentials of the assertions and allegations made by Suffolk County and New York State in their disqualification request. In the section which follows, I will use the same format to respond, paragraph by paragraph, to Suffolk/New York's substantially inaccurate account.

(1) Central to the allegations of Suffolk County and the State of New York is their seriously misleading description of the status of the Shoreham proceeding as of March 16. Contrary to their assertions, the Brenner Board's February 22 Order had *not* "settled" the diesel issue; the Staff had *not* declared that resolution of the diesel issue must precede low-power operation; a LILCO low-power proposal was expected by the parties, including Suffolk County, and the Board had *not* foreclosed the grant of a low-power license to Shoreham. As I shall describe below, the Suffolk/New York account is wholly at odds with reality, as reflected in the statements on the public record of Suffolk's own counsel, Judge Brenner, and others.

What the Brenner Board ruled, in its orally delivered Order of February 22, 1984, was that a license based on "reasonable assurance that the TDI diesel generators can reliably be depended upon" was not possible without first litigating contentions related to the diesel generators.[25] The Board's Order (which included responses to clarifying questions posed by counsel), made clear that though operation could not be authorized on the submissions then before the Board, LILCO would not be precluded from filing a proposal for allowing operation under a theory that did not involve reliance on the TDI diesels. Judge Brenner stated that the Board's ruling "would not preclude LILCO from proposing other methods by which LILCO believes the standards of 50.57(c) could be met, short of litigation of Contentions 1, 2, and 3 [the diesel generator

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[24] *Id.* at 32.

[25] Transcript of the Conference of the Parties, February 22, 1984, at 21,617. References to this transcript, which forms part of the record of the operating license proceeding, will hereinafter be indicated by "Tr."

contentions] on the merits. Or possibly seeking some sort of waiver under 2.758 or other procedures." Tr. 21,616.

The Board was emphatic that it was "up to LILCO" to develop and submit such a proposal. Tr. 21,617. With regard to the nature of such a proposal, the Board commented that "while someone could imagine different things in combination, we do not know what is feasible or what LILCO would seek to propose." Tr. 21,617. When LILCO's counsel sought reassurance that "the Board is not foreclosing other ways to low power?" Judge Brenner replied, "[t]hat's right but you are going to have to propose something . . . ." Tr. 21,631. To a further question whether the Board's Order might preclude a particular type of proposal, Judge Brenner replied, "[n]o, it does not preclude anything. It is solely based on what was before us . . . ." Tr. 21,631. Thus it is simply not true that the Brenner Board's February 22 Order had "settled" the issue of the need for an onsite emergency power source, or the schedule for a possible decision on low-power operation.

Likewise, it is flatly inaccurate of Suffolk/New York to claim that "as of February 22, the NRC staff had taken the unequivocal position" that resolution of the diesel issue was necessarily a prerequisite to issuance of a low-power license. The transcript of the February 22, 1984 Conference of the Parties makes clear that while the Staff believed that what LILCO had proposed as of that date was insufficient, it had not ruled out the possibility that LILCO could nevertheless satisfy the regulatory requirements for low-power operation. Staff counsel stated explicitly that it was "quite possible" that "they [LILCO] do not need diesels at all." Tr. 21,513. He added that Staff could not, however, make such determinations until it received a formal submission from LILCO, and that "we want to see what LILCO gives us." *Id.* Staff counsel told that Board that it was "very difficult to answer your questions until we get that submission from LILCO." *Id.* The context makes plain that Staff was fully expecting LILCO to file such a submission.

The Staff was not the only party expecting such a submission from LILCO, and saying so on the public record. Suffolk/New York's claim that "[n]othing in the public record suggested that LILCO would file such a proposal"[26] is belied by the statements on the public record *of Suffolk's own counsel.* At the February 22 Conference of Parties, Mr. Alan Dynner, counsel for Suffolk County, stated:

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[26] Request at 7.

> So what is being asked here, by *LILCO's proposal, which it will apparently — it intends to make sometime in the near future* — to have inadequate diesels for low-power operation.

(Emphasis added.) Tr. 21,521.

Even more striking, in view of Suffolk/New York's condemnation of the procedures followed in this case, is the following statement, also by Mr. Dynner, in the same conference:

> The County's point of view, we would expect that such a proposal by LILCO, if it wishes to make it in the proper context, *would involve a separate proceeding.*

(Emphasis added.) Tr. 21,518.

Moreover, when the LILCO motion was filed, Suffolk County, in its "Preliminary Views on Scheduling Regarding LILCO's New Motion," filed March 26, 1984, noted that the Board's February 22 Order "did not preclude LILCO from later filing a proposal to obtain a low-power license for Shoreham *without* relying upon the EDGs [emergency diesel generators]." (Emphasis in the original.)[27] Suffolk described the motion as "the type of proposal which this Board envisioned to require an entirely separate collateral proceeding."[28] This further underscores that Suffolk foresaw both a LILCO low-power proposal and the need for a separate proceeding.

The Suffolk/New York charges against me are thus based on what the public record shows to be a seriously distorted account of where the proceeding stood on March 16, 1984. The accusation that I intervened in March to alter a "settled" Board decision on operation of Shoreham is belied by a public record which makes clear that already in February, the Board and the parties regarded the question of low-power operation as far from settled. The charge that in March I brought about a "complete reversal" of the Staff's position is belied by a public record which demonstrates that already in February, the Staff was open-minded on the question of low-power operation of Shoreham. The assertion that there was nothing in the public record to suggest that LILCO would seek early approval of low-power operation is belied by a public record which shows that already in February, Suffolk County's own counsel was expecting such a motion to be filed shortly.

Although an understanding of these distortions is sufficient by itself to make the bulk of the charges against me evaporate, I think it important to proceed through a systematic analysis of the rest of the Suffolk/

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[27] "Suffolk County's Preliminary Views on Scheduling Regarding LILCO's New Motion" at 1.
[28] *Id.* at 3.

New York claims, in order to make fully clear that I have committed no improprieties, and that I have in no way prejudged the issues in the Shoreham proceeding.

(2) The Suffolk/New York account of the meeting with Dr. Catacosinos is also misleading. Dr. Catacosinos paid a brief get-acquainted call on all of the Commissioners on February 23. Dr. Catacosinos did not discuss any aspect of the Shoreham proceeding with me, nor did he discuss LILCO's financial difficulties, in our approximately 5-minute conversation.[29]

Suffolk/New York's charge that Dr. Catacosinos' March 9, 1984 letter to LILCO stockholders is evidence that he had influenced me in favor of Shoreham is frivolous. (That letter, according to Suffolk/New York, asserted that "federal, state, and county" officials showed "greater understanding" of LILCO's problems.) Although Suffolk/New York are correct in stating that a February 24, 1984 *Newsday* article reported that Dr. Catacosinos had met with the Commissioners, they omit to mention the title of the article: "Three Senators Offer Measures to Help LILCO Out of Crisis." (The article also described a meeting between Dr. Catacosinos and the Secretary of Energy, and a letter from Dr. Catacosinos to the Secretary of the Treasury, seeking relief from provisions of the tax laws.) Thus at least three "federal officials" (U.S. Senators) were on record as supporting relief for LILCO's financial difficulties, and the inference which Suffolk/New York seek to draw — that the mention of "federal officials" was a reference to me — is without foundation.

Finally, the fact that I was concerned, as I readily acknowledged in my testimony before Congress,[30] lest NRC's failure to make timely decisions be the cause of Shoreham's going under, is hardly evidence of

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[29] In a recent search of my files, responding to a Freedom of Information Act appeal, a followup letter from Dr. Catacosinos was found. I reproduce it in its entirety:

February 28, 1984

Dear Chairman Palladino:

I am writing to express my appreciation for your taking the time to meet with me on Thursday.

As you are aware, the vast majority of LILCO's current problems are related, either directly or indirectly, to the future of our Shoreham Nuclear Power Station.

As I am sure is obvious, our highest priority is to operate a safe, reliable and efficient power station, and to do so as soon as is consistent with appropriate safety considerations.

Sincerely,

/s/ W.J. Catacosinos

I understand that identical letters were received by at least three other Commissioners. I regard this letter as no more than a courtesy note.

[30] Testimony at 5, 11.

improper communications from anyone. LILCO's financial difficulties with Shoreham were common knowledge, discussed in congressional hearings and amply covered in the press.[31] My desire to assure that NRC processes be timely and efficient was not a prejudgment as to what the outcome of the Shoreham proceeding should be.

(3) My March 16, 1984 meeting with the Executive Director for Operations, the General Counsel, the Deputy General Counsel, the Executive Legal Director, Judge Cotter, and others, was a meeting to discuss the licensing status of a number of plants, in advance of a congressional hearing at which I expected to be asked questions about delays in the licensing process.

As I stated in my congressional testimony, the March 16 meeting had its origin in a meeting held the previous day with representatives of the Office of Policy Evaluation (OPE) and the Office of General Counsel (OGC) to discuss potential licensing delays at a number of facilities. At that March 15 meeting, there was a consensus that these delays warranted a broader discussion, to include the Executive Director for Operations and his staff, the General Counsel and his deputy, and the Chairman of the Atomic Safety and Licensing Board Panel.[32] It should be noted that, as I described in my testimony, Congress has repeatedly made clear its disapproval of unwarranted licensing delays, and that, under § 2(b) of NRC Reorganization Plan No. 1 of 1980, the Chairman is the "principal executive officer of the Commission, . . . responsible to the Commission for assuring that the Executive Director for Operations and the staff of the Commission . . . are responsive to the requirements of the Commission in the performance of its functions."[33] Thus to the extent that licensing delays at various plants might be attributable to the NRC Staff's performance of its functions, it was my responsibility to identify deficiencies and see that they were addressed.

At the March 16 meeting, the status of Shoreham was of particular interest to me, since a week before, on March 9, the Executive Director for Operations had informed the Commission that, based on the Licensee's estimates,[34] a licensing delay of 9 months was projected, whereas

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31 The *Newsday* article cited in the Suffolk/New York request is one example. *Three Senators Offer Measures to Help LILCO Out of Crisis*, Feb. 24, 1984.

32 Testimony at 8-9.

33 45 Fed. Reg. 40,561 (1980).

34 The Staff also provides the Commissioners with weekly memoranda on the status of plants under construction in which both licensees' estimated completion dates and the Staff's estimated completion dates are included. The weekly memorandum of March 6, 1984, indicated that the Staff projected a construction completion date for Shoreham 2 months later than LILCO's estimate. Under either estimate, the gap between facility completion and a decision on operation was substantial. The April 24, 1984 memorandum which Suffolk/New York cite was part of this series. All these memoranda were addressed to all Commissioners.

the Commission had informed the Congress as recently as January 25, 1984, also based on the Licensee's estimates, that no licensing delay was projected for Shoreham. (The other plant for which the March 9 memorandum projected a licensing delay was Limerick.)

In the portion of the meeting that dealt with Shoreham, there was no violation of the *ex parte* rules, because there was no discussion of the merits of the issues in controversy; rather, the discussion was of status, scheduling, and of the procedures by which the proceeding might be moved along.

As I stated in my testimony, there was discussion — initiated, I believe, by OGC — of the possibility of holding an expedited hearing on the question of low-power operation of Shoreham. I would note that the Executive Legal Director recalls that he pointed out, during that discussion, that the same Board Chairman who was presiding over the Shoreham operating license proceeding was also presiding over another active case.[35] (That case was Limerick.) It is worth stressing that none of the lawyers present indicated any *ex parte* problems with any part of the discussion.

(4) With regard to further discussions of Shoreham, after the meeting on March 16, I had a number of discussions with my personal staff of the problem of delays at Shoreham and elsewhere. I recall only one conversation, perhaps 2 or 3 minutes long, in which I discussed Shoreham at all with anyone from the NRC Staff. That conversation took place on March 21, after the Executive Director for Operations and I returned from a congressional hearing. Mr. Dircks, Mr. Norman Haller (my Executive Assistant), and I were present. I recall Mr. Dircks commenting, in essence, that the problem of delay at Shoreham was not within the Staff's power to correct, but was now a matter for the Commission and the Boards to resolve. I recall no discussion of the merits of the issues in the proceeding in this very brief exchange.

(5) There is no validity to the suggestion that my March 20 memorandum concealed anything from my fellow Commissioners, or that it presented misleading information of any kind. The memorandum reported to the Commissioners that I had held a status and scheduling meeting on March 16 with the "staff, OGC, OPE, and Tony Cotter" to discuss actual and potential delays at Shoreham, Limerick, and other plants. The memorandum also stated that I had asked the Office of General Counsel to provide a paper to the Commission "soon" on a proposal for expediting the Shoreham proceeding. In context, it was implicit that my request to OGC had been made at the March 16 meeting, and that our

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[35] Joint Affidavit of William J. Dircks and Guy H. Cunningham, III, at 3.

discussion included consideration of how scheduling changes might reduce or avert actual and potential delays. Certainly I did not seek to conceal the substance of the meeting from my colleagues.

Suffolk/New York's claim that my memorandum of March 20 to the other Commissioners failed to report "that the 'delay' estimate for Shoreham was based on LILCO's estimate, not the NRC's, and that the Staff disagreed with LILCO's estimate," is without merit. First, the other Commissioners *already knew* that the 9-month delay estimate came from LILCO, since the estimate appeared in a March 9 memorandum, addressed to all Commissioners, in which the EDO stated explicitly: "Therefore, *based on the applicant's estimate,* there will be a nine-month licensing delay." (Emphasis added.) Likewise, the Staff's April 24 memorandum (discussed in note 34, above) was also addressed to all Commissioners. Thus the suggestion that in my March 20 memorandum I withheld relevant information from my fellow Commissioners is without foundation, since I knew that they were receiving the same Staff memoranda I was receiving.

(6) It is hard to square Suffolk/New York's claim that the LILCO motion made "essentially the same arguments for a low power license that the Brenner Board had previously rejected"[36] with Suffolk's March 26, 1984 filing before the Licensing Board, in which it stated:

> The Motion is a voluminous, new proposal for low power operation of Shoreham, based upon complex technical factual information and *novel legal arguments never before presented to the County or this Board.* (Emphasis added.)[37]

Suffolk County further stated:

> The LILCO Motion obviously is an entirely new and radical change from LILCO's initial application for a low power license.[38]

There is no merit in Suffolk/New York's apparent belief that it is highly significant that the LILCO motion sought neither a waiver under 10 C.F.R. § 2.758 nor an exemption under 10 C.F.R. § 50.12(a), in proposing a legal theory for low-power operation. Suffolk/New York neglect to mention two crucial points. First, it was never assumed by the Brenner Board or the parties that the only pathways LILCO might propose were those two regulations. Suffolk County itself recognized that the LILCO proposal might take any of various forms. Once again, the

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[36] Request at 16.
[37] "Suffolk County's Preliminary Views on Scheduling Regarding LILCO's New Motion" at 2.
[38] *Id.* at 11.

proof of this is to be found in the words of Suffolk's own counsel, who at the February 22 Conference of the Parties said:

> From the County's point of view we can, of course, object to any motion they wish to file for a waiver of regulations, or a change in the FSAR, or waiver of specifications, or a motion to proceed to obtain a low power license on the grounds, as I understand the argument, that diesels which have not been proven to be reliable can nevertheless be used in a low power license because the demands and requirements for public safety may be less.

Tr. 21,517. Judge Brenner's statements in the same Conference of the Parties, cited above under § II.B.1, also indicate that the Board had not decided what procedural form LILCO's motion would be required to take.

Suffolk/New York also fail to mention that the particular legal theory advanced by LILCO was rejected by me and all other Commissioners when we addressed its merits in our Order of May 16, 1984 (CLI-84-8, 19 NRC 1154).

(7) The charge that my legal assistant incorrectly purported to speak for the Commission as a whole, in talking with Judge Cotter, is baseless. When he read the draft "working paper" to Judge Cotter on March 22, he was not purporting to represent the views of the Commission, but rather was seeking to obtain Judge Cotter's reaction to a possible approach that I might propose for Commission consideration. Judge Cotter's public statement of August 1, 1984, confirms that he was under no misapprehension on this point.[39]

(8) With regard to Suffolk/New York's assertions regarding Judge Cotter's draft order of March 23, the following comments are in order:

(a) Judge Cotter's draft order was drafted by him on his own initiative, not mine, and he has discussed it in his response to the request for his disqualification. There is, therefore, no need for me to discuss it in any detail here. I would add, however, that I did not read Judge Cotter's order as prejudging the factual issues (i.e., the safety of the plant if operated as proposed by LILCO) or the legal issue of whether satisfactory resolution of the factual issues would permit a low-power license for Shoreham.

(b) The Suffolk County/New York State request suggests that Judge Cotter could not have learned of the potential scheduling conflict between the Shoreham and Limerick Boards until 4

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[39] Statement of B. Paul Cotter, Jr., at 6.

days after his March 23 draft order; in fact, his awareness of that scheduling conflict appears plainly *in the March 23 document itself*. On page 8, under the heading "Some Considerations," Judge Cotter stated that the Shoreham and Limerick Licensing Boards were among seven Boards "committed to hearings or partial or initial decision writing in April and May." [40]

(c) Again, Judge Cotter is in a better position than I to respond to criticisms of the March 23 draft order, and he has done so in his statement of August 1. I sent the draft order to the Office of General Counsel for its evaluation on March 27. Soon thereafter,[41] Judge Cotter advised my office and OGC that he was considering the appointment of a new board to act on the LILCO motion, in view of the scheduling conflict between the Shoreham and Limerick Boards, and on March 30, a new board was established.

(9) Contrary to the Suffolk/New York assertion, the position taken by the NRC Staff in response to the LILCO motion was not only not an "abrupt and complete reversal" of the Staff's previous position, it was not a reversal at all. What is more, Suffolk counsel knows this. As indicated under (1), above, the Staff told the Licensing Board on February 22 that it would respond to any specific LILCO motion when such a motion was filed, and that it did not rule out the possibility of low-power operation with no diesels available. Suffolk counsel's awareness of the Staff's position is a matter of record. In the Conference of the Parties on February 22, Mr. Dynner, counsel for Suffolk County, referred to the Staff's position:

> We do not know of cases where diesels have been waived or as Mr. Reis [NRC Staff counsel] has said, *where diesels may not even be required at all.* Maybe there are such cases out there and maybe LILCO will cite them when they make their proposal, if they make their proposal. . . . I think our responses will have to wait and see what LILCO comes up with and if they come up with something, we will have our experts look at it and we will be in a position to respond.

(Emphasis added.) Tr. 21,549-50. To this Judge Brenner commented: "You sound a lot like the staff on that answer." Tr. 21,550.

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[40] Judge Cotter, in his August 1 statement, states that he had been monitoring the Shoreham-Limerick scheduling conflict since around September 1983, and had been checking periodically with Judge Brenner, who was Chairman of both boards.

[41] Judge Cotter's statement indicates that he advised my legal assistant of his intention in this regard on March 28, 1984

(10) With regard to Suffolk/New York's assertions regarding Judge Cotter's Order of March 30 (which established a new Licensing Board, empowered to act on LILCO's motion), the following comments are appropriate. Judge Cotter has explained in his August 1 statement that he believed that a failure to act by him would mean the *de facto* denial by the agency of the request for expeditious treatment.[42] It does not appear to me that Judge Cotter's order, which aimed at making it possible for the NRC to act on the motion expeditiously, in any sense prejudged whether the motion should be granted on its merits. Moreover, as noted above, Suffolk County had stated at the February 22 Conference of the Parties its expectation that the LILCO motion would entail a separate proceeding. Tr. 21,518.

The decision to appoint the new board was Judge Cotter's. The idea was not developed at my request, but it was certainly consistent with my view that the Shoreham proceeding should be handled with efficiency and expedition. My office was informed by Judge Cotter of his intent to appoint a new Board, and I see nothing inappropriate about his so informing me.

Finally, I recall no one at any time suggesting that the substance of Judge Brenner's decisions was or should be a reason for creating a new Board. Also, the Executive Legal Director recalls pointing out at the March 16 meeting that the Shoreham licensing proceeding and another active case were both assigned to the same Board Chairman (Judge Brenner).[43]

(11) The fact that the "Notice of Oral Arguments" was issued the same day that the Miller Board was established does not support, as Suffolk County and New York State imply, an inference of improper influence or of prejudgment in favor of an expedited proceeding. As I read the Miller Board's Order of March 30, 1984, it was not, as Suffolk County and New York State claim, a decision to "expedite the proceeding," but rather a decision to receive filings and hear oral argument on issues raised by the motion. Indeed, the title of the order is "Notice of Oral Arguments."

Where a motion requests that a proceeding be expedited, it is no more improper for a board to schedule a prompt oral argument on that motion than it is for a court to schedule prompt argument on a request

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[42] Judge Cotter's statement indicates that he based this judgment on two factors: an expression of doubt by Mr. Reamer of my office that the Commissioners could take action on the LILCO motion sooner than April 5 or April 12, and verification by the Brenner Board that its scheduling commitments made it unable to consider the motion. Statement of B. Paul Cotter, Jr., at 8.

[43] Dircks & Cunningham Affidavit at 3.

for emergency relief. In neither case has the decisionmaker thereby shown a prejudice in favor of the motion itself.

In the present case, one of the issues raised by the motion was the scheduling of any proceeding. Indeed, the County and State concede as much, for they note in their request that one of the issues argued on April 4 was "whether there was a basis to expedite the proceeding."[44]

(12) Contrary to Suffolk/New York's claim, the Miller Board's April 6 Decision was not the product of any "chain of impropriety" instigated by me at the March 16 meeting or elsewhere. It is certainly true that at the March 16 meeting I expressed the view that the Shoreham proceeding should be handled with efficiency and expedition, but I was not prejudging the issues in controversy. My office's working paper was a further expression of my interest in expedition, but again it prejudged nothing.

I had occasion to address the question of prejudgment of the Shoreham proceeding in response to a March 28, 1984 letter from Chairman Edward Markey of the Subcommittee on Oversight and Investigations of the Committee on Interior and Insular Affairs. In that letter, Chairman Markey asserted that my March 20 memorandum had prejudged the merits of the Shoreham proceeding, and urged me to retract my suggestions for expediting the proceeding; otherwise, he said, it was "imperative" that I recuse myself from it altogether.[45] In my reply, dated April 5, I said:

> I have not prejudged the merits of the Shoreham licensing proceeding in any respect, nor does my March 20, 1984 memorandum contain any suggestion that I have prejudged it, in reality or in appearance. My recommendation that the Commission consider options for an expedited hearing on the diesel problem, so that a low power decision might be possible, implies no judgment how the diesel generator problem should be resolved. Moreover, to assume that there will be a resolution of the emergency planning issue says nothing about how that issue might be resolved: the issue could be resolved either in granting or denying the Shoreham license.
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> The Administrative Procedure Act (APA) requires that agency licensing proceedings be conducted both with due regard for the rights of all the parties and completed "within a reasonable time." Since the Commission has supervisory responsibility over all of its adjudications, it is entirely in keeping with the spirit of the APA that I, as Chairman, suggest measures designed to assure that the Commission complies with both these statutory requirements. That is all that my March 20, 1984 memorandum attempts to do.

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[44] Request at 27.

[45] This letter was one of several in which Chairman Markey took exception to particular actions related to the Shoreham proceeding. *See also* Chairman Markey's letters of April 12, April 24, and May 10, 1984.

Finally, it must be pointed out that for Suffolk County and the State of New York, the history described in their request ends on April 6, 1984. This is perhaps understandable, for when the April 6 Order came before me on the merits, on May 16, 1984, I voted to reject its legal holding.

In sum, the theory advanced by the Suffolk County/New York State disqualification request does not hold water. The individual elements of the supposed "chain of impropriety" turn out on examination to be flawed by misstatements, errors, and omissions. Joining them into a "chain" only compounds and magnifies the distortions of fact and interpretation. I do not believe that I committed any impropriety, nor do I believe that a reasonable observer, once acquainted with the actual facts, which are a matter of record, would question my impartiality in this proceeding. Accordingly, I find that the legal standards for recusal from Commission proceedings, which follow the statutory standards, have not been met.[46]

That is not to say that an observer who did not know the facts, and who was not aware of the circumstances, might not be swayed by the mass of allegations in the disqualification request, if that observer were to accept those allegations at face value. But the standard for disqualification is not how artfully a motion can distort the public record; rather, the standard relates to reality, and to the perception of reality by an informed, disinterested, reasonable observer.

I recognize that the argument may be made that merely by filing their request, Suffolk County and the State of New York have created sufficient uncertainty that public concerns for the integrity of the process might suggest my voluntarily recusing myself. I reject that approach. First, I believe any such uncertainty is removed when one examines the actual record. Moreover, the public has an interest in knowing that the decisionmakers who make crucial health and safety decisions are persons of integrity, and that they appreciate the importance of the duties they owe to the public. Under these circumstances, to recuse myself could appear to give credence not only to the charges against me, but also to

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[46] The standard applicable in the federal courts, and applied by the NRC as well, is that a judge shall disqualify himself in any proceeding in which "his impartiality may reasonably be questioned." 28 U.S.C. § 455(a). The courts have made clear that this is an objective standard. One court has said that a judge faced with a disqualification request should consider "how his participation in a given case looks to the average person on the street; . . . disqualification should follow if the reasonable man, were he to know all the circumstances, would harbor doubts about the judge's impartiality." *Potashnick v. Port City Construction Co.*, 609 F.2d 1101 (5th Cir.), *cert. denied*, 449 U.S. 820 (1980). *See also Hall v. Small Business Administration*, 695 F.2d 175 (1983); *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), CLI-82-9, 15 NRC 1363, 1365-67 (1982); *Cinderella Career and Finishing Schools v. FTC*, 425 F.2d 583 (D.C. Cir. 1970).

unwarranted and unfounded accusations directed at a large number of individuals — licensing board judges, NRC Staff members, and other NRC personnel — whom I consider to be persons of dedication and integrity. This I will not do. In my view, the public has every reason for confidence in the integrity and devotion to duty under the law of the men and women who make the decisions affecting the public's health and safety in the field of nuclear energy.

For the reasons stated above, I decline to recuse myself from this proceeding.

III. TIMELINESS

In the preceding section of this memorandum, I have explained my reasons for determining that the allegations in the Suffolk County/New York State request do not, on their merits, warrant my recusal from the Shoreham proceeding. Although it is therefore not strictly necessary for the disposition of this request that I go on to consider whether the request was timely, I do so because I strongly believe that the issue deserves public airing. For in my view, the timing of the Suffolk/New York request regrettably presents all too vivid an example of the type of problems which Congress and the courts have sought to prevent through the requirement that recusal requests be timely filed.

The recusal request before me was submitted on June 5, 1984, by counsel for Suffolk County and the Governor of New York. It was presented as a formal filing in the Shoreham adjudication, and as such, was served on all the parties. Once it was filed, I withdrew temporarily from Commission deliberations and decisions concerning Shoreham. Under the circumstances, I thought it appropriate that I address and resolve the question of my recusal before participating in further Commission consideration of Shoreham-related matters.[47]

The Suffolk County/New York State request came 55 days after the Suffolk County Executive, Peter F. Cohalan, wrote to me on April 11, 1984, to protest what he termed my "personal intervention in the Shoreham licensing proceeding," which in his view had resulted in a "mockery of due process." It is worth examining that letter in some detail, since in virtually every particular — save only the request for my recusal or disqualification — it prefigures the formal recusal request which came

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[47] *See* my Memorandum to the Parties, June 19, 1984. In the interval between the filing of the recusal request and the issuance of that Memorandum, I abstained from participating in the only Shoreham-related matter to come before the Commission. *See* unpublished Order of June 8, 1984 (separate statement).

55 days later. Mr. Cohalan's letter cited, among other things: my March 20 memorandum to the Commissioners on licensing delays; my March 16 meeting with NRC Staff members, Judge Cotter, and others; Judge Cotter's Order of March 30, establishing a new Licensing Board under Judge Miller; the April 6 Order of the Miller Board; the alleged change of position on the diesel issue by the NRC Staff; my meeting with the LILCO Board Chairman; and my purported intent to "aid LILCO's efforts to gain access to Wall Street money markets."

Mr. Cohalan characterized my actions in the following terms:

> Mr. Chairman, the inevitable inference to be drawn from these events is that your meeting with LILCO's Board Chairman, your expression of interest to "expedite" the Shoreham proceeding when meeting with Mr. Cotter and the NRC Staff on March 16, and your March 20 memorandum proposing "expedited" treatment of LILCO's low power license request signalled the Licensing Board Judges and the Staff to shift gears; they were now to rush forward and issue a low power license for Shoreham, despite the effect this would have on the concerns for safety expressed by Suffolk County and New York State. The Licensing Board and Staff, in turn, took your signal as a marching order. And without any justification, they "expedited" the Shoreham proceeding so faithfully that the Board is now poised to issue a low power license for Shoreham. . . .

Mr. Cohalan's letter, which was not served by him on the parties to the Shoreham proceeding,[48] did not request my recusal or disqualification; rather, it requested that I and my fellow Commissioners take action to disestablish the Miller Licensing Board, and to direct the Staff and the Licensing Board that the Shoreham proceeding should *not* be expedited except under specified circumstances.

I do not find any substantial difference between the allegations in the June 5 recusal request and those in Mr. Cohalan's letter, sent 55 days earlier. To be sure, the June 5 request includes references to a few documents, notably Judge Cotter's notes, which were not in the possession of Suffolk County and New York State in early April. But even if one were to accept the Suffolk County/New York State interpretation of those documents (which interpretation I reject), they would serve merely to support the same allegations, about the same events, which Mr. Cohalan had made in his April 11 letter.

There can be no doubt that the attorneys for Suffolk County and New York State had obtained by April all the information they needed to form the basis of a disqualification motion, since on April 23, they asked

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[48] In accordance with procedures for handling *ex parte* communications, the letter was placed in the Shoreham docket file and served on the parties by the NRC's Docketing and Service Branch.

the United States District Court for the District of Columbia to disqualify me, as well as Judges Miller, Bright, Johnson, and Cotter, from the Shoreham proceeding.[49] In their amended complaint, filed April 26, 1984, they made essentially the same allegations contained in Mr. Cohalan's letter of April 11. In its response, the NRC pointed out that although the Commission's regulations explicitly provide for the filing of disqualification motions (at 10 C.F.R. § 2.704(c)), Suffolk County and the State of New York had not even attempted to invoke the prescribed procedure.[50]

Despite having the correct procedural course pointed out to them by this NRC filing, counsel for Suffolk County and the State of New York continued to stay their hand. Meanwhile, the Deputy County Executive of Suffolk County, Frank R. Jones, wrote to the Commissioners on April 27, renewing the April 11 request and adding a request for the disqualification (or alternatively, the voluntary recusal) of Judges Miller, Bright, Johnson, and Cotter, and of me.[51] The letter, which urged promptness on the Commission "in the strongest possible terms," stated: "As a follow-up to this request, on which the County urges prompt Commission action, the County's counsel have been instructed to serve on the named individuals additional *formal* papers." (Emphasis added).

It thus appears that counsel's delay in filing the disqualification request — a delay for which no explanation has even been offered — was more than mere dawdling. It seems also to have been contrary to the instructions of Suffolk County officials, who recognized that additional formal filings by counsel were required. Not until almost 6 weeks after the date of Mr. Jones' letter was the formal request for my disqualification filed; almost 8 weeks passed before the disqualification of Judges Miller, Bright, Johnson, and Cotter was requested.

It is well established in the case law on the timeliness of disqualification motions that such requests must be filed at the earliest moment after the moving party obtains knowledge of the facts demonstrating a basis for disqualification. *United States v. Patrick*, 542 F.2d 381, 390 (7th Cir. 1976), *cert. denied*, 430 U.S. 931 (1977); *Duffield v. Charleston Area Medical Center*, 503 F.2d 512, 515-16 (4th Cir. 1974).

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[49] *Cuomo v. NRC*, Civil Action No. 84-1264. The court's temporary restraining order, issued April 25, 1984, hinged on scheduling matters, and did not address the disqualification request.

[50] Memorandum in Support of Defendants' Motion to Dismiss the Complaint (April 27, 1984), at 15 n.1.

[51] Copies of this letter, unlike the April 11 letter, were sent by Suffolk County to the other parties to the proceeding.

In assessing whether a disqualification request is timely, reviewing courts look not only at the period of time which elapsed between the receipt of the underlying information and the filing of the request; they also consider what if anything was going on during that period in the trial or administrative proceeding at issue. Where trial has not begun, or is in abeyance, a lengthy delay in filing may do little or no practical harm, but where a proceeding is actively under way, with issues actually being decided by the decisionmaker whose participation is challenged, even a short delay may be destructive.

Courts are most disposed to find a disqualification motion untimely when it appears that the moving party obtained the information forming the basis for its motion but then held back while it speculated on whether the decisionmaker was likely to decide the case in its favor. This is especially true where the moving party has filed motions with the court or agency that gave it the opportunity to "sampl[e] the temper of the court before deciding whether or not to file" a claim of bias.[52] *Peckham v. Ronrico Corp.*, 288 F.2d 841, 843 (1st Cir. 1961). As the U.S. Court of Appeals for the Third Circuit wrote in *Smith v. Danyo, 585 F.2d 83 (1978)*:

> The judicial process can hardly tolerate the practice of a litigant with knowledge of circumstances suggesting possible bias or prejudice holding back, while calling upon the court for hopefully favorable rulings, and then seeking recusal when they are not forthcoming.

585 F.2d at 86.

In such situations, requiring timeliness is not mere procedural nitpicking. On the contrary, it is a matter of preserving the integrity of the adjudication. Without watchfulness on the part of courts and agencies, cynical litigants could use disqualification motions to manipulate the outcome of the judicial or administrative process. As one court has put it:

> It may be said, of course, that it is inconsistent with the interests of justice in most cases to reject any motion purely on the basis of procedural technicalities. But our courts have long recognized that in this sensitive area of claimed partiality on the part of a Judge, strict construction of the statutory provisions is essential to prevent abuse and to insure the orderly functioning of the judicial system.

Bumpus v. Uniroyal Tire Co., 385 F. Supp. 711, 713 (1974).

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[52] Courts also scrutinize carefully any claim by a moving party that the motion's untimeliness should be excused because evidence forming the basis of the motion developed cumulatively. In such cases, courts will be particularly strict in assuring that the motion was filed at the earliest possible moment after the necessary information was obtained. *Duplan Corp. v. Deering Milliken, Inc.*, 400 F. Supp. 497, 510 (1975).

The tardiness of Suffolk County and the State of New York in filing their disqualification motion might be more excusable if the proceeding had been in an inactive phase during the 55-day period from Mr. Cohalan's letter of April 11 to the June 5 date of the motion. This was hardly the case. On the contrary, during that period Shoreham was the subject of intense activity before the Commission. Between those dates, the Commission met thirteen times to discuss the Shoreham proceeding. No other single topic was the subject of so many meetings during that period.

Those meetings included: an April 23 discussion, lasting almost 3 hours, of whether the Licensing Board's disposition of substantive and procedural issues in the low-power proceeding warranted involvement at that time by the Commissioners; discussions on April 26 and April 27 of a proposed Commission order in the proceeding; an April 30 meeting to affirm such an order; oral argument before the Commission on May 7, involving both substantive and procedural issues; Commission discussions on May 9 and 10 of the issues which had been in dispute at the May 7 argument; two meetings on May 10 and a third on May 16 to review a draft Commission order addressing those issues; a May 16 meeting to affirm the order; a discussion on May 22 of substantive issues certified to the Commission by the Appeal Board; and on May 31, a meeting to affirm a Commission order on those certified questions.

All of those thirteen meetings involved, directly or indirectly, consideration of views and proposals submitted by Suffolk County and the State of New York. The most striking example is the oral argument held before the Commission on May 7, 1984.[53] At oral argument, the substantive legal issue of the applicability of the General Design Criteria to LILCO's proposal to operate Shoreham at low power was central; procedural issues (notably the scheduling issue, which is at the heart of the disqualification motion) were also addressed by the parties.

One might imagine that Suffolk County and the State of New York would have been reluctant to have these crucially important issues argued before, and adjudicated by, a decisionmaker whom they considered to be biased against them. Yet the formal objection to my participation remained in counsel's hip pocket. In their 42-page pre-argument submission, dated May 4, 1984, Suffolk County and the State of New York did not even mention the issue of my disqualification, although that filing did state Suffolk County's view that Judges Miller, Bright, and Johnson should be replaced in the event that further hearings were

[53] The Order setting forth the issues for decision and scheduling the oral argument was issued on April 30, 1984.

ordered. At oral argument, counsel for Suffolk County and the State said not a word on the subject of my disqualification or recusal. Nor did the County or the State mention the issue in their joint supplemental filing, submitted on May 10, 1984. Only after the Commission issued its decision,[54] by a 3-2 vote in which I formed part of the majority on the question of whether to disestablish the Miller Board, did the County and the State see fit to revive the issue, and at last bring their accusations of impropriety into the adjudicatory proceeding.

With the proceeding in so active a phase, and with Commissioners meeting so frequently on issues in dispute, it was especially essential for the County and the State to file their disqualification request expeditiously. As I mentioned earlier, when the formal request for my disqualification or recusal finally arrived, I withdrew from consideration of adjudicatory matters related to Shoreham pending my decision on the request. If, as early as April, Suffolk County and the State of New York sincerely believed my conduct to have been so improper as to destroy the procedural integrity of this proceeding, then it is beyond my comprehension that for almost 2 months, they should have permitted me to participate in meeting after meeting, deliberation after deliberation, and decision after decision, when at any time they could have brought the disqualification issue to a head through a single filing.

Under these circumstances, I find the Suffolk County/New York State request to be untimely, and seriously so. To do otherwise would be a disservice to the Commission and its processes, since it would serve notice on litigants that the Commission's processes may be abused with impunity. I feel a strong institutional concern — as opposed to accusations against me personally, which "go with the territory" — to assure that untimely disqualification motions do not become a device for manipulating the NRC's adjudicatory process.

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[54] CLI-84-8, *supra*.

IV. CONCLUSION

For the reasons set forth in this memorandum, the request for recusal is DENIED.

NUNZIO J. PALLADINO
Chairman

Dated at Washington, D.C.,
this 21st day of September 1984.

Atomic Safety and Licensing Appeal Boards Issuances

ATOMIC SAFETY AND LICENSING APPEAL PANEL

Alan S. Rosenthal, Chairman
Dr. W. Reed Johnson
Thomas S. Moore
Christine N. Kohl
Gary J. Edles
Dr. Reginald L. Gotchy
Howard A. Wilber

APPEAL BOARDS

Cite as 20 NRC 1087 (1984) ALAB-786

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

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

In the Matter of **Docket No. 50-382-OL**

LOUISIANA POWER & LIGHT COMPANY
(Waterford Steam Electric Station, Unit 3)

October 2, 1984

The Appeal Board defers ruling on intervenors' motion to reopen the record on the issue of the adequacy of safety-related concrete construction at Waterford, pending receipt of certain information that it requests from the NRC staff.

RULES OF PRACTICE: REOPENING OF RECORD

A successful motion to reopen the record of an adjudicatory proceeding must be timely, address a significant safety or environmental issue, and show that a different result might have been reached had the newly proffered material been considered initially. It must also present more than bare allegations. *Louisiana Power & Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-753, 18 NRC 1321, 1324-25 (1983).

RULES OF PRACTICE: REOPENING OF RECORD

A newspaper article alone does not provide a basis for reopening a closed adjudicatory record. *Id.* at 1324-25.

RULES OF PRACTICE: REOPENING OF RECORD

At a minimum, new material in support of a motion to reopen a closed record must be set forth with a degree of particularity in excess of the basis and specificity requirements contained in 10 C.F.R. 2.714(b) for admissible contentions. Such supporting information must be more than mere allegations; it must be tantamount to evidence. And, if such evidence is to affect materially the previous decision, it must possess the attributes set forth in 10 C.F.R. 2.743(c) defining admissible evidence for adjudicatory proceedings (i.e., it must be relevant, material, and reliable). *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-775, 19 NRC 1361, 1366-67 (1984). *See also id.* at 1367 n.18.

RULES OF PRACTICE: REOPENING OF RECORD (BURDEN OF PROOF)

The burden of satisfying the requirements for reopening a closed record is on the proponent of the motion and is a "heavy" one. *Kansas Gas and Electric Co.* (Wolf Creek Generating Station, Unit No. 1), ALAB-462, 7 NRC 320, 338 (1978).

BOARD NOTIFICATION: RESPONSIBILITIES OF STAFF

At a minimum, the staff has a duty to submit to an adjudicatory board by way of a Board Notification any information that is clearly relevant to a matter pending before the board. Such notification should be timely and include a discussion of its relevance.

RULES OF PRACTICE: STAFF WITNESSES (ASSIGNMENT)

As a general matter, the NRC's Executive Director for Operations determines which staff personnel testify at hearings. *See* 10 C.F.R. § 2.720(h)(2)(i).

APPEARANCES

Carole H. Burstein, New Orleans, Louisiana, for Joint Intervenors Oystershell Alliance and Save Our Wetlands, Inc.

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

Sherwin E. Turk for the Nuclear Regulatory Commission staff.

MEMORANDUM AND ORDER

Last December in ALAB-753, 18 NRC 1321 (1983), we denied Joint Intervenors' motion to reopen the record in this operating license proceeding on their original Contention 22 concerning safety-related concrete construction at Waterford.[1] Joint Intervenors had claimed that hairline cracks and associated water seepage in the concrete basemat on which Waterford is built, discovered in May 1983, raised questions about the integrity of the plant's design and safe operation of the facility. After review of several reports and analyses submitted by applicant Louisiana Power & Light Company (LP&L)[2] and the NRC staff, we concluded that "the cracking and related moisture do not now present a significant safety concern respecting the integrity of the foundation mat at Waterford 3." *Id.* at 1328 (footnote omitted). We went on, however, to endorse the staff's recommendation of "a surveillance program to assure the continued validity of this conclusion." *Ibid.*

Several days after issuing ALAB-753, we received Joint Intervenors' "Amended and Supplemental Motion to Reopen Contention 22."[3] LP&L and the staff oppose the motion. As explained below, we are unable to dispose of this motion on the basis of the material now before us. Hence, we defer our ruling, pending receipt of additional information we request from the staff.

1. We explained in ALAB-753 that a successful motion to reopen must be timely and address a significant safety or environmental issue. It must also show that a different result might have been reached had the newly proffered material been considered initially. We stressed as well the need for more than bare allegations, and we observed that a

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[1] At the same time we dismissed another motion for lack of jurisdiction and completed our sua sponte review of the Licensing Board's partial initial decision on the adequacy of applicant's emergency planning brochure, LBP-83-27, 17 NRC 949 (1983). In an earlier decision, we resolved all issues raised on appeal from the Licensing Board's principal decision in this proceeding. *See* ALAB-732, 17 NRC 1076 (1983).

[2] Specifically, two reports by Harstead Engineering Associates, Inc.: Harstead Report No. 8304-1 (Sept. 19, 1983) and Report No. 8304-2 (Oct. 12, 1983).

[3] Apparently this motion, filed December 12, 1983, and ALAB-753, issued December 9, crossed in the mail. No party contests our jurisdiction to decide the December 12 motion.

newspaper article alone does not provide a basis for reopening a closed adjudicatory record. *Id.* at 1324-25.[4] The burden of satisfying these requirements is on the proponent of a motion to reopen and it is a "heavy" one. *Kansas Gas and Electric Co.* (Wolf Creek Generating Station, Unit No. 1), ALAB-462, 7 NRC 320, 338 (1978).

There is little doubt that Joint Intervenors' motion itself fails to meet this standard. The entire pleading consists of one paragraph, in which Joint Intervenors allege that the applicant and staff studies on the basemat cracking "rely on falsified documents." Joint Intervenors merely direct our attention to an attached article from the December 10, 1983, edition of *Gambit* (a New Orleans weekly newspaper) as providing support for their charge. We recognize that the motion, as filed, was intended as a supplement to Joint Intervenors' earlier motion on basemat cracking, which, presumably unbeknown to Joint Intervenors, had already been denied. *See* note 3, *supra*. We thus construe the pleading generously and do not expect it to stand fully on its own. But even viewed as a supplementary filing, the motion lacks an explanation of the safety significance of the attached *Gambit* article. It is simply served up to us as res ipsa loquitur.

The article, however, does not speak for itself. It contains ostensibly serious charges but very little else in the way of specifics. For instance, the article begins with a reference to "massive deficiencies in records detailing potential flaws in the construction of the foundation." Ridenhour, *Records Inspections Blocked at Waterford III*, Gambit, Dec. 10, 1983, at 21 (hereafter *Gambit*). It then lists the categories of record keeping irregularities: missing documents, some of which have been replaced by "phony" documents; other documents that have been altered; "possible forged signatures" on safety inspections of, primarily, cadwelds;[5] the absence of proper certification for numerous construction inspectors; and failures to follow approved procedures and criteria for accepting completed work. *Id.* at 22. *Gambit* claims that "[s]ome or all of these deficiencies were found in nearly every records 'package' " — namely, those involving the compaction of the soil and crushed shell

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[4] We subsequently addressed this matter further in another proceeding:

> At a minimum, therefore, the new material in support of a motion to reopen must be set forth with a degree of particularity in excess of the basis and specificity requirements contained in 10 C.F.R. 2.714(b) for admissible contentions. Such supporting information must be more than mere allegations; it must be tantamount to evidence. And, if such evidence is to affect materially the previous decision (as required by the Commission), it must possess the attributes set forth in 10 C.F.R. 2.743(c) defining admissible evidence for adjudicatory proceedings. Specifically, the new evidence supporting the motion must be "relevant, material, and reliable."

Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-775, 19 NRC 1361, 1366-67 (1984) (footnote omitted). *See also id.* at 1367 n.18.

[5] A cadweld is a splice between two pieces of the reinforcing steel bars found within concrete.

base, placement of waterstops, cadwelds, and concrete pouring. *Ibid.* The article identifies its two principal sources, both former supervisors of the records review team of Ebasco Services Incorporated (Waterford's architect-engineer), and notes the opinion of one that "Waterford's problems are worse than those he saw" at Zimmer, a (now-terminated) nuclear plant in Ohio plagued by quality assurance deficiencies. *Ibid.*

The article goes on at length to repeat these charges again and again in several sidebars, but conveys virtually no more specific information that would permit a realistic appraisal of the safety significance of such record keeping irregularities.[6] Nor does the article's repetition make true the broader allegation of a connection between the basemat cracking and the documentation deficiencies. We highlight this not as journalistic criticism but by way of an elucidation of what Joint Intervenors' motion to reopen lacks. To be sure, as did an earlier *Gambit* report, the December 10 article "suggest[s] a basis for further inquiry." ALAB-753, *supra*, 18 NRC at 1325. Joint Intervenors themselves should have at least attempted such a pursuit in order to supply the necessary foundation for their motion.

Thus, if we had nothing more before us than Joint Intervenors' motion and convincing replies in opposition, we would likely be compelled to find that the request to reopen does not raise a significant safety issue and thus would deny the motion. This case, however, presents the unusual (if not unique) situation where the material filed in opposition to a motion to reopen raises more questions than it answers. Specifically, the staff's reply, in conjunction with other recent staff statements and action concerning Waterford, precludes us from determining whether a significant safety issue inheres in Joint Intervenors' motion. Our dilemma can be resolved, we think, by deferring our ruling on the motion and seeking supplementary and clarifying information from the staff.[7]

2. The staff's answer to Joint Intervenors' motion is extremely tentative and conditional. Although it urges us to deny the motion, it concludes:

> In sum, the civil/structural allegation review team has identified certain items relating to the base mat as *having potential safety significance*, and *further efforts on the part of the Applicant are required to satisfactorily resolve* these matters. However, the Staff

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[6] E.g., the location of the cadwelds that have inspection reports with "forged" signatures.

[7] In view of the seven additional months the staff required to produce its reply to Joint Intervenors' motion, we take this step reluctantly — recognizing, however, that it presents the only satisfactory way of proceeding at this point.

> believes that to the extent that these items relate to the base mat, they are *likely to be resolved* in a satisfactory manner and will not be found to have any safety significance; accordingly, these items are considered to be confirmatory in nature. Further, *subject to the satisfactory resolution of these items*, the Staff believes that the manner in which the base mat was constructed has not rendered the design assumptions invalid. *Pending satisfactory completion of these items*, the civil/structural allegation review team has concluded that the issues which it reviewed concerning the foundation base mat do not raise a significant safety or environmental issue.

NRC Staff's Answer (Aug. 7, 1984) at 5-6 (citations and footnotes omitted; emphasis added). *See id.*, Affidavit of Robert E. Shewmaker at 13-15. The staff's conclusions concerning the review of the basemat *design* (as opposed to construction) are similarly tentative. *See id.* at 6-7. We are unable to decide an adjudicatory matter on the basis of such speculative statements.

A number of inconsistencies and discrepancies in the various documents submitted to us in connection with Joint Intervenors' motion further illustrate the problem. Foremost are the staff's conflicting statements on the alleged irregularities in inspector certification records. In a recent letter to LP&L, the staff stated that it had found that four of the five inspectors from the firm responsible for Waterford's concrete construction (J.A. Jones) "failed to meet the applicable certification requirements related to relevant experience." Noting that this involved "safety-related activities," the staff found that "the fact that [the inspectors] may not have been qualified to perform such inspections, renders the quality of the inspected construction activities as indeterminant [sic]." Accordingly, the staff requested LP&L to review its records and to demonstrate either the qualifications of each such inspector or the impact on safety of such inspector's work. Letter from D.G. Eisenhut to J.M. Cain (June 13, 1984), Enclosure at 7-8 (hereafter "Eisenhut Letter").[8] But in its filing before us, the staff states that "this situation

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[8] This important document was provided to us by letter from staff counsel, dated June 15, 1984. While we appreciate counsel's efforts, this is precisely the sort of information that the staff itself should have submitted to us promptly and directly by way of a Board Notification. We are at a loss to understand why we were not thus served (as were the parties to this proceeding) with a document so clearly relevant to the matter pending before us. While in some instances there may be legitimate dispute as to the need and propriety of invoking the Board Notification procedure, this is not one of them.

LP&L is expected to provide the staff with responses to the 23 areas of concern addressed in the Eisenhut Letter. By our comments here on Board Notifications, it should be clear that we expect the staff to apprise us of any information it receives that is relevant to the basemat issue before us. We note, in this regard, our receipt on September 28, 1984, of Board Notification No. BN-84-158 (Sept. 26, 1984). This Board Notification consists solely of a 171-page transcript of an August 17, 1984, meeting between the staff and LP&L (and accompanying viewgraphs) concerning the 23 matters raised in the Eisenhut Letter. We view BN-84-158 as both untimely and wholly unsatisfactory in content. Provision of this transcript without any summary or discussion of its relevance to the specific matters pending before us is on the same footing as Joint Intervenors' submission of the *Gambit* article without benefit of any explanation. *See* pp. 1090-91, *supra*.

cannot be associated with any specific item of safety significance" and does "not appear to have had any impact on the quality of the base mat." Staff's Answer, *supra*, Shewmaker Affidavit at 12. The quality of safety-related construction cannot be *both* indeterminate *and* lacking in safety significance. It is incumbent on the staff to clarify its position.[9]

A similar inconsistency is apparent in the staff's position(s) on the soil backfill at Waterford. The Eisenhut Letter states that the records for the in-place density test of backfill in Area 5 are missing. It characterizes these documents as "important because the seismic response of the plant is a function of the soil densities." It therefore directs LP&L to review all soil package records "for completeness and technical adequacy" and, where records are missing, to verify by testing and analysis that soil conditions do not impair the structural capability of the plant under seismic loads. Eisenhut Letter, *supra*, at 6. In its filing with us, the staff acknowledges that the matter of these missing soil backfill documents "leaves open a question as to the adequacy of backfill placement and compaction." Nonetheless, it states that it "does not believe that the fact that soil records are missing will have any impact on plant safety, due to the limited soil volumes involved and the absence of any reason to believe that compaction results were obtained in those areas which were significantly different from the compaction results reflected in other records." Staff's Answer, *supra*, Shewmaker Affidavit at 11. No mention is made of the records' importance for the plant's seismic response capability, stressed in the Eisenhut Letter. *See id.*, Shewmaker Affidavit at 13-15.[10]

Other parts of the material presented to us and relied on by the staff raise unanswered questions. For example, according to the BNL Review (*see* note 10, *supra*), the basemat cracking discovered in May 1983 "is

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[9] The integrity of the concrete inspection program is, of course, critical to the quality assurance program and safety of the facility. That this is so is evident from the report of the staff's principal consultant on Waterford's concrete construction, Robert E. Philleo, which relies on "the high degree of inspection on the project." Memorandum from L.C. Shao to D. Crutchfield (May 21, 1984), Enclosure at 2 (hereafter "Philleo Evaluation") (attached to NRC Staff's Motion for Additional Extension of Time (June 14, 1984)).

[10] On a related point, the staff asked the Brookhaven National Laboratory (BNL) to perform a structural analysis of the Waterford basemat. BNL's overall conclusion is that the safety margins in the design of the basemat are adequate. It recommends, however, that the analyses in several areas be refined. Included are the (i) dynamic coupling between the reactor building and the basemat for seismic stresses resulting from the vertical earthquake input, and (ii) the dynamic effects of lateral soil/water loadings. BNL "Review of Waterford III Basemat Analysis" (July 18, 1984) at 14-17, 27 (hereafter "BNL Review"). The staff agrees with BNL's recommendations but believes that such "confirmatory" analyses need not be completed until restart following the first refueling outage at the facility. The staff is satisfied with this schedule because BNL's experts believe the additional analyses are not likely to change significantly the existing results. Staff's Answer, *supra*, Affidavit of James P. Knight at 21-23. But because some "important" documentation on backfill relevant to seismic response is missing, we question whether BNL's and the staff's temporary satisfaction with existing analyses is well-founded. Further, we wonder whether the refined analyses can be performed without the missing information.

most probably caused by dead loads acting on elements already cracked due to normal thermal and shrinkage effects." BNL Review, *supra*, at 12. These cracks "would be expected to have occurred after construction of the superstructure, but before placement of the backfill." *Id.* at 11. In reaching this conclusion, BNL disagrees somewhat with the earlier analysis of the Harstead Reports (*see* note 2, *supra*), which attributed the cracking solely to " 'benign' " factors, like shrinkage, differential soil settlement, and temperature changes. *Id.* at 3, 4. *See* ALAB-753, *supra*, 18 NRC at 1326-28. The staff has reviewed BNL's conclusion and embraces it as a "reasonable explanation of the cracking that has been observed in the base mat." Staff's Answer, *supra*, Knight Affidavit at 11. What neither BNL nor the staff explains, however, is why the cracks were not discovered before May 1983. Assuming that the backfill has been in place for some time,[11] the cracking as explained by BNL's analysis should have been wider and therefore more evident prior to placement of the backfill.

The staff's presentation to us also reveals possible gaps in its overall consideration of the allegations raised by Joint Intervenors' motion and the *Gambit* article. None of the affidavits attached to the staff's reply to the motion and none of the other documents previously submitted to us reflect that the staff interviewed the two primary sources for the *Gambit* article. *See* p. 1091, *supra*. After the staff completed its review of, for example, the cadweld records, one would expect the staff to have made some contact with at least one of the individuals identified in the article for the purpose of determining if the information uncovered by the staff fully addresses the individual's expressed concern.[12] Perhaps the staff did so, but it has not informed us of that fact.

Nor has the staff informed us of the current views of the two individuals (Drs. John S. Ma and Raman Pichumani) upon whose affidavits it relied in opposing Joint Intervenors' first motion to reopen on basemat cracking. *See* ALAB-753, *supra*, 18 NRC at 1327-28. The staff makes passing reference to their original views and notes that new information subsequently came to light that required further evaluation. Staff's Answer, *supra*, Knight Affidavit at 2-6. It is reasonable to expect some

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[11] Our assumption may well be invalid. The BNL Review (at 11) simply refers to "a period before dewatering was stopped and before the backfill was placed when a substantial portion of the superstructure was in place," but does not give a date. We would expect, however, the backfill to have been placed at least several years ago.

[12] One such pertinent inquiry would be whether the various "nonconformance reports" reviewed by the staff (and LP&L and its consultants) reflect all of the irregularities alleged by the *Gambit* sources.

statement from Drs. Ma and Pichumani as to what effect, if any, that further evaluation has on the position they espoused earlier.[13]

Similarly, the current views of the staff's independent concrete consultant, Robert E. Philleo, would be useful. As stated above at note 9, the staff submitted Mr. Philleo's evaluation of the adequacy of the basemat's construction in June 1984. Since then, nondestructive testing (NDT) of the basemat has been performed and the preliminary results obtained. The staff requested its other consultant, BNL, to reevaluate its earlier analysis on the basis of the NDT results. Staff's Answer, *supra*, Affidavit of Morris Reich, et al. The staff should do likewise with regard to the Philleo Evaluation, especially inasmuch as the staff relies on Mr. Philleo's earlier, pre-NDT conclusions. *See id.*, Shewmaker Affidavit at 9-10.

We also note an apparent discrepancy in the analysis submitted as an attachment to Applicant's Answer to Joint Intervenors' Amended and Supplemental Motion (Jan. 13, 1984). Appendix II to Report No. 8304-3 (Jan. 9, 1984), prepared by Harstead Engineering Associates (*see* note 2, *supra*), contains information about cadweld tensile strength tests. Cadweld No. 2W120 is shown as located in concrete production (or pour) area 16. But according to Appendix I of the same document (at C-6), area 16 contains *no* cadwelds.[14] This discrepancy may be insignificant or in the nature of a typographical error; or perhaps we have misread the document. But given that the allegations before us concern record keeping irregularities and their possible effect on basemat integrity, we believe it is important that any such discrepancies be accounted for to the maximum extent possible. We thus request the staff to review this matter and to determine if the discrepancy noted is indicative of broader problems with the reliability of the data supplied to Harstead by LP&L's contractors.

3. The staff should provide us with its responses to our inquiries and any other relevant information[15] by no later than *November 14, 1984*. We recognize that the staff's review in some of these areas is ongoing, but we believe six weeks is an adequate time for this response. If it is

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[13] We recognize that, as a general matter, the NRC's Executive Director for Operations (EDO) determines which staff personnel testify at hearings. *See* 10 C.F.R. § 2.720(h)(2)(i). In this instance, the EDO made the determination that Drs. Ma and Pichumani would "testify" (in affidavit form) on the basemat cracking issue. We seek now simply an updating of their views in light of the further analyses performed on that same subject.

[14] This is denoted by "NS" ("no mechanical splice in this pour," per Appendix I at C-2) for Document No. 11 (cadweld locations, per Appendix I at C-1). In this connection, we find somewhat surprising that, on the basis of our interpretation, there are no cadwelds in eight adjacent sections of the basemat. *See* Harstead Report No. 8304-3, Appendix I at C-6, C-7.

[15] E.g., the Task Force report mentioned in Staff's Answer, *supra*, Shewmaker Affidavit at 3. *See also* note 8, *supra*.

not, however, we expect the staff so to inform us and to provide us with a *realistic* date as to when it can supply the information we need to rule on Joint Intervenors' motion. Any party may file a reply to the staff's submission (properly supported by affidavits) within three weeks thereafter.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Gary J. Edles
Howard A. Wilber

In the Matter of **Docket No. 50-322-OL-4 (Low Power)**

LONG ISLAND LIGHTING COMPANY (Shoreham Nuclear Power Station, Unit 1)

October 5, 1984

The Appeal Board determines that the Commission has not deprived it of jurisdiction to review the Licensing Board's disposition of the intervenors' physical security contentions in this operating license proceeding, and dismisses, as interlocutory, intervenors' appeal of the Licensing Board decision denying certain of those contentions.

NUCLEAR REGULATORY COMMISSION: IMMEDIATE EFFECTIVENESS REVIEW

Normally the Commission does not undertake an immediate effectiveness review of a licensing board initial decision in an operating license proceeding unless the decision authorizes facility operation at greater than five percent of rated power. *See* 10 C.F.R. 2.764(f)(1).

NUCLEAR REGULATORY COMMISSION: IMMEDIATE EFFECTIVENESS REVIEW (EFFECT ON APPEAL BOARD JURISDICTION)

Commission immediate effectiveness reviews have no bearing upon the exercise by an appeal board of the general appellate review authority in 10 C.F.R. Part 50 proceedings that is conferred by 10 C.F.R. 2.785(a). 10 C.F.R. 2.764(g). If the Commission desires to preclude or to limit the exercise of that authority in a particular Part 50 proceeding, it must — and does — say so expressly. *See, e.g., Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), CLI-79-8, 10 NRC 141, 147 (1979); *id.*, CLI-81-19, 14 NRC 304, 305 (1981); *id.*, CLI-81-34, 14 NRC 1097, 1098 (1981).

RULES OF PRACTICE: INTERLOCUTORY APPEALS

The Commission's rules of practice bar appeal of an interlocutory order that does not dispose of a major segment of a proceeding, or terminate the participational rights of a party. 10 C.F.R. 2.730(f). *See Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-731, 17 NRC 1073, 1074-75 (1983), *quoting Toledo Edison Co.* (Davis-Besse Nuclear Power Station), ALAB-300, 2 NRC 752, 758 (1975), and *citing Houston Lighting & Power Co.* (Allens Creek Nuclear Generating Station, Unit No. 1), ALAB-635, 13 NRC 309, 310-11 (1981). By way of contrast, see *Kansas Gas and Electric Co.* (Wolf Creek Generating Station, Unit 1), ALAB-784, 20 NRC 845 (1984).

APPEARANCES

Martin Bradley Ashare, Hauppauge, New York, and **Herbert H. Brown** and **Lawrence Coe Lanpher,** Washington, D.C., for the intervenor Suffolk County, New York.

Fabian G. Palomino, Albany, New York, for the intervenor State of New York.

MEMORANDUM AND ORDER

Before us is a notice of appeal filed on October 1, 1984, by intervenors Suffolk County and the State of New York from a September 19, 1984

unpublished order of the Licensing Board in the low-power phase of this operating license proceeding. In that order, the Board denied certain revised contentions advanced by those intervenors that were addressed to the physical security of the Shoreham facility.

The notice of appeal set forth the intervenors' uncertainty respecting whether (1) given "the current procedural posture of this proceeding," such a notice was necessary at this time; and (2) if so, it should have been filed with us or, instead, the Commission. We have examined those questions in reverse order. For the reasons that follow, we conclude that the Commission has not divested us of jurisdiction to review the Licensing Board's disposition of the intervenors' physical security contentions. We further conclude, however, that the appeal must be dismissed as premature.

1. On more than one recent occasion, the Commission has undertaken to review directly (i.e., without intermediate Appeal Board consideration) Licensing Board action in this low-power phase of the proceeding. In CLI-84-8,[1] for example, the Commission reversed a Licensing Board order to the extent that the order held that General Design Criterion 17 was not applicable to low-power Shoreham operation.[2] In that connection, the Commission took note of the fact that the applicant had expressed an intent to seek an exemption under 10 C.F.R. 50.12(a) from the GDC 17 requirements. It added that any Licensing Board decision authorizing the grant of such an exemption "shall not become effective until the Commission has conducted an immediate effectiveness review."[3]

Thereafter, in an unpublished July 18 memorandum and order entered on the intervenors' motion for directed certification of a June 20 Licensing Board order, the Commission provided guidance to that Board with respect to the standard governing the admission of new contentions in the adjudication of the applicant's exemption request.[4] Still later, in CLI-84-16,[5] the Commission established a briefing schedule for its review of a Licensing Board order entered two days earlier with respect to the first two portions of the applicant's low-power testing program.

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[1] 19 NRC 1154 (1984).

[2] That Criterion, found in 10 C.F.R. Part 50, Appendix A, is concerned with the availability of onsite and offsite electric power systems for nuclear generating facilities.

[3] CLI-84-8, *supra*, 19 NRC at 1156. The procedure for immediate effectiveness reviews of licensing board initial decisions is detailed in 10 C.F.R. 2.764. Normally, the Commission does not undertake such a review in an operating license proceeding unless the initial decision authorizes facility operation at greater than five percent of rated power. *See* 10 C.F.R. 2.764(f)(1).

[4] On August 20, the Commission denied the applicant's motion for reconsideration of its July 18 order.

[5] 20 NRC 799 (1984).

In none of these orders, however, did the Commission announce that it was removing us entirely from the appellate review chain. That being so, we see no warrant for the Licensing Board's transmission of its September 19 order "directly to the Commission for appropriate action." The Board took that step because it believed the order to be within at least the "spirit" of "the Commission's reserved jurisdiction in CLI-84-8."[6] But, as noted above, all that the Commission "reserved" in CLI-84-8 was its conduct of an immediate effectiveness review of any section 50.12(a) exemption that the Licensing Board might grant to the applicant. It is clear from the terms of 10 C.F.R. 2.764(g) that Commission immediate effectiveness reviews have no bearing upon the exercise by an appeal board of the general appellate review authority in 10 C.F.R. Part 50 proceedings that is conferred by 10 C.F.R. 2.785(a). Rather, if the Commission desires to preclude or to limit the exercise of that authority in a particular Part 50 proceeding, it must — and does — say so expressly.[7]

2. The September 19 order is plainly interlocutory. Its sole effect is to preclude the litigation of intervenors' physical security contentions in the low-power phase of the proceeding. It neither concludes the phase nor disposes of a major segment of it.[8] Similarly, it does not terminate the participational rights of either Suffolk County or New York.[9] In the circumstances, the Rules of Practice bar an appeal from the September 19 order at this time.[10] Instead, the intervenors "must await the Licens-

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[6] September 19 order at 4.

[7] For example, when the Commission instituted the special Part 50 proceeding concerned with the restart of Unit 1 of the Three Mile Island facility, it explicitly reserved to itself all authority to dispose of appeals from licensing board decisions. *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), CLI-79-8, 10 NRC 141, 147 (1979). Subsequently, the Commission determined that the length and complexity of the record developed before the Licensing Board dictated that initial appeals on the merits be heard by an appeal board. CLI-81-19, 14 NRC 304, 305 (1981). At the same time, however, the Commission decided to reserve for itself any decision that would authorize the restart of Unit 1. Accordingly, in so many words it stripped the Appeal Board of the power to consider applications for a stay pending appeal of any Licensing Board decision in the proceeding. CLI-81-34, 14 NRC 1097, 1098 (1981).

[8] *See Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-731, 17 NRC 1073, 1074-75 (1983), *quoting from Toledo Edison Co.* (Davis-Besse Nuclear Power Station), ALAB-300, 2 NRC 752, 758 (1975).

[9] *Ibid.* By way of contrast, see *Kansas Gas and Electric Co.* (Wolf Creek Generating Station, Unit 1), ALAB-784, 20 NRC 845 (1984), in which the Licensing Board's dismissal of an intervenor's *sole* contention had the necessary effect of bringing to an end the participation of that party in the proceeding.

[10] 10 C.F.R. 2.730(f); *Seabrook, supra*, 17 NRC at 1075.

ing Board's initial decision before presenting [their] grievance for appellate consideration."[11]

Appeal *dismissed.*

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the
Appeal Board

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[11] *Seabrook, supra,* 17 NRC at 1075, *citing Houston Lighting & Power Co.* (Allens Creek Nuclear Generating Station, Unit No. 1), ALAB-635, 13 NRC 309, 310-11 (1981).

Cite as 20 NRC 1102 (1984) **ALAB-788**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Gary J. Edles
Howard A. Wilber

In the Matter of **Docket No. 50-322-OL**

LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Station, Unit 1)

October 31, 1984

The Appeal Board affirms the initial decision rendered by the Licensing Board in this operating license proceeding, LBP-83-57, 18 NRC 445 (1983), with the exception of three matters that are remanded to the Licensing Board: (1) the question whether the plant may be operated pending resolution of a specified unresolved safety issue; (2) resolution of certain issues associated with housekeeping; and (3) the issue of environmental qualification of electrical equipment. Additionally, the Appeal Board vacates as unnecessary a condition imposed by the Licensing Board requiring the applicant to adopt a particular definition of the regulatory term "important to safety."

QUALITY ASSURANCE: REQUIREMENTS (APPLICABILITY)

The quality assurance requirements contained in 10 C.F.R. Part 50, Appendix B or their equivalent do not automatically apply to "important to safety" structures, systems and components of a nuclear power plant.

ATOMIC ENERGY ACT: COMMISSION'S AUTHORITY

The Atomic Energy Act of 1954, as amended, makes clear the Commission's authority to regulate all items contained in a nuclear power plant in order to protect the public health and safety. *See* 42 U.S.C. 2201(i).

ENFORCEMENT ACTIONS: LICENSEE OBLIGATIONS AND COMMITMENTS

The NRC expects licensees to adhere to their obligations and commitments and will not hesitate to issue appropriate orders to make sure that such commitments are met. 10 C.F.R. Part 2, Appendix C, § IV.E.

SAFETY SYSTEMS: SYSTEMS INTERACTIONS

There is no express regulatory premise for requiring a single study directed exclusively to systems interactions at nuclear power plants. *See generally Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-728, 17 NRC 777, 810-11 (1983). But, an applicant must demonstrate that safety systems are not compromised because of their interrelationship with nonsafety or other safety systems.

UNRESOLVED SAFETY ISSUES: NRC STAFF'S OBLIGATION

Where there is a generic unresolved safety issue (USI) involving a discerned safety problem, the staff is obliged to explain why the USI does not stand in the path of construction permit or operating license issuance. *See Virginia Electric and Power Co.* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-491, 8 NRC 245, 247-48 (1978) and *Gulf States Utilities Co.* (River Bend Station, Units 1 and 2), ALAB-444, 6 NRC 760, 775 (1977).

QUALITY ASSURANCE: REVIEW (AUDIT REQUIREMENTS)

Criterion XVIII of Appendix B to 10 C.F.R. Part 50 requires that a comprehensive system of planned and periodic audits be carried out to verify compliance with and determine effectiveness of the Appendix B quality assurance program. Random-sampling statistical methodology, however, is not mandated by this requirement.

QUALITY ASSURANCE: REVIEW

Quality assurance review involves two separate, yet interrelated, inquiries, i.e., whether deficiencies have been uncovered and corrected, and whether a generic problem exists that could affect the confidence in the safety of the facility. *See Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983).

ATOMIC ENERGY ACT: SAFETY FINDINGS

Error-free construction of a nuclear power plant is not mandated for licensing. Rather, the Atomic Energy Act of 1954, as amended, and the Commission's implementing regulations require a finding of reasonable assurance that, as built, the facility can and will be operated without endangering the public health and safety. *Ibid.*

ADJUDICATORY BOARDS: RESPONSIBILITIES (QUALITY ASSURANCE ISSUES)

In examining claims of quality assurance deficiencies, an adjudicatory board must consider the implication of those deficiencies in terms of safe plant operation. *Ibid.*

ADJUDICATORY BOARDS: RESPONSIBILITIES (QUALITY ASSURANCE ISSUES)

In reviewing quality assurance, an adjudicatory board must be satisfied not only that construction defects have been corrected but that there has been no overall breakdown of quality assurance. *See ibid.* Numerous imperfections, even if minor, may be indicative of a more widespread or generic quality assurance problem.

QUALITY ASSURANCE: DEFICIENCIES

Not every violation of a quality assurance implementing manual or procedures constitutes a violation of 10 C.F.R. Part 50, Appendix B. *See* 10 C.F.R. Part 2, Appendix C, § IV.A.

QUALITY ASSURANCE: REQUIREMENTS (RECORDS)

Criterion XVIII of 10 C.F.R. Part 50, Appendix B does not establish requirements for the maximum amount of time allowed in tracing the

data used in design calculation, but requires simply that records be identifiable and retrievable.

QUALITY ASSURANCE: REQUIREMENTS (ORGANIZATION)

Criterion I of 10 C.F.R. Part 50, Appendix B requires that the persons and organizations performing quality assurance functions have sufficient authority and organizational freedom to identify quality problems; initiate, recommend, or provide solutions; and verify implementation of solutions.

RULES OF PRACTICE: APPELLATE REVIEW

Mere demonstration that a licensing board erred is not sufficient to warrant appellate relief. *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), ALAB-443, 6 NRC 741, 756 (1977). The complaining party must demonstrate actual prejudice — i.e., that the ruling had a substantial effect on the outcome of the proceeding. *Louisiana Power and Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1096 (1983).

LICENSING BOARDS: EXPEDITION AND THOROUGHNESS

Under the Commission's rules of practice, an adjudicatory board must use its powers to assure that the hearing is focused upon the matters in controversy and that the hearing process is conducted as expeditiously as possible, consistent with the development of an adequate decisional record. 10 C.F.R. Part 2, Appendix A, § V. Adjudicatory boards may impose time limits on cross-examination, require parties to pursue certain matters first, or limit evidentiary material to that information that is genuinely the subject of controversy.

LICENSING BOARDS: RESPONSIBILITIES (RESOLUTION OF ISSUES)

Certain matters may be left to the staff for post-hearing resolution where hearings would not be helpful and the adjudicatory board can make the findings requisite to issuance of a license. *Consolidated Edison Co. of New York* (Indian Point Station, Unit No. 2), CLI-74-23, 7 AEC 947, 951 (1974).

REGULATORY GUIDES: APPLICATION

Regulatory guides do not set out mandatory regulatory requirements. Methods and solutions different from those set out in the guides can be acceptable if they provide a basis for the findings requisite to the issuance of a license. *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), ALAB-698, 16 NRC 1290, 1299 (1982), *rev'd in part on other grounds*, CLI-83-22, 18 NRC 299 (1983).

REGULATORY GUIDES: APPLICATION

Seismic design response spectra set forth in Regulatory Guide (Reg. Guide) 1.60 are designed for applicability at essentially any location in the country and may be unnecessarily conservative for some plants. "Design Response Spectra for Seismic Design of Nuclear Power Plants," Reg. Guide 1.60 (Rev. 1) (Dec. 1973).

ADJUDICATORY BOARDS: RESOLUTION OF ISSUES

The mere pendency of confirmatory staff analyses regarding litigated issues does not automatically foreclose board resolution of those issues.

ATOMIC ENERGY ACT: HEARING REQUIREMENTS

Section 189 of the Atomic Energy Act, 42 U.S.C. § 2239, which provides parties with an opportunity for a hearing, does not preclude the adoption of procedures for written cross-examination.

ADMINISTRATIVE PROCEDURE ACT: EVIDENCE (WRITTEN)

The Administrative Procedure Act (APA), 5 U.S.C. § 556(d), expressly authorizes agencies in certain licensing cases to adopt procedures for the submission of all or part of the evidence in written form as long as the parties are not prejudiced.

ADMINISTRATIVE PROCEDURE ACT: EVIDENCE (CROSS-EXAMINATION AND REBUTTAL)

The APA does not give parties an unlimited right to submit rebuttal evidence and conduct cross-examination. Rather, these rights are bounded by a need for a full and true disclosure of the facts. *Ibid.*

TECHNICAL ISSUES DISCUSSED:

Safe Shutdown Earthquake;
Quality Assurance Requirements;
Important to Safety and Safety-Related;
Turbine Bypass System;
Reactor Core Isolation Cooling (RCIC) System;
Standby Liquid Control (SLC) System;
High Water Level Trip;
Rod Block Monitor (RBM);
Reactor Water Cleanup (RWCU) System;
Systems Interaction;
Unresolved Safety Issue (USI) A-17 (Systems Interaction);
USI A-47 (Control System Failures);
Probabilistic Risk Assessments (PRA);
Event Tree/Fault Tree Methodology of a PRA;
Housekeeping;
Control of Calculations;
Separation of Electrical Cables;
Quality Assurance Organization;
Water Hammer;
Environmental Qualification;
Post-Accident Monitoring;
Passive Mechanical Valve Failure;
Anticipated Transient Without Scram (ATWS);
ASME Code;
Single Failure Criterion;
Scram;
Seismic Design;
Earthquake Motion (displacement, velocity, acceleration);
Seismic Response Spectrum;
Mark II Containment;
Vacuum Breakers;
Design Basis Loads;
Containment Leakage Tests;
Safety Relief Valves (SRVs) (Two-Stage and Three-Stage SRVs).

APPEARANCES

Lawrence Coe Lanpher, Washington, D.C. (with whom **Herbert H. Brown** and **Karla J. Letsche,** Washington, D.C., were on the brief), for Suffolk County, New York.

Ben Wiles, Albany, New York (with whom **Gerald C. Crotty** and **Jonathan Feinberg,** Albany, New York, were on the brief), for the State of New York.

T.S. Ellis, III, W. Taylor Reveley, III, James N. Christman and **Anthony F. Earley, Jr.,** Richmond, Virginia, for the Long Island Lighting Company.

Bernard M. Bordenick and **Edwin J. Reis** (with whom **David A. Repka, Richard J. Rawson** and **Robert G. Perlis** were on the brief) for the Nuclear Regulatory Commission staff.

Scott E. Slaughter and **Peter S. Everett,** Washington, D.C., and **Anthony F. Earley, Jr.,** Richmond, Virginia, filed a brief for the Utility Safety Classification Group as amicus curiae.

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DECISION

Before us are appeals from a partial initial decision rendered by the Licensing Board designated to preside over all matters in this operating license proceeding other than offsite emergency planning and low power operation. LBP-83-57, 18 NRC 445 (1983).[1] In a comprehensive decision, the Board resolved all issues in favor of the applicant, Long Island Lighting Company (LILCO), with three exceptions. First, the record was reopened to admit portions of a new contention proposed by intervenor Suffolk County relating to excessive vibration and cylinder head cracking in the diesel generators that provide onsite emergency power.[2] Second, LILCO was required to supplement the record with regard to the testing of check valve internal parts.[3] Third, the record was held open with regard to one aspect of the operation of the residual heat removal system. The Board found that the information in the record on this issue was insufficient to determine whether a design modification would be necessary or whether this issue would be resolved on a generic or a Shoreham-specific basis.[4]

In the Board's view, however, only the diesel generator issue was serious enough to preclude the issuance of a license for operation of Shoreham at low power (i.e., at levels up to five percent of rated power).[5] On March 24, 1984, LILCO filed a "Supplemental Motion for Low Power Operating License" seeking an exemption under 10 C.F.R. § 50.57(c) to allow operation at low power pending resolution of the questions pertaining to the failure of the diesel generators during operational testing. A separate board was established to resolve the issues raised by the motion.[6]

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[1] The Licensing Board's decision consists of two principal portions, a narrative opinion that appears in volume 18 of the NRC issuances, and a separate set of findings of fact. (We shall refer to these findings as FF, with a parallel reference to the page number of the Board's unpublished slip opinion.) In another proceeding we criticized this bifurcation because it is repetitious and has a potential for creating internal inconsistencies. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-781, 20 NRC 819, 823 n.2 (1984); ALAB-776, 19 NRC 1373, 1375 n.4 (1984). Moreover, the format made it somewhat difficult for us at times to tie the Board's reasoning to its evidentiary findings. Additionally, the Board's separate findings, which contain some material not included in its opinion, are not published in the NRC issuances. Although the findings are part of the Board's decision and are available for consideration on review, and in the public document room, they will not be conveniently available to the general public. We deem this highly undesirable.

[2] LBP-83-57, *supra*, 18 NRC at 464 n.8.

[3] *Id.* at 466-67, 636-37.

[4] *Id.* at 517-18.

[5] *Id.* at 467, 637.

[6] In a decision issued on October 29, 1984 (LBP-84-45, 20 NRC 1343), that Board authorized the Director of Nuclear Reactor Regulation after making the findings required by 10 C.F.R. 50.57(a) to issue to LILCO a low-power testing license.

LILCO, the State of New York, Suffolk County, New York, and the Shoreham Opponents Coalition appealed from the Board's decision.[7] As discussed below, LILCO's appeal is limited to a single issue, i.e., the Board's imposition of an operating license condition based upon its acceptance of the NRC staff's definition of the regulatory term "important to safety." With our permission, the Utility Safety Classification Group, an organization consisting of thirty-nine electric utility companies who own over half of the operating or planned commercial reactors in the country, filed a brief as amicus curiae urging reversal of the Licensing Board's decision with respect to this definition. New York's appeal is likewise limited to a single issue, i.e., authorization of low power operation in the absence of assurance that an adequate level of offsite emergency preparedness will be developed at Shoreham. Suffolk County's appeal is directed to the Board's disposition of a wide range of issues.[8]

Last April, following appellate briefing and oral argument, we certified to the Commission three questions.[9] First, we asked whether the terms "important to safety" and "safety-related" should be deemed synonymous for the purpose of establishing an acceptable quality assurance program in accordance with General Design Criterion (GDC) 1 of Appendix A and Appendix B to 10 C.F.R. Part 50. Second, we sought Commission guidance as to how the resolution of that question should be applied in this proceeding. Finally, we asked whether some form of environmental evaluation under the National Environmental Policy Act (NEPA) is a precondition to issuance of a license for low power operation in this proceeding. We indicated that we would await the Commission's disposition of these matters before addressing the other issues now pending on appeal.[10]

The Commission responded to the certified questions in an opinion issued on June 5.[11] The Commission concluded, first, that the question of the definition of "important to safety" required further consideration; accordingly, it set in motion procedures looking toward resolution of the question through the notice and comment process. Second, it instructed us to proceed in the interim "on a case-by-case basis in accordance with

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[7] The Shoreham Opponents Coalition did not file its own exceptions or brief. Rather, it joined in the exceptions and brief filed by Suffolk County. *See* letters of James B. Dougherty, Shoreham Opponents Coalition, to the Appeal Board (Oct. 17, 1983 and Dec. 23, 1983).

[8] The NRC staff and, except as noted above, LILCO support the Board's result.

[9] ALAB-769, 19 NRC 995 (1984).

[10] *Id.* at 1007 n.34.

[11] CLI-84-9, 19 NRC 1323 (1984).

current precedent. *Cf. Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), ALAB-729, 17 NRC 814 (1983)."[12] Lastly, it determined that NEPA does not require preparation of an environmental impact statement or any other form of environmental evaluation on the proposal to issue a low power license for the Shoreham facility.[13] We invited the parties to comment on the Commission's opinion insofar as it offered guidance which we must apply in arriving at our decision. Comments were received on July 6.

We now turn to a resolution of the issues on appeal. Like the Licensing Board, we decide those issues essentially in the applicant's favor. We do, however, remand three relatively minor matters to the Board: (1) the question whether the plant may be operated pending resolution of Unresolved Safety Issue A-47, as discussed in section II(D); (2) resolution of certain issues associated with housekeeping, as discussed in section III, and (3) the issue of the environmental qualification of electrical equipment, as discussed in section IV(B).

We first examine LILCO's appeal and the application of the Commission's guidance concerning the definition of "important to safety" to the pending proceeding. In sections II and III we deal with Suffolk County's arguments regarding systems interaction and quality assurance. In section IV we dispose of the County's remaining challenges to the Licensing Board's decision.[14] Finally, we consider New York's appeal in section V.

I. "IMPORTANT TO SAFETY"

All nuclear power plants classify structures, systems, or components according to their safety significance. At Shoreham, certain structures, systems, and components are identified as "safety-related."[15] That term is derived from Appendix B to 10 C.F.R. Part 50 and Appendix A to 10 C.F.R. Part 100.

Appendix B establishes quality assurance requirements for the design, construction, and operation of those structures, systems, and components "that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public."[16] The

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[12] *Id.* at 1325.

[13] *Id.* at 1326.

[14] The Commission's June 6 opinion is wholly dispositive of Suffolk County's argument regarding the need for a further environmental evaluation.

[15] The term "safety-grade" is frequently used interchangeably with "safety-related." *See Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), ALAB-729, 17 NRC 814, 874 n.280 (1983), *aff'd in principal part*, CLI-84-11, 20 NRC 1 (1984).

[16] 10 C.F.R. Part 50, Appendix B, Introduction.

Appendix B requirements apply to "all activities affecting the *safety-related* functions"[17] of such structures, systems, and components. These safety functions are more specifically set forth in Appendix A to 10 C.F.R. Part 100. According to Appendix A, "safety-related" structures, systems, and components are those that must remain functional in the event of a Safe Shutdown Earthquake[18] to assure:

> (1) [t]he integrity of the reactor coolant pressure boundary,
> (2) [t]he capability to shut down the reactor and maintain it in a safe shutdown condition, or
> (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of . . . [Part 100].[19]

In order to comply with what it perceived to be the Commission's requirements, LILCO classified all Shoreham structures, systems, and components as either "safety-related" or "nonsafety-related." Only the former are subject to a quality assurance program designed to satisfy all Appendix B requirements.

Appendix A to 10 C.F.R. Part 50, which sets forth the general design criteria for nuclear power plants, contains yet another term: "important to safety." According to the introduction to that Appendix, structures, systems, and components "important to safety" are those "that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public."[20] In LILCO's view, there are no "important to safety" structures, systems, and components that do not fall within the classification "safety-related." Moreover, LILCO does not interpret General Design Criterion (GDC) 1, which provides that "[a] quality assurance program shall be established and implemented" for structures, systems, and components that are *important to safety*, as imposing any requirements in addition to those contained in Appendix B. Rather, LILCO believes that GDC 1 is satisfied by the Appendix B quality assurance program that it applies to all safety-related items.

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[17] *Ibid.* (emphasis added).

[18] The Safe Shutdown Earthquake for a particular site is that earthquake "which produces the maximum vibratory ground motion for which certain structures, systems, and components [must be] designed to remain functional," based upon a consideration of "the maximum earthquake potential." 10 C.F.R. Part 100, Appendix A, § III(c).

[19] *Ibid. See id.* at §§ VI(a)(1), VI(b)(3). The Commission recently repeated, in effect, this definition of safety-related structures, systems and components as part of its new rule on environmental qualification of electrical equipment. *See* 10 C.F.R. § 50.49(b)(1).

[20] 10 C.F.R. Part 50, Appendix A, Introduction.

In its Contention 7B, Suffolk County, joined by the State of New York and the Shoreham Opponents Coalition, challenged LILCO's classification scheme.[21] Those intervenors asserted, and continue to claim on appeal, that the "important to safety" category includes structures, systems, and components contained in, but is broader in scope than, the "safety-related" category. Without specifically identifying those structures, systems, and components deemed to be "important to safety" albeit not "safety-related," the intervenors maintain that they too had to be covered by a quality assurance program essentially equivalent to that required by Appendix B.[22]

The NRC staff agrees that an "important to safety" class exists and it includes items that are not "safety-related."[23] Unlike the intervenors, however, the staff believes that LILCO has fulfilled all requirements applicable to "important to safety" structures, systems, and components.[24]

A. Licensing Board Resolution

The Licensing Board agreed with the intervenors and staff that, as applied to the classification of structures, systems, and components, the term "important to safety" is broader than "safety-related."[25] But the Board parted company with the intervenors at that point. It found that, notwithstanding utilization of a two-tier classification scheme ("safety-related" and "nonsafety-related"), LILCO had complied with the Commission's quality assurance requirements because it provided the structures, systems, and components in the Shoreham design with quality assurance "commensurate with the items' importance to safety."[26] The Board nonetheless imposed a license condition requiring that LILCO "adopt and implement" the definition of important to safety as determined by the Board.[27]

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[21] Contention 7B concerns the classification scheme used for the quality assurance program and the assessment of potential interactions among plant systems. Systems interaction is discussed in section II, *infra*.

[22] *See* Suffolk County Brief in Support of Appeal of Licensing Board Partial Initial Decision (Dec. 23, 1983) (hereafter Suffolk Brief) at 3-11; Suffolk County Response to Appeal Board Order of June 7, 1984 (July 6, 1984) (hereafter Suffolk Reply Brief) at 3-4.

[23] NRC Staff's Brief in Opposition to "Suffolk County Brief in Support of Appeal of Licensing Board Partial Initial Decision" and "LILCO's Brief on Appeal" (March 9, 1984) (hereafter Staff Brief) at 12-38.

[24] *Id.* at 39-42.

[25] LBP-83-57, *supra*, 18 NRC at 546. *See* ALAB-729, *supra*, 17 NRC at 876 ("nothing in the regulations supports [the] assertion that the term 'important to safety' must be read as equivalent to 'safety[related]' . . . .").

[26] LBP-83-57, *supra*, 18 NRC at 546.

[27] *Id.* at 546, 635.

B. Commission Guidance

Both LILCO and Suffolk County challenged the Licensing Board's disposition of this issue. Our review of the matter led us to find that "the existing regulations [were] too varied and the historic industry and agency practice too diverse simply to set forth what we perceive to be the proper interpretation of the regulations."[28] Accordingly, on April 23, 1984 we certified the following questions to the Commission:

> 1. Are the terms "important to safety" and "safety-related" to be deemed synonymous for the purpose of establishing an acceptable quality assurance program in accordance with GDC 1 of Appendix A and Appendix B to 10 C.F.R. Part 50?
> 2. How should the outcome of Question 1 be applied to the operating license application proceeding before us?[29]

As earlier noted, the Commission responded by taking steps toward institution of rulemaking on this issue.[30] Pending the outcome of the rulemaking, we are to apply "current precedent." In this regard, the Commission confirmed the Licensing Board's determination that, under current precedent, " 'important to safety' applies to a larger class of equipment than the term 'safety-related.' "[31] But "this does not mean," the Commission stated, "that there is a pre-defined class of [important to safety] equipment . . . . Rather, whether any piece of equipment has a function 'important to safety' is to be determined on the basis of a particularized showing of clearly identified safety concerns for the specific equipment . . . ."[32]

C. Analysis

In view of the foregoing, what remains for our consideration is whether the Licensing Board correctly determined the quality assurance requirements for "important to safety" systems, structures, and components and LILCO's compliance with those requirements. Additionally, we must determine the appropriateness of the Board's license condition that requires LILCO to adopt the proper definition of "important to safety." For the reasons discussed below, we affirm the Licensing

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[28] ALAB-769, *supra*, 19 NRC at 1000.
[29] *Id.* at 1010.
[30] *See* p. 1111, *supra*.
[31] CLI-84-9, *supra*, 19 NRC at 1325.
[32] *Ibid.*

Board's finding that LILCO has complied with the Commission's regulations with respect to its treatment of "important to safety" equipment. We additionally conclude that the license condition imposed by the Board is no longer necessary in light of the Commission's guidance. Therefore, that condition is vacated.

1. Adequacy of Quality Assurance

The principal system components for the Shoreham nuclear plant and the quality assurance classification of each are listed in Table 3.2.1-1 of LILCO's Final Safety Analysis Report (FSAR), which contains design criteria and quality standards for the plant.[33] In addition to identifying those structures, systems, and components that LILCO considers to be subject to the quality assurance requirements of Appendix B (i.e., that come within the applicant's "safety-related" category), the table identifies various industry codes and other requirements that LILCO applies to both its safety-related and nonsafety-related components.[34] Beyond the requirements identified in the FSAR, standards for nonsafety-related equipment are contained in technical specifications approved by the NRC.[35] Finally, under Commission regulations and staff guidance, LILCO, like all other utility permittees and licensees, has been required to apply "upgraded"[36] quality assurance to certain items – for example, fire protection systems that, although not performing a safety-related function, are worthy of special treatment.[37]

In addition, the reactor vendor and principal architect/engineer for Shoreham, General Electric and Stone and Webster Engineering Corporation (Stone and Webster), respectively, apply their own quality assurance treatment to all items produced for Shoreham. General Electric requires an essentially identical degree of *engineering* quality assurance for

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[33] Tr. fol. 4346 at 170 (Burns, *et al.*). *See also* Tr. fol. 1114, Exh. 2, for revisions to this FSAR table.

The FSAR is reviewed by the staff against specific criteria provided by the Standard Review Plan (SRP) (NUREG-0800). While the primary focus of the SRP is safety-related items, other items that the staff believes must meet certain criteria are also addressed. Staff Brief at 30-31.

[34] FSAR Table 3.2.1-1. *See also* Tr. fol. 4346 at 41 (Burns, *et al.*).

[35] Technical specifications include surveillance requirements and conditions that limit operation of the plant when certain specified systems become unavailable. *See, e.g.*, Tr. fol. 4346, LILCO Attachment 8.

[36] Upgraded quality assurance refers to a range of requirements that are imposed depending upon the particular structure, system, or component involved and the degree of its importance. *See* Board Notification 84-011 (Jan. 18, 1984) for a generic letter sent by the staff to all licensees and applicants that indicates that the staff intends to continue, as in the past, the practice of imposing additional quality assurance requirements on important to safety items, commensurate with their safety importance. *See, e.g.*, 49 Fed. Reg. 26,036, 26,041 (1984) where the staff has been directed to provide guidance on the application of selected sections of Appendix B to nonsafety-related equipment utilized during the response to an anticipated transient without scram (ATWS) event.

[37] *See* 10 C.F.R. Part 50, Appendix R for fire protection requirements.

all structures, systems, and components, independent of safety classification.[38] Insofar as their procurement or manufacture is concerned, nonsafety-related items are otherwise afforded quality assurance treatment in varying degrees, based upon an evaluation of their importance.[39] Even for such structures, systems, and components, however, most of the 10 C.F.R. Part 50, Appendix B criteria are addressed.[40] Similarly, while not applying Appendix B to items which it deems to be nonsafety-related, Stone and Webster does have some quality assurance procedures for such items.[41] For example, all nonsafety-related systems, structures, and components are designed, procured, constructed, and tested in accordance with applicable industry codes and standards.[42]

(a) Requirements

Suffolk County's dissatisfaction with LILCO's quality assurance classification scheme is two-fold. The County agrees with the Licensing Board that LILCO must recognize and apply quality assurance to an "important to safety" category that is distinct from the safety-related class.[43] According to the County, besides failing to identify separately and specifically "important to safety" equipment,[44] LILCO does not have an appropriate quality assurance program under GDC 1 for any items that would fall into this category.[45] The County, therefore, urges us to overturn the Licensing Board's finding that adequate quality assurance was applied notwithstanding the definitional error by LILCO.[46]

More particularly, the County argues that GDC 1[47] requires, for "important to safety" items, a quality assurance program containing planned and systematic actions composed of written policies, procedures, and instructions, and specifying the organizations involved.[48] As the County sees it, the FSAR, technical specifications, and supplier qual-

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[38] Tr. fol. 4346 at 42 (Burns, *et al.*).
[39] *Ibid.*
[40] *Id.* at 43.
[41] *Id.* at 44.
[42] *Id.* at 47.
[43] Suffolk Brief at 3; LBP-83-57, *supra*, 18 NRC at 546. *See also* CLI-84-9, *supra*, 19 NRC at 1325.
[44] Suffolk Brief at 10-11.
[45] *Id.* at 4-11.
[46] *Id.* at 4-5.
[47] 10 C.F.R. Part 50, Appendix A, GDC 1 states in relevant part (emphasis added):

> A *quality assurance program* shall be established and implemented in order to provide adequate assurance that [important to safety] structures, systems, and components will satisfactorily perform their safety functions.

[48] Suffolk Brief at 7-10.

ity assurance programs described above do not so qualify but, rather, amount to "an *ad hoc* endeavor"[49] in violation of the implicit requirements of GDC 1.

In support of its argument, the County points to the requirements contained in 10 C.F.R. Part 50, Appendix B.[50] The introduction to that appendix states that the term "quality assurance" used "in this appendix . . . comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service."[51] Further, Criterion II of the appendix specifies that a quality assurance program under that appendix "shall be documented by written policies, procedures, or instructions . . . [applied to] identif[ied] . . . structures, systems, and components . . . [and carried out by identified] organizations . . . ."

We find the County's reasoning to be without merit. By their literal terms, the provisions of Appendix B relied on by the County only apply to quality assurance programs for the *safety-related* items covered by Appendix B. There are no similar requirements contained in Appendix A to Part 50 pertaining to "important to safety" equipment. Further, the County points to no other authority, and we are aware of none, that would require that degree of formality for the "important to safety" quality assurance program.

Additional support for not extending the Appendix B requirements to the quality assurance program required by GDC 1 for "important to safety" equipment is contained in the Commission's June 6, 1984 response to our certified questions. There, the Commission stated that there is not

> a pre-defined class of equipment at every plant whose functions have been determined by rule to be "important to safety" . . . . Rather, whether any piece of equipment has a function "important to safety" is to be determined on the basis of a particularized showing of clearly identified safety concerns . . . . and the requirements of . . . GDC 1 must be tailored to the identified safety concerns.[52]

The Commission's guidance indicates the regulations are to be flexibly applied, with variation depending on specific safety concerns. For these reasons, we agree with the Licensing Board that a separate quality assurance program akin to an Appendix B program, including written proce-

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[49] *Id.* at 8.
[50] *Id.* at 7-8.
[51] 10 C.F.R. Part 50, Appendix B, Introduction.
[52] CLI-84-9, *supra*, 19 NRC at 1325.

dures and identification of all "important to safety items," is not required.[53]

(b) LILCO's Quality Assurance Program

According to the County, LILCO's quality assurance treatment of nonsafety-related items was deficient in that LILCO misclassified a number of systems in FSAR Table 3.2.1-1. We consider each of these systems in turn.

(i) Turbine Bypass System

The turbine bypass system is used to pass partial steam flow to the condenser during normal startup and shutdown and following a turbine trip or load rejection.[54] The turbine bypass valves are designed to open automatically in the event of a turbine trip or load rejection in order to reduce the pressurization rate of the reactor.[55] At the hearing below, the County pointed to this system as an example of a system that, because relied upon in whole or in part to mitigate accidents or transients, should be classified as "safety-related."[56] On appeal, the County modified its position to assert that the turbine bypass system need not be treated as "safety-related" but, rather, exemplifies the need for a separate "important to safety" category.[57]

The short answer is that the County's current concern has been satisfied. Under the Commission's recent guidance, an "important to safety" class that is broader than the safety-related category must be recognized by LILCO. Nonetheless, not every structure, system, or component need be upgraded to safety-related status. In this connection, we have undertaken a review on our own initiative of the adequacy of the classification and quality assurance applied to this system.

We agree with LILCO and the staff that the turbine bypass system need not be treated as safety-related.[58] Accident analyses indicate that failure of the system in the event of generator load rejection or turbine

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[53] *See* LBP-83-57, *supra*, 18 NRC at 558-59 (adopting conclusion of *Three Mile Island*, ALAB-729, *supra*, that GDC 1 contemplates gradations of quality requirements); *id.* at 560, 561 (no requirement for a list of "important to safety" systems exists). *See also* App. Tr. 39-40, where counsel for the County acknowledged the difficulty with creating a generic list of all "important to safety" items for all plants.

[54] Tr. fol. 4346 at 146 (Burns, *et al.*).

[55] *Ibid.*

[56] Tr. fol. 1114 at 39-40 (Goldsmith, *et al.*).

[57] Suffolk Brief at 14.

[58] Tr. fol. 4346 at 147-48 (Burns, *et al.*); Tr. fol. 6357 at 27 (Speis, *et al.*).

trip would not result in fuel damage.[59] The main turbine bypass valves, however, play a role, along with other valves, in relieving the pressure in the event of a feedwater control failure.[60] Therefore, some importance must be attributed to this system. Even so, should there be a simultaneous failure of the turbine bypass system, the Level 8 trip (*see* pp. 1122-23, *infra*) and the feedwater controller, only a minor amount of damage to a few fuel rods might occur.[61] This would not pose an undue risk to public health and safety. Thus, the system need not meet the more stringent requirements for safety-related items.

Although the entire turbine bypass system is not considered to be "safety-related," the steam lines leading to the turbine bypass valves meet Appendix B quality assurance requirements.[62] Further, turbine bypass valves and the turbine generator electrohydraulic control system are subject to the quality assurance program of the supplier, General Electric.[63] Additionally, LILCO has proposed a technical specification requiring periodic surveillance to confirm operability of the system.[64] In these circumstances, we believe the system is subject to quality assurance requirements commensurate with its intended function.

(ii) Reactor Core Isolation Cooling System

The reactor core isolation cooling (RCIC) system can provide core cooling water during reactor shutdown in the event of a failure of the main feedwater system.[65] The RCIC system may also be used to supplement the high pressure coolant injection (HPCI) system.[66] The County asserted before the Licensing Board that the RCIC system should have been treated as a safety-related system.[67]

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[59] FSAR at 15A-11 (§ 15A.1.1.5), 15A-16 (§ 15A.1.2.5). LILCO witness Edward T. Burns also indicated that any effect of a failure of the turbine bypass valves to open in the event of a generator load rejection or turbine trip would be minor. Tr. fol. 4346 at 146-47 (Burns, *et al.*).

[60] FSAR Table 15A.1.7-1.

[61] Tr. fol. 6357 at 24 (Speis, *et al.*).

[62] Tr. fol. 1114, Exh. 2 (FSAR Table 3.2.1-1) at 13; Tr. fol. 4346 at 147 (Burns, *et al.*).

[63] Tr. fol. 4346 at 148 (Burns, *et al.*). *See* pp. 1116-17, *supra*, for a description of General Electric's quality assurance program.

[64] Tr. fol. 4346 Attachment 8, at 3/4 3-102 to 3-103 and 3/4 7-36. *See also* NUREG-0420, Safety Evaluation Report (April 1981) (hereafter Staff Exh. 2A) at 7-18 to 7-19. To the extent we rely upon the proposed technical specifications, they must be finally adopted by LILCO prior to the issuance of a full-power license.

[65] Tr. fol. 4346 at 143 (Burns, *et al.*).

[66] *Ibid.*

[67] Tr. fol. 1114 at 39-40 (Goldsmith, *et al.*). *Cf.* Tr. fol. 6357 at 25 (Speis, *et al.*) (notwithstanding the staff witnesses' statement that the RCIC system is safety-related, they explain that only that portion of the system necessary to perform a safety function should be treated as safety-related); *see also* Tr. 7485-86 (Hodges).

The RCIC system is not directly relied upon in the accident analyses presented in the FSAR.[68] It is, however, considered a backup for the HPCI system in the event of a control rod drop accident.[69] Additional backup utilizing safety-related equipment is provided by the combination of the automatic depressurization system (ADS) and low pressure coolant injection (LPCI) or core spray systems.[70] It is questionable whether the RCIC system is an essential backup given the availability of these other systems. Nonetheless, as shown in Table 3.2.1-1 of the FSAR, the principal components of the RCIC system are subject to the quality assurance requirements of Appendix B.[71] Moreover, the technical specifications proposed for the facility require that the RCIC system undergo periodic surveillance to ensure its operability.[72] For these reasons, we believe that the RCIC system has been designed, constructed, and will be operated under quality standards commensurate with its function.

(iii) Standby Liquid Control System

The Standby Liquid Control (SLC) system is a diverse, backup reactivity control system, capable of shutting the reactor down from rated power to cold conditions in the event that an insufficient number of control rods are inserted.[73] The FSAR states:

> The standby liquid control system is a special safety system and is maintained in a standby status whenever the reactor is critical and at all times when it is possible to make the reactor critical.[74]

The County claimed[75] below that the FSAR and the Safety Evaluation Report (SER) do not demonstrate that the SLC system is properly designed, classified, and qualified. Further, the County asserts that the system should be classified as safety-related.[76]

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[68] Tr. 4813 (Robare); FSAR, Chapter 15.

[69] Tr. 4813 (Robare); FSAR Appendix 7A at 7A-34, 7A-35.
We note that those portions of the RCIC system used to mitigate the effects of a control rod drop accident meet most of the safety-related design requirements. Tr. 4814 (Robare).

[70] Staff Exh. 2A at 5-41 to 6-42; 7-10 to 7-11.

[71] Tr. fol. 1114, Exh. 2, at 7; Tr. fol. 4346 at 144 (Burns, *et al.*).

[72] Tr. fol. 4346, Attachment 8, at 3/4 7-10 to 7-11, 3/4 3-42 to 3-46. *See also* note 64, *supra*.

[73] Tr. fol. 4346 at 159 (Burns, *et al.*).

[74] FSAR (Rev. 5, March 1977) at 4.2-84.

[75] Tr. fol. 1114 at 48, 51.

[76] The SER for Shoreham lists the SLC system as a "[s]ystem[] required for safe shutdown." Staff Exh. 2A at 7-9 to 7-10. It is clear, however, from the FSAR and testimony of LILCO and staff witnesses that the system is only used as a backup for a type of event that is not considered a design basis accident. *See* Tr. 4881-82 (Robare, Dawes); Tr. fol. 6357 at 24-25 (Speis, *et al.*); FSAR at 4.2-84.
(Continued)

Inasmuch as this system does not perform a safety-related function described in Appendix A to Part 100, it is not required to meet all of the qualification requirements for such systems.[77] LILCO does regard the SLC system as a backup that could be considered to have some safety significance.[78] Consequently, all of the equipment essential for injecting boron solution into the reactor is built to safety-related standards, including Appendix B quality assurance requirements.[79] Non-essential equipment, including the tank heater system, is designed to lesser standards.[80] Further, the proposed technical specifications for the facility require the system to undergo periodic surveillance to ensure its operability.[81] We conclude, therefore, that the SLC system has been accorded quality assurance treatment commensurate with its intended function.[82]

(iv) High Water Level (Level 8) Trip of Main Turbine and Feedwater Pumps

The feedwater control system employs a reactor vessel high water level trip ("Level 8 trip") that terminates feedwater flow and trips the turbine in the event of a feedwater controller failure.[83] Were the Level 8 trip to fail, the water level would increase until either (1) manual operator action was taken, or (2) wet steam began to enter the turbine, causing vibrations that, in turn, would bring about a trip.[84] The County points to the Level 8 trip as another example of a system that should be classified as safety-related.[85]

Further, only a portion of the system would be called upon to perform in such circumstances and that portion is covered by safety-related requirements. Tr. 7485 (Kirkwood), Tr. fol. 6357 at 24 (Speis, *et al.*). *See also* note 79 and accompanying text, *infra*.

[77] *See* Tr. fol. 6357 at 24-25 (Speis, *et al.*) (notwithstanding its general statement that the SLC system is safety-related, the staff explains that its views apply only to portions of the system).

[78] Tr. 4880, 4901 (Robare).

[79] Tr. fol. 4346 at 160 (Burns, *et al.*); Tr. 4888 (Robare); Tr. fol. 6357 at 24 (Speis, *et al.*); Tr. fol. 1114, Exh. 2 (Table 3.2.1-1), at 3-4.

[80] Tr. fol. 4346 at 160 (Burns, *et al.*). The County was concerned about the maintenance of the liquid temperature to ensure that the boron remains in solution. *See* Tr. 1680-81 (Goldsmith). The heaters for this purpose are not primarily relied upon, but are used only when the ambient temperature of the reactor building is too low. Tr. fol. 4346 at 160 (Burns, *et al.*). Further, the solution temperature is monitored so that an alarm will sound if the temperature falls below a pre-set value. *Ibid.* Finally, the proposed technical specifications for Shoreham require the solution temperature to be checked every 24 hours. *Id.*, Attachment 8, at 3/4 1-19. These provisions are adequate to ensure that the temperature of the boron solution is maintained despite lower standards applied to the heater system.

[81] Tr. fol. 4346, Attachment 8, at 3/4 1-19 to 1-20. *See* note 64, *supra*.

[82] The SLC system is covered by recently promulgated regulations aimed at reducing the risk from anticipated transients without scram (ATWS) events. 49 Fed. Reg. 26,038 (1984). *See* section IV(D), *infra*. As a result, the system may have to meet additional requirements not as yet developed by the staff. *See* 49 Fed. Reg. at 26,040-41.

[83] Tr. fol. 4346 at 145 (Burns, *et al.*); Staff Exh. 2A at 7-19.

[84] Tr. fol. 4346 at 145 (Burns, *et al.*).

[85] Tr. fol. 1114 at 40 (Goldsmith, *et al.*).

Analyses show that a Level 8 trip failure would not have a significant impact on the transient severity.[86] Thus, the trip does not perform a safety function[87] and need not be considered safety-related.

Nevertheless, the Level 8 trip is assumed by the FSAR Chapter 15 transient analysis to operate in the event of failure of the feedwater controller.[88] LILCO, therefore, has taken steps to assure the reliability of the system. For example, the quality assurance applied to the Level 8 trip instrumentation is equal or very close to that prescribed by Appendix B.[89] Additionally, a technical specification that requires periodic surveillance to assure operability of the trip has been proposed.[90] In light of its limited effects in the event of failure, we believe that the Level 8 trip has received appropriate attention.

(v) Rod Block Monitor

Together with the local power range monitor (LPRM) and the reactor manual control (RMC) systems, the rod block monitor (RBM) is designed to prohibit the erroneous withdrawal of a control rod and thus to prevent local fuel damage.[91] The RBM will initiate a rod block signal to the RMC system to stop drive motion during the worst single rod withdrawal error.[92] Before the Licensing Board, the County cited the RBM as another example of a system which should have been, but was not, classified as safety-related.[93] On appeal, the County no longer contends that the RBM need be treated as safety-related, but argues that it demonstrates the need for an "important to safety" classification that is broader in scope than the safety-related category.[94] As we have seen, the Commission has adopted that position. Because the County does not identify any quality assurance deficiencies with regard to this system, its concern must be deemed satisfied.[95]

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[86] Tr. fol. 4346 at 145 (Burns, *et al.*). As noted earlier, even if a feedwater controller failure occurred together with a failure of the Level 8 trip and turbine bypass system, at most the result would be only a small degree of fuel rod damage, insufficient to cause undue risk to the public health and safety. *See* p. 1120, *supra*.

[87] Tr. 4820 (Robare).

[88] Tr. fol. 4346 at 145 (Burns, *et al.*).

[89] Tr. 4821 (Robare).

[90] Staff Exh. 2A at 7-19. *See* note 64, *supra*.

[91] Tr. fol. 4346 at 141 (Burns, *et al.*).

[92] *Ibid.*

[93] Tr. fol. 1114 at 40 (Goldsmith, *et al.*).

[94] Suffolk Brief at 14.

[95] The RBM is subject to the quality assurance requirements of Appendix B. *See* FSAR at 7.6-62, § 7.6.2.5.5. In addition, LILCO indicated that "full safety system criteria" are applied to the signal sent by the LPRM to the RBM. Tr. fol. 4346 at 142 (Burns, *et al.*); *see also* Tr. 4796-98 (Robare). The RMC

(Continued)

(vi) Reactor Water Cleanup System

The Reactor Water Cleanup (RWCU) system continuously removes a small amount of water from the reactor coolant system for purification and then returns the water via a feedwater system injection line.[96] The County cites portions of the RWCU system listed in Table 3.2.1-1 of the FSAR as examples of improper classification by LILCO.[97]

The RWCU system serves no safety function.[98] But a portion of that system, up to and including the outermost containment isolation valve in the suction lines, is part of the reactor coolant pressure boundary.[99] Under the traditional criteria used to determine safety-related items, only this portion of the system need be, and is, classified by LILCO as safety-related.[100] The remainder of the system can be isolated from the reactor by motor-operated valves and check valves[101] and, thus, need not be considered safety-related.[102] We agree with LILCO that the RWCU system has been properly classified for its intended function.[103]

2. License Condition

After concluding that there is a distinction between the terms "safety-related" and "important to safety," the Licensing Board imposed a condition upon the Shoreham operating license. Insofar as the classification and qualification of structures, systems, and components is concerned, the condition obligates LILCO to "acknowledge[] and adopt[]" the Board's definition of the term "important to safety."[104] The Board concluded, howe , that despite its incorrect usage of the terms,

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system, however, is not designed to full safety system standards even though LILCO does believe it to be of high quality. Tr. fol. 4346 at 143 (Burns, *et al.*). Regardless, these systems do not have to be safety-related because failure of the rod block function would result in only minor (if any) damage to a few fuel rods with no significant threat of radioactive release. *Id.* at 141; Tr. 4787-88, 4797 (Robare).

[96] Tr. fol. 4346 at 164 (Burns, *et al.*).

[97] Tr. fol. 1114 at 24-25 (Goldsmith, *et al.*).

[98] Tr. fol. 4346 at 165 (Burns, *et al.*).

[99] *Id.* at 164.

[100] *Ibid. See* p. 1113, *supra*.

[101] Tr. fol. 4346 at 164 (Burns, *et al.*).

[102] It is true, as the County notes, that additional components of the RWCU system are classified as Quality Group C, "safety-related" under Regulatory Guide 1.26, in a separate cl sification scheme designed to satisfy that regulatory guide. *See* Tr. fol. 1114 at 25. Nonetheless, we agree with the staff that these components need not be subject to the Appendix B QA program. Tr. fol. 6357 at 13-14 (Speis, *et al.*). In this instance, the regulatory guide does not provide an accurate measure of the necessary QA treatment. Moreover, as we discuss *infra*, regulatory guides are not binding standards.

[103] The classification of other systems (e.g., the water level indication system) challenged by the County at the hearing either was not pursued on appeal or is questioned for purposes other than quality assurance treatment, such as system interaction analysis, which is discussed *infra* at section II. Nevertheless, we have reviewed the record concerning these systems and conclude that they have been subject to quality assurance requirements commensurate with their intended functions.

[104] LBP-83-57, *supra*, 18 NRC at 563. *See also id.* at 635.

LILCO has met all Commission requirements and modifications would not be likely to result from the condition.[105] Although it thought changes were unlikely, the Licensing Board perceived two reasons for the condition:

> (1) [to] confirm the Commission's regulatory authority over [structures, systems and components] and related activities beyond those which are safety-related, and
>
> (2) to assure, as a regulatory requirement, the continuation by LILCO of the application of quality assurance [to] important to safety [structures, systems, and components] and related activities, commensurate with their safety function.[106]

The staff originally was satisfied that the Licensing Board's condition requiring adoption of an "important to safety" classification was appropriate.[107] We have since been advised by the staff that it believes that the Commission's recent recognition of this separate quality assurance class in CLI-84-9 [108] obviates the need for the license condition.[109] Similarly, LILCO is of the view that, given CLI-84-9, no license condition is necessary either to confirm NRC regulatory authority or ensure LILCO's compliance.[110]

For its part, Suffolk County did not present to us its views on the effect that CLI-84-9 might have on the need for the license condition. We assume, therefore, that the County stands by its original appellate position that the license condition is not only necessary but does not go far enough in requiring LILCO to apply the definitional distinction between "important to safety" and "safety-related."[111] Presumably, the County would have us impose additional requirements upon LILCO. In particular, it seeks to have LILCO identify all "important to safety" structures, systems, and components, and then modify all plant documents to reflect this change. It then wants LILCO to produce evidence of a quality assurance program for all items in the "important to safety" category.[112]

In light of the Commission's guidance, we agree with the staff and LILCO that the license condition imposed by the Board is no longer

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105 *Id.* at 563.
106 *Id.* at 563-64.
107 Staff Brief at 60-71.
108 *Supra*, 19 NRC at 1323.
109 NRC Staff Response to Order of June 7, 1983 Allowing Comments on the Application of CLI-84-9 (July 6, 1984) (hereafter Staff Response) at 5-7.
110 LILCO's Views on CLI-84-9 (July 6, 1984) at 5-6.
111 Suffolk Brief at 11-17.
112 *Id.* at 12-13.

necessary. By its decision in CLI-84-9, the Commission clearly exercised its authority to regulate other than safety-related items. Further, the Commission's authority to regulate all items contained in a nuclear power plant in order to protect the public health and safety is made clear by the Atomic Energy Act of 1954, as amended.[113] The license condition, therefore, adds nothing to the authority of the Commission to regulate in this area.

As to the second purpose ascribed to the condition — to assure continued application of quality assurance to "important to safety" items — other means of enforcement exist. LILCO's commitment to continue to apply certain quality assurance measures to "important to safety" equipment appears in its FSAR.[114] The FSAR constitutes part of a license application upon which a license approval is based. As stated in 10 C.F.R. Part 2, Appendix C, § IV.E, the "NRC expects licensees to adhere to any obligations and commitments . . . and will not hesitate to issue appropriate orders to make sure that such commitments are met." No further assurance is required.[115]

For these reasons, the license condition imposed by the Licensing Board is no longer warranted and, accordingly, is vacated.

II. SYSTEMS INTERACTION

The subject of systems interaction was introduced into this case as part of a broad contention (7B) that was crafted by the Licensing Board from related contentions proffered by the intervenors.[116] The contention read as follows:

> LILCO and the [s]taff have not applied an adequate methodology to Shoreham to analyze the reliability of systems, taking into account systems interactions and the classification and qualification of systems important to safety, to determine which sequences of accidents should be considered within the design basis of the plant, and if so, whether the design basis of the plant in fact adequately protects against every such sequence. In particular, proper systematic methodology such as the fault-tree and event-tree logic approach of the IREP program or a systematic failure modes and effect analysis has not been applied to Shoreham. Absent such a methodological approach to defining the importance to safety of each piece of equipment, it is not

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[113] *See* section 161(i), 42 U.S.C. 2201(i).

[114] Tr. fol. 20,654, LILCO Exh. 70, at Insert "A"; Tr. 21,071; Tr. 21,119. *See also* LILCO's Reply Brief (March 2, 1984) at 12 n.10.

[115] In fact, the license condition has the potential for causing difficulty. First, a potential conflict could arise between the condition and the Commission's ultimate resolution of the matter in its rulemaking. Second, it might convey the impression that, absent such a condition, the Commission would lack regulatory authority over other than safety-related items at a particular facility.

[116] LBP-82-19, 15 NRC 601, 604 (1982).

possible to identify the items to which General Design Criteria 1, 2, 3, 4, 10, 13, 21, 22, 23, 24, 29, 35, 37 apply, and thus it is not possible to demonstrate compliance with these criteria.[117]

The Licensing Board found, as a threshold matter, that there is no direct, explicit NRC regulatory requirement for LILCO to perform a single, comprehensive systems interaction analysis for Shoreham.[118] Based on the numerous and diverse studies bearing on systems interaction actually performed by LILCO,[119] the Board concluded:

> We are persuaded that despite the County's position to the contrary, LILCO has far exceeded any regulatory requirements for systems interaction analysis and that the totality of these analyses, although not performed as a dedicated, single exercise, nevertheless represents the equivalent of such an exercise, performed in a thoroughly professional manner. The County has failed to identify any systems interaction that has not been considered and has failed to identify any structure, system or component that is improperly classified.[120]

The Board recognized that systems interaction is listed as one of the "Top 20" so-called Unresolved Safety Issues (known as USI A-17) and that progress toward resolution of A-17 had been delayed.[121] The Board nevertheless agreed with the staff that there is no undue risk to the public associated with operation of Shoreham pending resolution of the item.[122] Further, the Board found that "the [s]taff position on USI A-47 [a specific systems interaction, discussed at pp. 1135-37], is acceptable, i.e., the [s]taff will review the analyses to be supplied by LILCO . . . to assure that they do not represent an undue risk to the public health and safety."[123] As a result, the Board concluded that this part of the contention must fail.[124]

The County objects to the Licensing Board's conclusions regarding the applicant's search for adverse systems interactions at Shoreham.[125] In particular, according to the County, the Board erred in concluding that (1) there is no direct explicit regulatory requirement for LILCO to conduct a systematic systems interaction analysis for Shoreham, and (2) the County failed to identify any systems interaction that had not been

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[117] *Id.* at 611.
[118] LBP-83-57, *supra*, 18 NRC at 549.
[119] These analyses are listed by the Board at 18 NRC 551-53.
[120] *Id.* at 553.
[121] FF J-143 (slip opinion at 511).
[122] LBP-83-57, *supra*, 18 NRC at 554.
[123] *Id.* at 555.
[124] *Ibid.*
[125] Suffolk Brief at 18.

considered.[126] The County also objects to the Licensing Board's treatment of Unresolved Safety Issues A-17 and A-47.[127] We address these arguments below.

A. Regulatory Requirements and Systems Interaction Studies

The County argues that there is a requirement under Commission regulations that applicants systematically assess their reactor designs for potentially adverse systems interactions.[128] "Such an assessment," the County maintains, "while perhaps not a single study, must be sufficiently comprehensive to provide confidence that all serious potential interactions have in fact been identified."[129] The County points to Appendix A to 10 C.F.R. Part 50 and one of our *North Anna* decisions[130] as support for its position.

The County acknowledges that there is no express regulatory premise for requiring a single study directed exclusively to systems interactions at nuclear power plants.[131] As the Licensing Board noted, there is also no uniformly recognized definition of "systems interaction" or any generally accepted methodology for conducting studies of systems interaction.[132] This is not to say, of course, that potential systems interaction problems may be left unaddressed. There is general agreement that an applicant must "provide assurance that the independent functioning of safety systems is not jeopardized by preconditions in the plant design (particularly dependencies hidden in supporting and interfacing systems) that cause faults to be dependent."[133] In other words, an applicant must demonstrate that safety systems are not compromised because of their interrelationship with nonsafety or other safety systems.

As the Licensing Board additionally observed, there are various techniques for evaluating systems interactions, each with its own strengths and weaknesses, and the most effective way to identify potential systems

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[126] *Ibid.*

[127] *Id.* at 28-43.

[128] *Id.* at 22-25.

[129] *Id.* at 25.

[130] *Virginia Electric and Power Co.* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-491, 8 NRC 245 (1978).

[131] Suffolk Brief at 22-25. *See generally Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-728, 17 NRC 777, 810-11 (1983).

[132] LBP-83-57, *supra*, 18 NRC at 548.

[133] *Ibid. See* Tr. fol. 6357 at 34-35 (Speis, *et al.*). Systems interaction is defined by LILCO as a subset of dependent failures whereby one system or component interacts with a second system or component in such a way that it may affect the function of the second system or component. Tr. 5018-19 (Kascsak). We consider the above definition of systems interaction sufficient for our use in this decision.

interaction problems is through a combination of various techniques.[134] At issue is the thoroughness and efficacy of the numerous studies related to systems interaction performed by LILCO and others that were discussed at the hearing.[135]

The County condemns the studies because they "do not constitute systematic analyses performed *for the purpose of identifying* potential adverse systems interactions and incorporating those data into LILCO's classification scheme."[136] The Licensing Board was satisfied, however, that systems interaction problems were adequately analyzed to assure that the Shoreham design protects the public from credible accidents despite the lack of a single comprehensive analysis.[137] So are we.

As noted earlier, the Board reviewed a wide variety of evaluations pertaining to systems interaction. The County insists that we should question the value of two studies because they failed to identify the potential interaction (known in this proceeding as the "Michelson concern") resulting from a reactor vessel water level sensing line break.[138] These two studies are the water level measurement error analysis performed by General Electric in 1981 (GE Study)[139] and the Shoreham probabilistic risk assessment (PRA) performed by Science Applications Incorporated. The County focuses particularly on the PRA. In its view, the PRA's methodology was deficient and, additionally, its results were not analyzed to identify or assess potential adverse interactions.[140] Specifically, the County argues, first, that the PRA failed to detect a sensing line break. Moreover, it submits that the PRA was not a systems interaction analysis because it was not undertaken for that purpose and did not consider several external initiating events and their potential impact on interactions.[141] Finally, it asserts that there is no persuasive evidence that potential adverse systems interactions that may have been identified in the Shoreham PRA have been addressed in any systematic way by LILCO.[142]

We do not consider these studies or LILCO's overall systems interaction review fatally flawed. The Shoreham PRA was designed to identify systematically postulated accident sequences and the failures which can

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134 FF J-39 (slip opinion at 476).
135 *See* FF J-51 to J-141 (slip opinion at 480-510).
136 Suffolk Brief at 25-26 (emphasis in original).
137 LBP-83-57, *supra*, 18 NRC at 576.
138 Suffolk Brief at 26. *See* our discussion of this potential interaction (the Michelson concern), *infra*.
139 Tr. 5329 (Robare).
140 Suffolk Brief at 26.
141 *Id.* at 27.
142 *Id.* at 28.

cause them.[143] Although we believe the PRA should have detected the sensing line break, we are satisfied that this failure does not undermine the entire study. The sensing line break problem was omitted from the PRA because its frequency of occurrence was underestimated by the analysts performing the study.[144] This would not automatically affect other aspects of the study. Perhaps more importantly, a basic purpose of employing a battery of analyses is to ensure that genuine problems will be uncovered despite a failure in an individual analysis. The sensing line break problem was separately analyzed by LILCO and General Electric and found not to be significant.[145]

We agree with the County that a PRA is not equivalent to a systems interaction study. Nevertheless, a PRA will identify systems interactions if it employs the event tree/fault tree methodology.[146] This methodology was used at Shoreham.[147]

Plant walkdowns were used both to develop the event tree/fault tree models[148] and to identify potential independent multiple system failures (i.e., systems interactions).[149] The County argues generally that the walkdowns were limited and not performed in a manner designed to search comprehensively for potential interactions.[150]

In this connection, the County pointed below to the fact that the walkdowns at Shoreham were on a smaller scale than those performed at the Diablo Canyon and Indian Point plants.[151] The evidence indicated, however, that the County's comparison is inappropriate. The purpose of the walkdowns in the Shoreham PRA was to identify system dependencies and interfaces which could disable multiple systems.[152] The systems

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[143] Tr. fol. 4346 at 87 (Burns, *et al.*).

[144] Tr. 6171 (Burns). *See also* Tr. fol. 4346 at 120-21 (Burns, *et al.*).

[145] Tr. 6176-77 (Burns, Kascsak). As earlier noted, the County also criticizes the GE water level measurement error analysis for its failure to detect a sensing line break. Tr. fol. 4346 at 64 (Burns, *et al.*). That study was not intended to analyze such a break.

[146] Tr. fol. 4346 at 71 (Burns, *et al.*). The plant event trees delineate the accident sequences leading to core damage. The fault trees are used to assess the failure probability for each function or system displayed as a branch point in the event trees. Hence, the event trees should account for intersystem dependencies given a representative spectrum of initiating events while dependencies on common support systems should be accounted for in the fault trees. *Id.* at 72.

[147] *Id.* at 87. We note that the disagreement among the parties concerning the definitions of the terms "important to safety" and "safety-related" does not affect the determination of the acceptability of the Shoreham PRA. The PRA methodology disregards labels such as "safety-related" and "nonsafety-related" and evaluates the performance of systems entirely on their engineered or reliability merits. *Id.* at 73. Consequently, the analysis considers interactions between safety-related systems and between safety-related and nonsafety-related systems. *Id.* at 100; Tr. 5897 (Kascsak).

[148] Tr. fol. 4346 at 101 (Burns, *et al.*).

[149] *Id.* at 102.

[150] Suffolk Brief at 27.

[151] *See* Suffolk County's Proposed Opinion, Findings of Fact, and Conclusions of Law in the Form of a Partial Initial Decision (Jan. 31, 1983) at 73-74, 248-50.

[152] Tr. fol. 4346 at 102 (Burns, *et al.*).

interaction study at Diablo Canyon had a different purpose. It consisted of an extensive walkdown of plant systems searching for potential failures of non-seismic qualified structures, systems, and components that could affect the functioning of safety-related equipment.[153] Moreover, according to the staff, the Diablo Canyon study had gone beyond the regulatory requirements with respect to the single failure criterion.[154] Similarly, the Indian Point study was designed to identify and to evaluate seismic-initiated interactions and employed methods and criteria akin to those used at Diablo Canyon.[155] A significant part of the Indian Point walkdown effort involved either the verification or re-creation of system drawings as a result of the age of the plant.[156] In sum, we believe that the Shoreham effort is sufficiently different from the studies conducted at Diablo Canyon and Indian Point to prohibit a direct comparison of the length of the walkdowns at each plant.[157]

The County also argues that the Shoreham PRA is deficient because it excluded certain external events such as fire, sabotage, and earthquakes.[158] These exclusions were reasonable. At the time the Shoreham PRA was initiated, published studies had generally concluded that external events were not a dominant contributor to risk.[159] In addition, the ability to assess seismic and other external effects was a developing technique and had not been demonstrated to be manageable.[160] The exclusion of certain external events from the Shoreham PRA does not render the study deficient. It does mean, however, that this exclusion must be taken into account when determining whether the Shoreham PRA satisfies any requirement that may be forthcoming for a comprehensive systems interaction study.

Finally, the County contends that there is no showing that potential adverse systems interactions that may have been identified in the PRA have been systematically addressed. Specifically, it claims that the LILCO PRA review process "appeared to focus on whether there were any unusual risk outliers, accident sequences, or probabilities identified

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[153] Tr. fol. 6357 at 38 (Speis, *et al.*). The Diablo Canyon study required 55 staff-years of effort for the development of the methodology and system for documenting and keeping track of interactions identified and analyzed. Tr. 7313 (Conran). LILCO's witnesses characterized the Diablo Canyon study as a "brute force method" and did not believe that the walkdown would identify dynamic or hidden dependencies. Tr. 6117-18 (Joksimovich); Tr. 6151 (Burns).

[154] Tr. 7156, 7524 (Conran).

[155] Tr. fol. 6357, Attachment on Indian Point-3 Meeting Summary at 7. *See also* Tr. 7524 (Conran).

[156] Tr. 7515-18 (Conran).

[157] Although we find nothing in the County's presentation or the record to undermine the adequacy of the Shoreham walkdowns, we note that the PRA is still being reviewed by the staff. *See* Tr. 6656 (Thadani).

[158] Tr. fol. 4346 at 82 (Burns, *et al.*).

[159] Tr. 5653-54 (Burns); Tr. fol. 4346 at 82-83 (Burns, *et al.*).

[160] Tr. 5658 (Burns). *See also* Tr. fol. 4346 at 82 (Burns, *et al.*).

at Shoreham that were not common to other similar plants."[161] We can find no fault with LILCO's review of the PRA.

LILCO witness Robert M. Kascsak explained that the reviewers look at the unacceptable interactions identified by the fault trees and event trees and evaluate how particular sequences contribute to the failure of a system or lead to an unsafe condition.[162] If the trees indicate that the plant will not respond as designed, LILCO investigates in more detail.[163] While LILCO looked at Shoreham in light of the experience of other plants,[164] we see nothing in the record to suggest that its overall PRA review looked *only* at those potential problems at Shoreham that were different from those at other plants.

At the time of the hearing, LILCO indicated that the PRA was in draft form and undergoing peer review.[165] Although some interactions that could disable multiple systems had already been identified, these are of such low probability that they do not pose a significant risk to the public.[166] Other potential adverse systems interactions (or other design weaknesses) are being (or will be) addressed by LILCO and the staff. For example, Mr. Kascsak indicated that, as a result of the review process, two design changes were already planned and two other specific analyses were underway.[167]

B. Alleged Failure to Identify a Serious Systems Interaction Problem

The Board found that the County had failed to identify any systems interaction that had not been considered. The County contends that, to the contrary, it did provide a concrete example of a serious adverse interaction between systems to support its claim that the design process and methodology for Shoreham are deficient.[168] In this regard, the County points to the interaction between the reactor protection and feedwater control systems, which is colloquially known in this proceeding as the "Michelson concern."

The facts surrounding the analysis of the Michelson concern are essentially uncontroverted. The reactor protection and feedwater control sys-

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[161] Suffolk Brief at 28.
[162] Tr. 5846-48 (Kascsak).
[163] Tr. 5873 (Kascsak).
[164] Tr. fol. 4346 at 103-04 (Burns, *et al.*).
[165] *Id.* at 107.
[166] *Id.* at 108.
[167] Tr. 5843-45, 5849-53, 6199-200 (Kascsak). *See also* Tr. 6191-94 (Burns).
[168] Suffolk Brief at 18.

tems share instrument sensing lines that monitor reactor vessel water level, and both would be affected by a break in a common sensing line. Such a break could result in a false high water level signal – causing the feedwater control system to reduce feedwater flow rate and, at the same time, eliminating redundancy in the automatic protection system.[169] General Electric has been aware of the common point between these systems for many years.[170] In January 1982, an NRC staff office released a report that described this potential systems interaction. While not deeming the problem of immediate concern, the staff nonetheless believes that it needs to be addressed.[171] LILCO claims that the Shoreham design largely precludes the potential interaction; in any event, it argues, established means are available to accommodate any interaction problem that may occur.[172] Essentially, operator action could mitigate any interaction problem.[173] The staff has determined that there is adequate time for any necessary operator action and, as a consequence, the plant is safe.[174] The County argues that permitting the interaction to remain without a design solution over the years is unacceptable.[175]

The Licensing Board carefully reviewed the Michelson concern and endorsed the staff's judgment that current regulatory requirements and procedures are sufficient to provide reasonable assurance of adequate protection of the public health and safety.[176] We too have reviewed the record and cannot agree with the County that the treatment of the Michelson concern illustrates that a serious interaction problem has been overlooked. The Michelson concern has been known for some time. The five examples of interaction problems associated with that concern noted by the County as evidence of a failure to address the issue were, in fact, listed in the January 1982 staff report[177] and were analyzed for Shoreham.[178] A fully acceptable solution has been devised. We do not agree that the failure to design a 100 percent effective preventive or the need to rely on operating procedures[179] warrants a conclusion that serious

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169 Tr. fol. 5373, SC Exh. 1 at 10.

170 Tr. 5559-60 (Ianni); Tr. 5585, 5588 (Robare).

171 Tr. fol. 5373, SC Exh. 1 at 10. While this interaction can result in the loss of redundancy in the automatic feature of the protection system, the staff does not suggest that the plant design fails to meet any regulatory requirements. Tr. 6895 (Rossi).

172 LILCO's Reply Brief at 15-16. *See also* Tr. fol. 4346 at 157-58 n.39 (Burns, *et al.*); Tr. 4847-48 (Robare).

173 Tr. 5362 (Robare); Tr. fol. 6357 at 31 (Speis, *et al.*).

174 Tr. 6893 (Rossi).

175 Suffolk Brief at 20-22.

176 FF J-540 to J-606 (slip opinion at 653-84).

177 *See* Tr. fol. 5373, SC Exh. 1 at Appendix A.

178 FF J-597 (slip opinion at 680-82).

179 Operators at Shoreham are trained to recognize this event and take proper action. Tr. 5375-76 (McGuire).

systems interactions have gone unaddressed. As a consequence, a review of the Michelson concern does not alter our judgment that systems interactions were adequately considered.

C. Unresolved Safety Issue A-17

As previously noted, there is no explicit NRC requirement for a comprehensive systems interaction analysis of each plant design. Licensing requirements, however, are founded on a defense-in-depth principle and include provisions for design features such as physical separation and independence of redundant safety systems.[180] These design features are supplemented by NRC staff review procedures that assign primary responsibility for review of various technical areas and safety systems to specific groups within the staff. (For example, the acceptability of the facility's containment systems would be addressed by the branch in the Office of Nuclear Reactor Regulation specifically concerned with such systems.) It was this division of responsibility among several staff entities that led the NRC's Advisory Committee on Reactor Safeguards to recommend that the staff give attention to the evaluation of safety systems from a multidisciplinary viewpoint to ensure the identification of potentially adverse systems interactions.

In the wake of this recommendation, the staff initiated Task A-17 in 1977.[181] While that task is categorized as an "unresolved safety issue," it does not focus upon a particular safety problem (such as the cracking of feedwater nozzles in boiling water reactors (Task A-10)). Rather, it is a generic study to confirm that the current safety criteria and NRC review procedures provide an acceptable level of independence and redundancy for systems required for safety.[182]

While the study has not been completed, there has been no indication to date that current NRC review procedures and safety criteria are inadequate to assure that the effects of potential systems interactions are within the design-basis envelope of the plants.[183] More specifically, the staff believes that, even though the study is important and should be completed promptly, those procedures and criteria would identify most, if not all, of the safety-significant interactions and, thus, provide rea-

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[180] Staff Exh. 2A at B-9 and B-10.
[181] *Id.* at B-10.
[182] *Ibid.*; Tr. fol. 20,810 at 5 (Mattson, *et al.*).
[183] Tr. fol. 20,810 at 5 (Mattson, *et al.*).

sonable assurance that the facility under scrutiny can be operated without undue risk to the public health and safety.[184]

Given the staff's view of the matter, together with the numerous completed systems interaction-related studies having specific application to Shoreham (*see* p. 1127, *supra*), the Licensing Board concluded that plant operation need not be precluded pending the completion of the staff's A-17 confirmatory study.[185] We agree. True, as the County points out, one staff witness, James H. Conran, supported its claim that there had been insufficient progress made in the A-17 efforts.[186] But, whether or not the staff should have attached a greater priority to the completion of the project, the fact remains that A-17 is not directed to the remedy of a specific determined safety hazard (e.g., feedwater nozzle cracking). Instead, to repeat, its purpose is to confirm the adequacy of existing review procedures and criteria. At this juncture, there is no concrete suggestion of inadequacy; this being so, we see no reason why the mere possibility that the A-17 project might ultimately disclose a weakness in a procedure or criterion should stand in the way of licensing Shoreham operation now. In this regard, at any particular time the staff presumably has a number of its regulatory directives and processes under re-examination. The pendency of such a re-examination should not preclude the issuance of an operating license in circumstances where reasonable assurance otherwise exists that the facility can be safely operated.[187]

D. Unresolved Safety Issue A-47

Another unresolved safety issue concerns the potential for control system failures or malfunctions interfering with the use of safety equipment in the event of an accident or transient.[188] Until recently, systematic evaluations of control system designs had not been performed to

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[184] Tr. fol. 6357 at 36-37 (Speis, *et al.*); Tr. fol. 20,810 at 5-6 (Mattson, *et al.*); Tr. 20,862-63 (Thadani).

[185] LBP-83-57, *supra*, 18 NRC at 550.

[186] Suffolk Brief at 31 n.15.

[187] *Cf. Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), CLI-84-11, 20 NRC 1, 16 (1984) (operation of the plant need not be held up pending resolution of the staff's generic systems interaction program). We need add only that the County's cause is not advanced by its reliance upon *Virginia Electric and Power Co.* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-491, 8 NRC 245, 247-48 (1978) and *Gulf States Utilities Co.* (River Bend Station, Units 1 and 2), ALAB-444, 6 NRC 760, 775 (1977). Those decisions impose an obligation upon the staff to explain why a generic unresolved safety issue does not stand in the path of construction permit (*River Bend*) or operating license (*North Anna*) issuance. Both, however, were written in the context of unresolved safety issues involving discerned safety problems requiring solutions. As noted in the text above, we do not regard A-17 as fitting that description. In any event, as also indicated in the text, we are satisfied with the staff and Licensing Board explanation as to why Shoreham licensing need not await the completion of the A-17 study.

[188] Staff Exh. 2A at B-15.

determine the effect of control system problems in such circumstances.[189] Therefore, the staff initiated an investigation of such potential interactions, known as USI A-47.[190] Because the effects of control system failures may differ from plant to plant, it is not possible to develop universal solutions to any potential problems.[191] Rather, the purpose of USI A-47 is to define generic criteria that will be used for plant-specific studies and to review the adequacy of current control system licensing requirements.[192]

For Shoreham, no specific evaluation of the control system design has been performed.[193] As we mentioned, systems interactions in general have been studied and to date no undue risk to public health and safety has been discovered (*see* p. 1127, *supra*). The Licensing Board concluded that the ongoing activities associated with USI A-47 were not an obstacle to its operating license authorization.[194] Rather, as the Board saw it, staff review of the matter outside the adjudicatory arena will be adequate.[195]

Contrary to the determination of the Licensing Board, the County asserts that LILCO must complete the studies contemplated by USI A-47 prior to the authorization of a license for Shoreham.[196] In this regard, the County would have LILCO complete two evaluations requested by the staff.[197] Further, the County claims that the results of these studies must be made a part of the adjudicatory record.[198] We agree.

True enough, this issue bears some similarity to USI A-17 (*see* pp. 1134-35, *supra*). Like USI A-17, there has been no showing of a "discerned safety problem."[199] At the time of the hearing, the staff knew of "no specific control system failures or actions at Shoreham or any other plant which would lead to undue risk to the health and safety of the public."[200] Further, staff witness C.E. Rossi testified that serious consequences, not included in those already analyzed for the plant, were

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189 Tr. fol. 6357 at 43, 44 (Speis, *et al.*).
190 *Id.* at 44; FF J-208 (slip opinion at 538).
191 Staff Exh. 2A at B-15.
192 *Ibid.*; FF J-210 (slip opinion at 539).
193 Tr. fol. 6357 at 44 (Speis, *et al.*).
194 LBP-83-57, *supra*, 18 NRC at 555.
195 *Ibid.*
196 Suffolk Brief at 41, 43.
197 *Id.* at 40-41. The staff has requested that LILCO perform evaluations of (1) the effect of power supply, sensor and sensor impulse line failures on several control systems and (2) the effect of high energy line breaks on control systems. Tr. 7440 (Rossi).
198 Suffolk Brief at 41, 42.
199 *See* note 187, *supra*, and cases cited.
200 Tr. fol. 6357 at 44 (Speis, *et al.*).

of "low probability."[201] Moreover, the staff indicated in its SER that should such control system failures occur, they would not result "in serious events . . . or conditions" beyond the capability of safety systems.[202]

There are, however, significant differences between this issue and USI A-17. One notable difference is that in-depth studies have not been performed to verify the staff's expectations in connection with A-47.[203] Importantly, the staff took the position before the Licensing Board that before it could make the reasonable assurance finding necessary for the issuance of a license, it was requiring more information from LILCO.[204]

We, like the staff, do not have sufficient information to conclude that the ultimate resolution of USI A-47 will have no significance for Shoreham. That may well be the case, as some of the staff's testimony indicates. But, without additional analyses, we cannot be sure. Further, the County is entitled to test the basis of any conclusion regarding this matter, in the same manner as any other litigable issue. For these reasons, we remand the questions raised by USI A-47 to the Licensing Board for further consideration in light of any additional information developed by LILCO or the staff.

III. QUALITY ASSURANCE

A. Background

Four contentions concerning quality assurance (QA) at Shoreham were admitted by the Licensing Board for litigation. Contention SC/SOC '2 charged that LILCO has failed to comply with Appendix B to 10 C.F.R. Part 50 because (1) the QA program for the design and installation of structures, systems, and components for Shoreham was not conducted in a timely manner, and (2) there was a pattern of QA breakdowns at Shoreham. Referring to alleged failures in several areas, Suffolk County argued in Contention SC 13 that the description of the operational quality assurance program for Shoreham does not comply with 10 C.F.R. § 50.34(b)(6)(ii) and Appendix B. Contention SC 14 asserted that the NRC staff's Inspection and Enforcement (I&E) program has not adequately verified that LILCO's QA program has been implemented in accordance with 10 C.F.R. § 50.34(a), paragraph 7, and Appendix

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201 Tr. 7456 (Rossi).
202 Staff Exh. 2A at B-15.
203 *Ibid.*
204 Tr. fol. 6357 at 45 (Speis, *et al.*).

B. In Contention SC 15, the County claimed that the Shoreham QA program involved inadequate review and physical inspection to verify compliance with Appendix B and, as a result, a statistically valid audit of QA documentation of physically inspectable structures and components should be performed.[205]

The quality assurance portion of the hearing consumed fifty-five days and generated a massive record. The findings of fact of the Licensing Board extended over 500 pages in the slip opinion. The Board reached specific conclusions regarding numerous areas of controversy. It summarized its conclusions as follows:

> Design, construction and installation at Shoreham have been affected by the long period of construction and the changing requirements of the AEC and NRC during this period. Stepping back from the details of errors made, we have focused on the overall performance of LILCO and the [s]taff at Shoreham. Our perception is that neither has been perfect, nor could it have been with realistic use of resources. Nor is perfect performance expected by the Commission. We do conclude, however, that both LILCO and the [s]taff have had effective programs for identifying and correcting deficiencies. We also conclude that LILCO's and the [s]taff's programs for operation of Shoreham meet the Commission's requirements and will provide adequate protection of the health and safety of the public.[206]

The County objects to a number of the Board's underlying findings. We address these objections below.[207]

B. Technical Issues

1. Compliance of the QA Program with 10 C.F.R. Part 50, Appendix B

Criterion XVIII of Appendix B to 10 C.F.R. Part 50, dealing with audit requirements, provides, in relevant part, that

> [a] comprehensive system of planned and periodic audits shall be carried out to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program.

In its brief, the County argues that Criterion XVIII requires the use of a random-sampling statistical methodology in the selection of items to be audited and that such a methodology is feasible.[208] Because LILCO does

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[205] These contentions are stated in their entirety at FF K-1 to K-4 (slip opinion at 847-50).
[206] LBP-83-57, *supra*, 18 NRC at 580-81.
[207] The County does not categorize its arguments according to individual contentions. We have structured our decision essentially to parallel the County's brief.
[208] Suffolk Brief at 43.

not use such a methodology, the County contends that an audit program has not been established that complies with Criterion XVIII.[209]

Auditing within LILCO's quality assurance program does not involve a 100 percent review of quality assurance items and records.[210] According to LILCO, the audit process is not a product acceptance activity and, consequently, not every work product was examined.[211] Audits were, instead, "aimed primarily at assessing the process of engineering and the process of building the plant. . . ."[212] Samples were selected based on the auditor's specific knowledge of the area; the auditor was allowed flexibility in pursuing more important items.[213] LILCO did not consider random sampling to be effective.[214]

The County submitted below, and reasserts on appeal, that, for accurate extrapolation of the audit results to those activities not audited, the audit program must employ a statistical methodology in making its sample selection.[215] The Licensing Board did not explicitly reject that assertion but concluded that audits acceptable for nuclear power plant applications need not provide the type of "mathematical rigor" the County sought.[216] The Board observed:

> We do need to conclude that the QA program in general meets NRC requirements and, despite whatever lack of mathematical rigor there may be in sampling and overall evaluation, there remains reasonable assurance of no undue risk to the health and safety of the public. This we do, not on the basis of individual noncompliances or lack of rigor, but on the basis of the sum of all factors that contribute to acceptable design, construction and operation. These factors include NRC requirements, professional experience, organization and management, training and procedures and continuing dedication by all concerned.[217]

The County contends that the Board's conclusion is not consistent with the requirements of Criterion XVIII. In its judgment, standing alone LILCO's audits must verify compliance with all aspects of the QA program and determine its effectiveness.[218] According to the County, the Board's consideration of "all factors" is not acceptable.[219]

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[209] *Id.* at 44.
[210] Tr. 12,406 (Eifert).
[211] *Ibid.*
[212] *Ibid.*
[213] Tr. 12,420 (Burns); Tr. 12,446-47 (Eifert).
[214] Tr. 12,413 (Eifert).
[215] Suffolk Brief at 44.
[216] LBP-83-57, *supra*, 18 NRC at 584.
[217] *Id.* at 584-85.
[218] Suffolk Brief at 46.
[219] *Ibid.*

Periodic and planned audits must verify all aspects of the quality assurance program. Contrary to the County's view, however, audits conducted in compliance with Criterion XVIII are not intended to verify every QA *record* or *item* through extrapolation of the audit results. In conformity with standard industry usage, LILCO employed the term "audit" to mean a "documented activity performed in accordance with written procedures or checklists to verify by examination or evaluation of objective evidence that applicable elements of the quality assurance program have been developed, documented, and effectively implemented in accordance with specified requirements."[220] At Shoreham, auditors primarily review the work process in light of their familiarity with various mechanisms that can cause problems, the disciplines that actually performed the work, and the technical guidance that is available to those disciplines.[221]

In our opinion, Criterion XVIII requires the performance of audits to ensure that the quality assurance program as a whole has been effectively implemented. Rather than attempting to verify the accuracy of every QA item or record, the *audit* process determines whether the overall quality assurance program is providing adequate control over activities affecting quality. (This is to be distinguished from quality assurance *inspection* activities, which are in the nature of product acceptance, as the Licensing Board recognized.)[222] To comply with Criterion XVIII, LILCO must identify the activities within the QA program and organize the audit process around these activities.[223] Furthermore, it must conduct audits of all activities on a regular basis. This, in fact, is what LILCO has done.[224] As a result, we find that it has satisfied Criterion XVIII.

As mentioned previously, the Licensing Board considered other factors (such as "NRC requirements, professional experience, organization and management, training and procedures and continuing dedication by all concerned") in arriving at its ultimate finding of reasonable assurance of adequate safety despite the lack of a statistical sampling audit program. The County complains that such reliance on "other factors" is impermissible because a valid audit must either undertake a 100 percent assessment or develop a methodology from which reliable extrapolations to the entire plant may be made.[225] The County misinterprets the

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[220] LILCO Exh. 21 at 23 (Alexander, *et al.*). *See generally* ANSI/ASME NQA-1-1983, "Quality Assurance Program Requirements for Nuclear Facilities," at 5.

[221] Tr. 12,428-31 (Eifert).

[222] *See* FF K-186 to K-189 (slip opinion at 921-23).

[223] Tr. 12,410-11 (Eifert).

[224] *See, e.g.*, LILCO Exh. 21 at 25-31, 112-13, 168-69, and 174-75 (Alexander, *et al.*).

[225] Suffolk Brief at 46.

Board's opinion. The Board relied on these "other factors" — properly, in our view — in reaching its overall conclusion that safety can be assured. It also found — specifically — that the audit program was acceptable even though random sampling techniques were not used. In our opinion, the Board reasonably found, in this latter connection, that judgment sampling in the conduct of audits is consistent with the requirements of Criterion XVIII.[226]

2. *Implementation of LILCO's QA Program*

The Licensing Board concluded that LILCO has implemented its QA program in accordance with 10 C.F.R. Part 50 Appendix B and that the program has been effective.[227] The County disagrees.[228] Its position centers on its belief that the Board erred in interpreting the QA regulatory requirements.[229] We find no error in the Board's analysis.

(a) Classifying a QA Deficiency

According to the County, the Licensing Board improperly concluded that, even if proven, deficiencies should not be considered significant unless they can be linked to actual or potential safety defects. As we understand the County's argument, every deficiency, however minor, reflects an attitude or lack of discipline that undermines confidence that the QA program has been successful. We have reviewed the Licensing Board's approach and find it fully consistent with Commission regulations and governing precedent.

Quality assurance review involves two separate, yet interrelated, inquiries, i.e., whether deficiencies have been uncovered and corrected, and whether a generic problem exists that could affect the confidence in the safety of the facility. As we observed in our *Callaway* decision:

> It would . . . be totally unreasonable to hinge the grant of an NRC operating license upon a demonstration of error-free construction. Nor is such a result mandated by either the Atomic Energy Act of 1954, as amended, or the Commission's implementing regulations. What they require is simply a finding of reasonable assurance that, as built, the facility can and will be operated without endangering the public health and safety. . . . Thus, in examining claims of quality assurance deficiencies,

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[226] LBP-83-57, *supra*, 18 NRC at 611. In light of our determination, we need not reach the question whether the Board correctly resolved in LILCO's favor the issue of feasibility of random sampling.
[227] *Id.* at 580-81.
[228] Suffolk Brief at 48.
[229] *Id.* at 49.

one must look to the implication of those deficiencies in terms of safe plant operation.

Obviously, this inquiry necessitates careful consideration of whether all ascertained construction errors have been cured. Even if this is established to be the case, however, there may remain a question whether there has been a breakdown in quality assurance procedures of sufficient dimensions to raise legitimate doubt as to the overall integrity of the facility and its safety-related structures and components. A demonstration of a pervasive failure to carry out the quality assurance program might well stand in the way of the requisite safety finding.[230]

The Licensing Board considered, individually, numerous audit and surveillance findings relative to construction of the Shoreham facility.[231] It found the identified deficiencies to be minor, readily correctable, and posing no concern about the adequacy of the Shoreham design, construction or installation.[232] We find no fault with the Board's approach. Contrary to the County's suggestion, all deficiencies need not be treated alike when evaluating the efficacy of a QA program. Obviously, problems genuinely affecting the safety of the plant must be cured before the plant can be permitted to operate. Indeed, Criterion XVI of Appendix B requires specific actions in the event that "significant" deficiencies are identified.[233] Thus, in determining whether significant defects have been uncovered and corrected the Licensing Board should — indeed must — make a judgment respecting the importance of particular defects.

We do not mean to suggest that minor defects may be disregarded. In reviewing quality assurance, after all, a licensing board must be satisfied not only that construction defects have been corrected but that there has been no overall breakdown in quality assurance procedures. In this connection, numerous imperfections, even if minor, may, as the County suggests, be indicative of a more widespread or generic quality assurance problem. That is quite different, however, from the County's position that no QA deficiencies can be considered minor.

(b) Defining a QA Violation

The County argues that the Licensing Board "compounded its error in classifying certain QA/QC deficiencies as 'minor,' etc., by failing to rule

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[230] *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983).

[231] *See generally* LBP-83-57, *supra*, 18 NRC at 586-601.

[232] *See id.* at 601.

[233] Criterion XVI of Appendix B requires, in part:

> Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition.

correctly regarding what constitutes a QA/QC violation or noncompliance in the first place."[234] The Board determined that not every violation of an internal quality assurance program procedure uncovered by LILCO or Stone and Webster (S&W) auditors represented a violation of Appendix B.[235] In the County's view, any failure to comply with the requirements of a QA manual, operating procedure or other document implementing a portion of the QA program constitutes a violation of Appendix B.[236] We agree with the Board's approach.

Criterion XVI of Appendix B recognizes that deficiencies will occur, and establishes requirements for their identification and correction. Further, Criterion XVIII requires the reaudit of deficient areas. Thus, it is clear that the mere identification by an applicant of a deficiency as part of an audit conducted in accordance with its QA program does not *per se* constitute a violation of the Commission's regulations. That is not to say that a violation of an applicant's QA manual, operating procedures or other QA document may not, if sufficiently serious, constitute a violation of Appendix B. But, contrary to the County's argument, not *every* violation of implementing manuals or procedures constitutes an Appendix B violation. Indeed, the Commission's enforcement practice is as follows:

> Because the NRC wants to encourage and support licensee initiative for self-identification and correction of problems, NRC will not generally issue a notice of violation for a violation that meets all of the following tests:
>
> (1) It was identified by the licensee;
>
> (2) It fits in Severity Level IV or V;
>
> (3) It was reported, if required;
>
> (4) It was or will be corrected, including measures to prevent recurrence, within a reasonable time; and
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> (5) It was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation.[237]

The examples set out in the County's brief are consistent with this enforcement practice and the Board's approach.[238]

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[234] Suffolk Brief at 58.

[235] FF K-309 (slip opinion at 978).

[236] Suffolk Brief at 59-60.

[237] 10 C.F.R. Part 2, Appendix C, § IV.A.

[238] Tr. 16,730 (Higgins). The current staff method for defining violations includes five severity levels with Severity Level I being the most severe and Level V the least severe. Tr. 13,815 (Eifert). These levels are roughly distinguished as follows: Levels I and II — very significant regulatory concern, Level III — significant concern, Level IV — less serious but more than minor concern, and Level V — minor safety significance. Tr. 17,119 (Higgins). *See* 10 C.F.R. Part 2, Appendix C, § III.

(c) Specific Areas of QA Program Implementation

The County contends that the Licensing Board erred in its consideration of specific deficiencies related to LILCO's QA program.[239] To support its argument, the County discusses three examples which it believes demonstrate the error in the Board's conclusion that LILCO effectively implemented its QA program. We address the County's examples separately.

(i) Housekeeping

During the construction and operation of nuclear power plants, utilities are required by the Commission's regulations to ensure that activities affecting quality are accomplished under controlled conditions such as adequate cleanliness.[240] At Shoreham, LILCO has established housekeeping procedures to minimize the accumulation of dirt and debris in all areas of the plant.[241] To the extent they cover areas involving safety-related equipment, those procedures are part of the implementation of Appendix B requirements.[242]

There has been a history of poor implementation of housekeeping procedures at Shoreham. From a staff inspection in 1979 through the Readiness Assessment Team (RAT) inspection in January 1983, continuing inadequacies in housekeeping were identified.[243] These shortcomings persisted despite notices of violation issued by the staff, commitments for improvement by LILCO, and meetings between the staff and LILCO management. Finally, during the RAT inspection, the staff determined that housekeeping was still not acceptable, and it issued Confirmatory Action Letter (CAL) 83-01 on January 19, 1983.[244]

In response to that letter, LILCO agreed to undertake a series of actions to resolve the housekeeping problems:

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[239] Suffolk Brief at 61.

[240] Criterion II of Appendix B states, in part:

> Activities affecting quality shall be accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity, such as adequate cleanness; and assurance that all prerequisites for the given activity have been satisfied.

[241] Tr. 11,925 (Kelly, Arrington, Museler).

[242] Tr. 11,926 (Museler).

[243] The details of these problems are given at FF K-706 (slip opinion at 1142-43); K-724 (slip opinion at 1149); K-731 (slip opinion 1151-52); K-741 (slip opinion at 1155); K-751 (slip opinion at 1159-60).

[244] Tr. 20,009 (Greenman); Staff Exh. 12; Confirmatory Action Letters are documents confirming an applicant's agreement to take certain actions to remove significant concerns about health and safety, safeguards or the environment. 10 C.F.R. Part 2, Appendix C, § I.E(4).

(a) A general clean-up of the major buildings in the plant will be conducted on at least a weekly basis. Additional craft personnel will be assigned full-time to housekeeping duties until [p]lant readiness is acceptable to NRC inspectors. Fifty additional laborers have already been dedicated full-time to this process.

(b) Specific eating areas were established in the [p]lant even within zone 5 areas which normally permit eating and smoking.

(c) Specific verbal instructions have been and will continue to be provided to [p]lant personnel and to all manual construction personnel regarding housekeeping policies.

(d) Inspections have been and will be conducted of all areas by LILCO management personnel and these inspections will be documented.

(e) Field quality assurance will monitor these additional activities as part of their normal surveillance program.

(f) LILCO has initiated weekly Monday morning walking tours of the reactor building, control building, and screenwell with the following personnel generally in attendance:

1. Manager of Construction and Engineering;
2. General Superintendent of Construction;
3. Safety Supervisor (head of [p]lant clean-up program);
4. NRC Resident Inspector; and
5. Field Quality Assurance Manager.[245]

In light of these recent staff and LILCO actions concerning housekeeping, and the staff's assertion that none of the housekeeping issues had safety implications, the Board found that the housekeeping problems had been adequately resolved.[246]

Before us, the County contends that the repeated housekeeping deficiencies illustrate lack of compliance with Appendix B.[247] According to the County, the repetitive nature of the deficiencies demonstrates not only that proper corrective action was not implemented, but also that it is not possible to depend on commitments by LILCO management.[248] As a result, the County would have us find that the Board erred in relying upon LILCO's commitments in response to the Confirmatory Action Letter regarding housekeeping.[249]

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[245] Tr. fol. 19,757 at 21-22 (Museler, *et al.*). In three weekly tours conducted subsequent to these measures, improvements in housekeeping were noted, although additional efforts were considered necessary. Tr. 20,051-52 (Higgins); Tr. fol. 19,757 at 22 (Museler, *et al.*).

[246] LBP-83-57, *supra*, 18 NRC at 598-99.

[247] Suffolk Brief at 65-66.

[248] *Ibid.*

[249] *Id.* at 66. The County also argues that the Confirmatory Action Letter cannot be relied upon because it was not permitted to present evidence on the letter. *Id.* at 66-67. This argument is actually part of the County's assertion that the Board below erred in prohibiting the County from presenting direct testimony regarding the RAT inspection. We discuss that overall assertion in section III(C), *infra*.

We agree with the County that, given LILCO's past lack of diligence in correcting housekeeping deficiencies at Shoreham, the Licensing Board erred in finding the matter had been adequately resolved. It may well turn out that LILCO will totally fulfill the commitments it made in response to the Confirmatory Action Letter. In the circumstances, however, we do not believe that the Board justifiably could terminate its consideration of the housekeeping issue on the strength of an assumption to that effect. Rather, the Board should have kept the issue open to await LILCO's further actions to ensure that housekeeping problems no longer existed. Accordingly, we shall remand this phase of the proceeding to the Licensing Board and require the staff to certify to the Board that LILCO has met its commitments and is maintaining an appropriate level of cleanliness. The Board shall review the staff's certification and determine whether compliance has been achieved.[250]

(ii) Control of Calculations

A second example of the Licensing Board's error with respect to QA compliance, according to the County, concerns the Board's treatment of calculation deficiencies, particularly related to the "ready traceability" of data.[251] Ready traceability involves the ability to identify the source of the data, as well as the computer program (if any) employed in performing particular calculations.[252] As a result of a review of audits of Stone and Webster's Shoreham engineering project by its Engineering Assurance Division since 1973, twenty-nine deficiencies concerning ready traceability have been identified in audit observations.[253] The Licensing Board discussed this issue as follows:

> S&W [Stone and Webster] asserted that there always was traceability, but that in S&W's own view there was not positive ("ready") traceability of the kind that S&W

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[250] We take into account the staff's assessment that none of the identified housekeeping deficiencies posed a safety problem. Nonetheless, we believe strict compliance with the actions set out in CAL 83-01 is necessary to ensure that deficiencies with safety significance do not arise in the future. In this connection, at oral argument, the County made clear that it did not believe that housekeeping problems justified denial of a license. Rather, it sought only to guarantee that items important to safety have been maintained in a clean condition. App. Tr. 103-07. Although the County was somewhat unsatisfied with the staff's monitoring of cleanliness and sought an audit by some independent, outside auditors approved by the Licensing Board, App. Tr. 104, we are confident that our requirement that the Board approve a staff certification will be sufficient to guarantee that housekeeping receives proper attention from the LILCO management.

[251] Suffolk Brief at 67.

[252] Tr. 13,323-24; 13,332-33 (Eifert).

[253] LILCO Exh. 24, Tr. fol. 13,320; SC Exh. 51; SC Exh. 53, Tr. fol. 10,726. An "audit observation" is defined in the Stone and Webster Quality Assurance Program Manual as "[a] description of each program deficiency in sufficient detail to assure that corrective action can be effectively carried out by the audited organization." LILCO Exh. 21, Attachment 5 at III-4.

procedures required. In some instances it took as much as 10 hours to find the input for a given analysis. The observations did not indicate that the input used was incorrect or that the calculation reviewer failed to review the corrections of the input. Nevertheless, S&W, through its audit program, ensured that action was taken to correct the conditions identified by each observation in this category . . . . We conclude that any deficiencies in this area had no adverse impact and have been satisfactorily corrected.[254]

The County asserts that the Licensing Board failed to "come to grips with" the QA implications of these deficiencies.[255] According to the County, these deficiencies "are not simply items of 'minor' concern . . . whose significance/insignificance can be resolved just by determining whether there has been correction or a potential, identifiable safety impact."[256] Based on the repeated failures of Stone and Webster to comply with its procedures for ready traceability, the County maintains that LILCO's QA program was not effective in implementing the requirements of Criterion V of Appendix B or in taking necessary corrective and preventative action.[257]

In advancing this line of argument, the County acknowledges that the "ready traceability" problems have not caused safety defects.[258] It nonetheless would have us find that the existence of these deficiencies reveals some inadequacy in the Shoreham QA effort. This is not necessarily so. Appendix B, after all, does not establish requirements for the maximum amount of time allowed in tracing the data used in design calculations. Criterion XVII, Quality Assurance Records, requires simply that records be "identifiable and retrievable." Stone and Webster personnel were always able to trace the data, although in some instances it took as long as ten hours to find the input for a given analysis.[259] Thus, there was traceability, but not as prompt as required by Stone and Webster internal procedures.[260] We are unprepared to condemn LILCO's QA program as a result of an effort (not completely successful as of the time of the hearing) to establish a strict system for traceability. In our opinion, applicants and licensees should be encouraged to improve on the general re-

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[254] LBP-83-57, *supra*, 18 NRC at 587.

[255] Suffolk Brief at 68.

[256] *Ibid.*

[257] *Id.* at 71. Criterion V, Instructions, Procedures, and Drawings, of Appendix B states:

> Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

[258] Suffolk Brief at 69.

[259] Tr. 10,540 (Eifert).

[260] Tr. 10,540-41 (Eifert).

quirements of Appendix B. Given the acknowledged lack of any genuine safety shortcoming resulting from the "ready traceability" issue, we find no fault with the QA program in this regard.

Apart from this issue, the County suggests generally that failure to follow rules for the control of calculations can lead to safety concerns.[261] The County asserts that "there were a number of calculation audit findings, resulting from failure to follow procedural requirements, which clearly had potential to affect safety."[262] The Licensing Board specifically reviewed those findings, however, and determined that the deficiencies in this area had been satisfactorily resolved. The Board concluded

> that deficiencies identified in this area were minor and were readily corrected without impact on the adequacy of the Shoreham design, construction and installation.[263]

We also have reviewed the audit findings and agree with the Board's conclusion. The findings appear to identify deficiencies that one would expect to occur in an engineering project of this magnitude extending over a decade.

(iii) Electrical Separation

In the construction of a nuclear power plant, electrical cables must be separated sufficiently to ensure that a failure in one system does not prevent power from being supplied to a redundant safety system. Maintaining sufficient separation has been an on-going problem at Shoreham.[264] The Licensing Board considered this matter and stated:

> Noting the lack of current problems in electrical separation and LILCO's several programs in this area, the Board finds LILCO to comply with Commission requirements.[265]

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[261] Suffolk Brief at 70.

[262] *Ibid.* As an example, the County refers to a problem with large bore pipe supports that resulted in the reperformance of 1800 design calculations with modifications made to about one percent of those supports. *Id.* at 70 n.34. LILCO determined that the primary cause for the need to reperform the calculations was adjustment made to pipe supports during installation. Tr. 10,640-41 (Eifert). Even though some supports were modified following the recalculations, none had lost their entire design safety margin. Tr. 10,641-42 (Museler). While the County did not specify any other audit findings that it believed had the potential to affect safety, LILCO testified that, where necessary, the disclosures contained in the audit findings led to corrective and preventative action. Tr. 13,383-84 (Eifert).

[263] LBP-83-57, *supra*, 18 NRC at 587.

[264] *See, e.g.*, SC Exh. 89B at 4-8; SC Exh. 105, Appendix A; SC Exh. 108, Appendix A; Staff Exh. 8 at 25.

[265] LBP-83-57, *supra*, 18 NRC at 601.

On appeal, the County argues that the Board failed to respond to the question whether LILCO complied with QA requirements for electrical separation.[266] As a result of electrical separation concerns at Shoreham, the County asks us to conclude that LILCO did not implement its QA program in a timely and effective manner.[267]

Adequate separation of electrical cables is a complex area that has been difficult for all nuclear power plants.[268] The staff observed that the Shoreham facility manifested a "little bit higher . . . level of problem" in this area than the average plant.[269] A major reason was the effort by LILCO to implement Regulatory Guide 1.75, which provides guidance for electrical separation.[270] According to the staff, applicants implementing this guide during construction (as LILCO has done) would likely have had similar problems.[271]

We believe that the problems regarding electrical separation have been resolved and are not indicative of a breakdown of LILCO's QA program. Over the extended period of plant construction, certain requirements will inevitably change to reflect increased knowledge and experience of designers and regulators. Electrical separation in particular has undergone considerable re-analysis since the early 1970s. LILCO has had a difficult time in this area but appears to have implemented successfully the final separation criteria.[272]

In the circumstances, we find that LILCO has complied with Criterion II of 10 C.F.R. Part 50, Appendix B by implementing a QA program with respect to electrical separation in a timely and effective manner. It might also be noted that LILCO has agreed to perform partial reinspection of electrical cables as part of an agreement between the parties to resolve another contention.[273] The agreement also includes a provision for a 100 percent inspection if a certain number of deficiencies are identified.[274]

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[266] Suffolk Brief at 71-72.

[267] *Id.* at 72-75. The County refers to Criterion II of 10 C.F.R. Part 50, Appendix B as a basis for the requirement that the QA program should be implemented in a timely manner. That criterion states, in part:

> The applicant shall establish at the earliest practicable time, consistent with the schedule for accomplishing the activities, a quality assurance program which complies with the requirements of this appendix.

[268] Tr. 16,969-70 (Gallo); Tr. 17,161 (Narrow).

[269] Tr. 16,969-70 (Gallo).

[270] Tr. 16,582 (Gallo).

[271] *Ibid.*

[272] Tr. 16,936-37; 16,970-71 (Higgins).

[273] *See* Resolution of SC Contention 31/SOC Contention 19(g) – Electrical Separation, Tr. fol. 18,596 at 5.

[274] *See* Amendment to "Resolution of SC Contention 31/SOC Contention 19(g) – Electrical Separation," Tr. fol. 17,818.

3. Quality Assurance Organization

The LILCO operational quality assurance organization is separated into an onsite Operational Quality Assurance (OQA) Section and an offsite Quality Assurance (QA) Department.[275] The onsite OQA Section is headed by the OQA Engineer, who reports to the Plant Manager. The Plant Manager, in turn, reports to the Vice President, Nuclear. The offsite QA Department is headed by the QA Manager, who reports directly to the Vice President, Engineering. The QA Manager has authority to develop and direct the overall QA program for Shoreham but has no functional or administrative authority over the onsite OQA Engineer. One of the functions of the QA Department, however, is to audit the performance of the OQA Section.[276]

Criterion I of 10 C.F.R. Part 50, Appendix B requires, generally, that the persons and organizations performing quality assurance functions have sufficient authority and organizational freedom to identify quality problems; initiate, recommend, or provide solutions; and verify implementation of solutions. To that end, those persons and organizations are to report to a management level such that the required authority and organizational freedom are provided. In Contention 13, the County asserted that LILCO's operational quality assurance program did not comply with Criterion I. It argued at the hearing that the operational quality assurance organization did not enjoy sufficient independence.

The Licensing Board rejected the County's argument. In assessing the independence of the operational QA function, the Board considered not merely the organizational structure but all aspects of the operational QA program, including oversight by various groups within LILCO. The Board concluded that LILCO's overall program for operational QA provides sufficient organizational freedom and independence from cost and schedule concerns.[277]

The County continues on appeal to press its argument that the LILCO organizational structure is unacceptable.[278] Several considerations, however, convince us that the LILCO operational QA organization has sufficient authority and organizational freedom to satisfy Criterion I of Appendix B. First, the Commission has indicated that there is no need for the rigid separation of quality assurance personnel from individuals having significant responsibility for work performance that is advocated

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[275] LILCO Exh. 21, Attachment 4, sections 1.2.7, 1.2.19 and 1.2.22, and Exhibits (Figures) 1.1 and 1.2.
[276] Tr. 12,718; 12,796-97; 14,902 (Muller); Tr. 20,224-25 (Caphton).
[277] LBP-83-57, *supra*, 18 NRC at 584-85.
[278] Suffolk Brief at 82-87.

by the County.[279] Further, the LILCO organizational structure meets the current staff and industry guidance for providing the necessary freedom and independence for quality assurance personnel.[280] Finally, and most significant, while the onsite OQA Engineer reports to the Plant Manager, the OQA Section is audited by the offsite QA Department. This audit program, along with oversight by other organizational entities within and outside LILCO, provides us with confidence that the LILCO operational quality assurance personnel will have adequate independence from cost and schedule concerns.[281] Contrary to the County's assertion that outside audits and oversight would only detect influence after the fact, we believe that this continuing surveillance of the OQA Section would provide a substantial incentive for proper action by those quality assurance personnel initially.

C. Procedural Issues

The County asserts that various Board procedural rulings prejudiced its ability to present its case. We have reviewed each of the County's charges. In doing so, we start from the proposition that a mere demonstration that the Board erred is not sufficient to warrant appellate relief.[282] "The complaining party must demonstrate actual prejudice — *i.e.*, that the ruling had a substantial effect on the outcome of the proceeding."[283] In each instance we seriously doubt that any error was committed. More importantly, we are convinced that the County has totally failed to demonstrate actual prejudice.

1. The County objects generally to the time limits placed on its cross-examination. Despite the limits, the quality assurance portion of the hearing lasted fifty-five days and involved consideration of scores of County exhibits. Even the County's counsel characterized the hearings as "undeniably long . . . undeniably detailed."[284] During the hearing, the

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[279] *See* 40 Fed. Reg. 3210C (1975); 39 Fed. Reg. 13,974 (1974).

[280] The NRC Standard Review Plan (NUREG-0800) and Revision 2 of Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," accept the LILCO organizational structure. Tr. 20,220-23 (Gilray); Tr. 14,837-38 (Muller). Revision 2 of Regulatory Guide 1.33 endorses American National Standards Institute Standard N18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants," with certain exceptions not relevant here. Tr. 14,837-38 (Muller).

[281] This independent surveillance of the OQA Section was essential to the staff's acceptance of the LILCO organizational structure. Tr. 20,187-88 (Gilray).

[282] *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), ALAB-443, 6 NRC 741, 756 (1977).

[283] *Louisiana Power and Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1096 (1983).

[284] App. Tr. 113.

County was admonished by the Board to pursue its best points first[285] and we must assume that the County did so. While the Board clearly did not accord the County an unfettered right to cross-examine, our review of the record reveals no genuine prejudice flowing from the Board's limitations. We note, moreover, that despite the limits, in only two instances did the County make an offer of proof following a curtailment of cross-examination.[286] In one case, the offer related to issues that were ultimately settled by agreement among the parties.[287] In the other case, involving document control and alleged deficiencies concerning the storage of items in the wrong areas, the County does not attempt to explain how its offer of proof relates to the Board's substantive findings on these issues. Thus, we are hard pressed to see how the Board's limitation genuinely affected the County's case.

2. The County complains that the Board impermissibly required it to restructure its cross-examination plan. Following the first day of highly general foundation examination by the County's counsel, which went largely uninterrupted, the Board urged the County to proceed immediately to that portion of its cross-examination plan that involved the actual examples of quality assurance breakdowns and implementation deficiencies. In the Board's view, any additional foundation questioning could be better pursued after the "nitty-gritty" was revealed.[288] Although the County did not strenuously object to the Board's proposal at the time,[289] it now asserts that a presiding officer should not be "permitted to interfere" with a party's structure of its cross-examination absent "a clear abuse in the conduct of that examination."[290] The County cites no authority for its view, however, and we know of none. On the contrary, the Commission's rules direct the Board to use its powers

> to assure that the hearing is focused upon the matters in controversy among the parties and that the hearing process for the resolution of controverted matters is conducted as expeditiously as possible, consistent with the development of an adequate decisional record.[291]

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[285] *See, e.g.*, Tr. 11,319-21 (Judge Brenner).

[286] *See* Suffolk County Offer of Proof (OQA), SC Exh. 79 (Nov. 9, 1982) and Suffolk County Offer of Proof, SC Exh. 78 (Nov. 5, 1982).

[287] *See* LILCO's Reply Brief at 58. *See also* Joint Status Report on SC Contention 13(a) (OQA Procedures) (June 20, 1983).

[288] *See* Tr. 10,260-61 (Judge Brenner).

[289] Counsel asked for, and received, a recess in order to prepare for the more detailed examination. *See* Tr. 10,265: "If you want me to go to the nitty-gritty, to go through these audits and some other things that establish the pattern, which I am willing to do, I'm not prepared to do so immediately. I think I can be prepared to do so tomorrow morning. . . ." *See generally* Tr. 10,264-74.

[290] Suffolk Brief at 77.

[291] 10 C.F.R. Part 2, Appendix A, § V.

Given that the County's contentions were directed principally to alleged breakdowns in the implementation of the quality assurance program at Shoreham, the Board reasonably required the County to pursue those matters first. The County was not deprived of an opportunity to return to more general matters at a later stage and it has not shown how the Board's action in any way prejudiced its case.

3. The County complains that the Board's requirement that it "state precisely, in advance, which audit findings it would pursue and, in addition . . . , state exactly what [its] theory was with respect to those audit findings" is a departure from ordinary NRC hearing practice.[292] We fail to see that any error was committed or harm done.

Numerous LILCO and Stone and Webster audits were marked for identification as County exhibits during the course of the hearing.[293] Before the hearing began, LILCO and the County agreed to exchange information as to which audits would be used during cross-examination, so that the witnesses could become familiar with them. Apparently as a result of continuing identification by the County of new documents to be used during cross-examination, LILCO asked the Board to direct the County to prepare some statement explaining how each group of audit findings bears on the County's contentions regarding alleged breakdowns in quality assurance.[294] The Board did so, and the County complied.[295] The County does not indicate that it objected to the Board's ruling or how it has been prejudiced by it. Given the extensive audit findings the County sought to examine by way of cross-examination, we cannot conclude that the Board abused its discretion in requiring the County to explain in some detail which audit findings it would examine, and why.[296]

4. The County argues that the Board improperly denied it the right to introduce certain audit reports into evidence. In this connection, the County directs our attention to hearing transcript pages 10,286-89 where, it claims, "the Board refused admission of particular audits into evidence" but required, instead, that the County "go through each audit finding which the County believed supported its case."[297] Its complaint is without merit.

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[292] Suffolk Brief at 77.

[293] See, for example, SC Exhs. 51 and 56. Each of these exhibits collects 30 or more separate audit reports which, together, comprise hundreds of pages.

[294] *See* LILCO's Motion for Further Board Direction on the Conduct of QA Cross-Examination (Oct. 5, 1982) at 15.

[295] *See* Suffolk County Submittal of QA/QC Information (Oct. 11, 1982).

[296] Indeed, the County concedes that, given the highly technical nature of the subject matter, "to some extent, it is appropriate that witnesses know the areas of intended cross-examination so that there can be proper preparation." Suffolk Brief at 77 n.40.

[297] *Id.* at 78.

The County, over the applicant's objection, sought to introduce four exhibits which embrace forty-three separate audits, comprising hundreds of pages of exhibit material. It wanted the exhibits introduced into evidence in their entirety in advance of cross-examination. The Board, instead, directed the County to conduct its cross-examination first, and reserved the right to rule on the admissibility of the exhibits following cross-examination. We see nothing wrong in the Board's approach. In our judgment, the Board was under no obligation to allow the introduction of masses of undigested information but was entitled to limit the evidentiary material to those portions of the audit reports that were genuinely the subject of controversy.[298]

5. The County challenges the Board's decision to limit its presentation concerning the Readiness Assessment Team (RAT) inspection to cross-examination and the filing of proposed findings.[299] The Board denied the County's request to present a witness to address the inspection results. The Board explained:

> The purpose of the inquiry is limited to finding out what the results of the inspection mean, what the staff found and what LILCO's explanation, if any, is for these matters. We don't need another party coming in and telling us what the facts are. We will get the facts in terms of understanding the County's view of the significance of the items. We have had extensive testimony. We will be able to apply these items to that testimony. And that in fact is the very purpose of having these other examples of applying it to the framework of testimony we have. And the County will be able to cross examine and write findings on it. It is just an area that is highly unlikely that we will make any efficient headway with yet another comment on it. We will have the record from LILCO and the [s]taff.[300]

The County asserts "that it was gross, reversible error for the Licensing Board to permit testimony by two parties, both of whom had previously stated that the allegations of [its] Contentions 12-15 were not true and then to deny the same right to present testimony by the one party who had sponsored those contentions, namely Suffolk County."[301]

The RAT inspection was a special, unannounced team inspection of the Shoreham plant conducted in January 1983 by members of the NRC's Region I staff. The inspection was performed to determine the

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[298] The County contends that five weeks of cross-examination was insufficient because of the Board's refusal to admit audits that were not specifically addressed. Suffolk Brief at 78. The Licensing Board, however, did allow the County to group audit findings. *See, e.g.*, Tr. 11,360. As a result, we believe the County was provided adequate time to present its best case.

[299] *See* 18 NRC at 611-14. FF K-1041 (slip opinion at 1277).

[300] Tr. 19,534-35 (Judge Brenner).

[301] Suffolk Brief at 80.

status of operational readiness of the Shoreham facility.[302] The inspection report became available as the extensive quality assurance hearing was drawing to a close. As far as we can tell, the Board's purpose in entertaining testimony regarding the RAT inspection was to determine whether its conclusions called into question the evidence already in the record.[303] This purpose appears to be roughly compatible with the County's objectives.[304] Counsel for the County characterized its purpose for presenting a witness as follows:

> [I]t would be our intent, if we were permitted to file supplemental testimony, it would be focused. It would be, as it is stated, supplemental testimony. I think it would help at the hearing in terms of keying people into what the County would like to examine into.[305]

There is always a potential for prejudice when a board opens the door to new evidence but allows only some of the parties to enter. In the instant case, however, the County appeared interested in presenting affirmative testimony as a means of outlining its areas of concern, rather than presenting additional factual information. As the Board correctly noted, the results of the RAT inspection and LILCO's response to it were matters uniquely within the knowledge of staff or LILCO witnesses. At oral argument, the County acknowledged that it did not intend to address the facts; it argues, however, that it intended to offer expert opinion on what the facts mean.[306] To some degree, such argument could easily be presented in its proposed findings. We cannot ignore, however, that its argument to the Licensing Board suggested only that it wished to outline areas for exploration rather than introduce new, affirmative expert analysis. In such circumstances, the Board quite reasonably concluded that the County's concerns could be amply put forth in its proposed findings. Thus, we see no error in the Board's decision.

Even more important, the County simply alleges an error on the Board's part without demonstrating that the error — if it was an error — was genuinely prejudicial. The County acknowledges that it made no offer of proof in connection with any affirmative expert testimony it

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[302] Staff Exh. 13, cover letter.

[303] Tr. 18,816: "[W]e are here to put all of the evidence together and we can put in what . . . [earlier inspections] said along with what we hear from other witnesses, including perhaps the more correct witnesses for the RAT inspection; that is, the staff and maybe LILCO witnesses who are familiar with the details of that inspection." (Judge Brenner).

[304] Tr. 18,814: "[I]t seems to us . . . that the inspection report makes some determinations in the very areas that were examined and conclusions drawn upon by Torrey Pines with respect to the QA/QC program, which is what this trial is all about." *See generally* Tr. 18,812-20 (Miller).

[305] Tr. 19,444-45 (Miller).

[306] App. Tr. 113.

would have put forward.[307] In the circumstances, any procedural error that may have occurred was plainly harmless.

IV. MISCELLANEOUS TECHNICAL ISSUES

A. Water Hammer

As the Licensing Board explained, "water hammer" is engineering jargon used to describe the pressure changes that result from a sudden change in the velocity of liquid through a pipe.[308] As the Board also noted, the term was used expansively in this proceeding to include as well transients involving steam (steam hammer) and two-phase flow (e.g., water entrainment in steam lines).[309] No one disputes the need to prevent water hammer, reduce its occurrence, and mitigate its effects. The County acknowledges that LILCO witnesses testified that industry experience with water hammer has been taken into account in the Shoreham design, plant procedures, training, and test programs.[310] It argues, however, that such consideration is too general so there is no basis to believe that there will be any significant improvement at Shoreham over the experience depicted in the so-called EG&G Report tabulating industry water hammer experience over a twelve year period.[311] The Licensing Board disagreed.

We have reviewed the Board's decision and the underlying record and can find no support for the County's allegation. Among other things, LILCO's witness testified, without serious challenge, that the events described in the EG&G Report were reviewed, that none of the water hammer types was new, and that Shoreham had been adequately designed to guard against the problem.[312] Furthermore, a staff witness testified that findings and recommendations dealing with design as developed in the Quadrex Report,[313] which evaluated the data in the EG&G Report, were incorporated at Shoreham.[314] Moreover, the Licensing Board

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[307] App. Tr. 116.

[308] FF A-3 (slip opinion at 281).

[309] LBP-83-57, *supra*, 18 NRC at 469.

[310] *See* R. Chapman, D. Christensen, R. Dafoe, O. Hanner, M. Wells, "Compilation of Data Concerning Known and Suspected Water Hammer Events in Nuclear Power Plants," NUREG/CR-2059 (May 1982) (hereinafter EG&G Report).

[311] Suffolk Brief at 99.

[312] Tr. 2335-A to 2335-E (Fortier, Hodges).

[313] R. Uffer, S. Banergee, F. Buckholz, M. Frankel, M. Kasahara, L. Miller, A. Silvester, "Evaluation of Water Hammer Events in Light Water Reactors," NUREG/CR-2781 (July 1982).

[314] Tr. 2113-14 (Hodges).

found that water hammer was a condition explicitly considered in developing Shoreham's operating procedures[315] and means to prevent and mitigate water hammer events are included in operator training.[316] In sum, if design information is implemented and procedures are followed, water hammer is not likely to be a problem at Shoreham.

B. Environmental Qualification and Post-Accident Monitoring

Section 50.49 of 10 C.F.R. requires that certain electrical equipment be environmentally qualified, i.e., it must be able to withstand events such as design basis accidents. As far as pertinent here, LILCO must demonstrate the environmental qualification of (1) all nonsafety-related electrical equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions by safety-related electrical equipment (10 C.F.R. § 50.49(b)(2)), and (2) certain post-accident monitoring equipment (10 C.F.R. § 50.49(b)(3)). Suffolk County raised two interrelated contentions concerning compliance with 10 C.F.R. § 50.49. First, it claimed that LILCO failed to comply with the environmental qualification requirements of 10 C.F.R. § 50.49(b)(2). Second, the County argued that LILCO failed to comply with 10 C.F.R. § 50.49(b)(3) because it did not meet the requirements of Regulatory Guide 1.97, Rev. 2.[317] We treat these claims together. The Licensing Board rejected both. With one minor exception, we affirm.

1. Section 50.49(b)(2) Compliance

Because 10 C.F.R. § 50.49(b)(2) did not become effective until after hearings began on this issue,[318] the LILCO environmental qualification program does not explicitly identify any nonsafety-related equipment that might interact adversely with safety-related equipment.

The County claims that, as a consequence, LILCO cannot be in compliance with the Commission's regulations. "The logical first step in complying with Section 50.49," the County asserts, "is the preparation of a list of all electrical equipment at Shoreham that is important to safety. Following such preparation, the items can be evaluated to determine if they meet the criteria set forth in section 50.49, and if they do,

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315 FF A-12 (slip opinion at 284-85).

316 FF A-14 (slip opinion at 285).

317 "Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident" (Dec. 1980).

318 *See* LBP-83-57, *supra*, 18 NRC at 538.

they must be included in the Shoreham EQ program."[319] LILCO argues, to the contrary, that electrical equipment identified by section 50.49(b)(2) is typically either classified as safety-related or otherwise isolated by design so as not to prevent accomplishment of safety functions.[320] The NRC staff agrees.[321]

The Licensing Board suggested that the staff should articulate criteria that applicants would use when identifying specific nonsafety-related equipment that must be qualified under section 50.49(b)(2).[322] Nevertheless, it agreed with LILCO that the Shoreham design did preclude interactions between safety-related and nonsafety-related equipment.[323]

As noted earlier, section 50.49(b)(2) requires each applicant to establish a program for qualifying such nonsafety-related equipment "whose failure . . . could prevent satisfactory accomplishment of safety functions. . . ." While the preparation of a list of equipment as suggested by the County and recommended by the Board would plainly be one method of complying with the regulation, we agree with the Board's conclusion that LILCO's approach is equally satisfactory. As the Board pointed out, LILCO and staff witnesses testified that, for newer plants such as Shoreham, equipment of the type identified by section 50.49(b)(2) is either classified as safety-related or otherwise designed so as not to prevent the accomplishment of necessary safety functions.[324] Thus, there should be no nonsafety-related equipment that could compromise the functioning of safety-related equipment. It follows, therefore, that there would be no equipment to be included in a section 50.49(b)(2) list. Such an approach satisfies the requirements of 10 C.F.R § 50.49.

The County argues, in addition, that LILCO's design approach, even if conceptually valid, is untested, that the staff has no basis for reviewing it, and that there can thus be no assurance that it will satisfy the requirements of section 50.49. As LILCO points out, however, various analyses were performed to provide assurance that there were no unacceptable interactions between safety-related and nonsafety-related electrical equipment.[325] At the hearing, the County's witness challenged LILCO's assertion by pointing to certain nonsafety-related equipment that he be-

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[319] Suffolk Brief at 103.
[320] LILCO's Reply Brief at 95.
[321] Staff Brief at 95.
[322] LBP-83-57, *supra*, 18 NRC at 539.
[323] *Ibid.*
[324] *Id.* at 538-39; FF I-14, I-15, I-16 (slip opinion at 444-45).
[325] LILCO's Reply Brief at 95 n.87. *See also* Tr. 19,653-54 (Kascsak).

lieved should be included in the environmental qualification program because their failure could mislead an operator. On cross-examination, however, it was demonstrated that such equipment need not be included because, in each case, there was redundant, series or diverse instrumentation that would prevent misleading information being provided to the operator. We have reviewed the record and agree with the Licensing Board's determination that the LILCO and staff testimony has not been effectively undermined.[326]

Although the Board was prepared to resolve the contention regarding nonsafety-related equipment in LILCO's favor, it nonetheless recognized that documentation of the Shoreham environmental qualification program was incomplete in two respects. First, the final scope of the environmental qualification program for nonsafety-related equipment had not yet been determined. Second, the staff had not completed its review of the Shoreham plant.[327] The gist of the County's argument is that completion of such review is a prerequisite to a definitive finding that LILCO has complied with section 50.49 and that only the Board can make such finding.[328]

All parties recognize that certain minor matters may be left to the staff for post-hearing resolution where hearings would not be helpful and the Board can "make the findings requisite to issuance of the license."[329] The disagreement arises as to whether the issues left for post-hearing resolution are of the type that must be reserved for board resolution.[330] Except in one respect, we think the answer is no.

Because the LILCO program could not have explicitly included formal qualification of nonsafety-related equipment at the time it was developed, LILCO was to submit to the staff a list of any equipment which must comply with 10 C.F.R. § 50.49(b)(2). Such list was to include equipment whose failure under postulated accident conditions could mislead the operator and thereby prevent satisfactory accomplishment of certain safety functions.[331] But the Licensing Board found, with support in the record, that there would be little or no nonsafety-related equipment at Shoreham that could prevent the satisfactory accomplishment of safety functions by safety-related equipment because all nonsafety-related electrical equipment will be *either* upgraded to be environ-

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[326] LBP-83-57, *supra*, 18 NRC at 539; FF I-19, I-20, I-21 (slip opinion at 446-47).

[327] LBP-83-57, *supra*, 18 NRC at 543.

[328] Suffolk Brief at 104-06.

[329] *Consolidated Edison Co. of New York* (Indian Point Station, Unit No. 2), CLI-74-23, 7 AEC 947, 951 (1974) (footnote omitted).

[330] *Id.* at 951-52.

[331] LBP-83-57, *supra*, 18 NRC at 636.

mentally qualified or isolated from safety-related equipment.[332] As we read the Board's decision, the staff is being asked simply to confirm that LILCO has either upgraded or properly isolated nonsafety-related equipment so that no nonsafety-related equipment falls within the section 50.49(b)(2) category. In our judgment, such confirmation does not constitute an improper delegation of decisional responsibility over adversary issues from the Board to the staff.

Nonetheless, the Board also observed that there may be "a small number of items which must be included in the qualification program."[333] If so, LILCO would need to justify interim operation before environmental qualification. In such circumstances, the County would be entitled to address this matter. In a note to the parties served last August, the staff indicated that LILCO had submitted any necessary identification of equipment under section 50.49(b)(2) and that this matter "has been resolved by LILCO to the satisfaction of the NRC staff."[334] It is unclear, however, whether the staff's approval rests on its confirmation that there is no equipment that needs to be qualified or a substantive determination that LILCO has properly justified interim operations. As a consequence, we require the staff to advise the Licensing Board (with copies of its filing served on all parties) whether any equipment falls into the section 50.49(b)(2) category and, if so, the basis for the staff's approval. The Licensing Board shall review the staff's submission and take such further action as it deems necessary.

2. Section 50.49(b)(3) Compliance

Certain post-accident monitoring equipment must be environmentally qualified in accordance with 10 C.F.R. § 50.49(b)(3). Specific guidance concerning the types of variables to be monitored is provided in Regulatory Guide (Reg. Guide) 1.97, Rev. 2, and a schedule for implementing that guide is set out in SECY-82-111,[335] adopted by the Commission in 1982.[336] At the hearing, the County contended that LILCO was not in compliance with Reg. Guide 1.97 for two reasons: first, that regulatory

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[332] *Id.* at 538-39, 543-44; FF I-14, I-15, I-16, (slip opinion at 444-45). *See also* Tr. 19,529 ("It is our belief . . . [that] [t]here would be no equipment in that [10 C.F.R. § 50.49(b)(2)] category for Shoreham.") (LILCO witness Kascsak); Tr. 19,510-11 ("It is a general opinion that the list in item [(b)(2)] should be very small or nonexistent. And that is because of the way Class [1E] equipment is normally defined.") (Staff witness Noonan).

[333] LBP-83-57, *supra*, 18 NRC at 544.

[334] Note to Attached Service List from Bernard M. Bordenick (August 7, 1984), transmitting Memorandum for Edwin Reis, from A. Schwencer, "Shoreham License Conditions" (July 30, 1984) at 2.

[335] "Requirements for Emergency Response Capability" (March 11, 1982).

[336] *See* FF H-8 (slip opinion at 420).

guide had not yet been implemented by the staff so there was no staff position on whether LILCO was in compliance; second, four specific variables would not be properly monitored. The Board acknowledged that it had to decide the issues presented by the County in the absence of staff testimony on their technical merits.[337] Nevertheless, it did not see that lack of information as an obstacle to decision. Rather, it reviewed the evidence submitted by LILCO and the County and concluded that the post-accident monitoring equipment would achieve the purposes stated in the regulatory guide for the four variables in question.[338]

The County does not seriously challenge the Board's technical resolution of the issue.[339] Rather, it contends that the Board should have found that the issue was not ripe for litigation because the staff had failed to complete its work.[340] It claims, in this connection, that LILCO's "commitment" to comply with Reg. Guide 1.97 is an insufficient basis for the Board's decision. We uphold the Board's determination.

We do not find the staff's failure to implement Reg. Guide 1.97 or to review Shoreham's post-accident monitoring capability to be an obstacle to the Board's resolution of the issue. To begin with, SECY-82-111 provides that Reg. Guide 1.97 compliance need not be accomplished before fuel loading. Thus, such compliance is not a precondition to issuance of the Board's decision. Moreover, regulatory guides do not set out mandatory regulatory requirements. Methods and solutions different from those set out in the guides can be acceptable if they provide a basis for the findings requisite to the issuance of a license.[341] In the instant case, based on the evidence in the record, the Licensing Board concluded that LILCO satisfied the purposes stated in the regulatory guide for each of the four items which were the subject of the County's contention.[342] The Board's substantive conclusion is unchallenged. We have reviewed the record and find no basis for upsetting the Board's decision.

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[337] LBP-83-57, *supra*, 18 NRC at 533.

[338] *Id.* at 535.

[339] Suffolk County argues generally that there is insufficient information to permit the conclusion that LILCO will adequately comply. Suffolk Brief at 121. The County fails to support its argument in this respect, however.

[340] *Id.* at 120-21.

[341] *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), ALAB-698, 16 NRC 1290, 1299 (1982), *rev'd in part on other grounds*, CLI-83-22, 18 NRC 299 (1983).

[342] LBP-83-57, *supra*, 18 NRC at 535.

C. Passive Mechanical Valve Failure

Suffolk County is concerned about the possibility that undetected failures will occur in valves used in various Shoreham safety-related systems. On appeal, the County makes three principal points. First, it maintains there should be a comprehensive failure analysis of all safety-related valves. Such analysis is necessary, the County claims, chiefly for two reasons: there have been repeated valve failures and there is no better way to justify requests for deviation from valve testing frequency requirements. Second, it asserts that, absent such analysis, all safety-related valves should have position indicators. Third, it contends that the Board improperly construed the single-failure criterion embodied in the Commission's regulations. We affirm the Board's determination.

The Board found, with support in the record, that the safety-related valves were constructed to appropriate codes and standards and are highly reliable.[343] The analysis recommended by the County does not represent standard industry practice and is not required by Commission regulations.[344] The County concedes as much[345] but argues that the experience at other plants justifies the type of comprehensive analysis it seeks. The Board carefully scrutinized the one historical example of supposed unreliability pointed to by the County — namely, the failure of main steam isolation valves at Brunswick Unit 2. It concluded that the valve failures were caused primarily by plant-specific maintenance problems at the Brunswick plant, and that, in any event, the failures were detectable.[346] We agree.

Section 50.55a of 10 C.F.R. requires valve testing to satisfy the requirements of the ASME Boiler and Pressure Vessel Code section XI. The Code prescribes a three month testing interval for valves.[347] Nonetheless, deviations from Code requirements are permitted.[348] In our judgment, and contrary to the County's assertion, comprehensive analysis of all valves is not needed to justify departures from valve testing frequencies. Such deviations require technical justification which must be evaluated by the staff. While we are inclined to agree with the County that a comprehensive analysis of the type it seeks could provide some additional information, the County has not demonstrated that the current deviation approval procedure is faulty or unsatisfactory or that a

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[343] *Id.* at 483.
[344] FF C-19 to C-21 (slip opinion at 312).
[345] Suffolk Brief at 107.
[346] LBP-83-57, *supra*, 18 NRC at 484.
[347] Tr. 3656 (Fortier).
[348] Tr. 3635 (Fortier); Tr. 3929 (Kirkwood). *See also* 10 C.F.R. § 50.55a(a)(2).

comprehensive analysis would result in a significant improvement over existing practices.

The Board thoroughly evaluated the County's argument about the need for position indicators, and rejected it.[349] We can add little to the Board's analysis. The Board noted that many safety-related valves have position indicators, and that the others either cannot accommodate them (but nonetheless have some other mechanism for detecting failure) or are sufficiently reliable not to warrant them.[350] The County's witness did not suggest that such indicators were essential, but merely desirable.[351] We do not believe that the County has undermined the Board's findings regarding the need for position indicators.

Finally, the County challenges the Board's approval of LILCO's application of the so-called single failure criterion. That criterion provides:

> A single failure means an occurrence which results in the loss of capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electric systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly) nor (2) a single failure of a passive component (assuming active components function properly), results in a loss of the capability of the system to perform its safety functions.[2]
>
> [2] Single failures of passive components in electric systems should be assumed in designing against a single failure. The conditions under which a single failure of a passive component in a fluid system should be considered in designing the system against a single failure are under development.[352]

Generally speaking, the single failure criterion requires that fluid and electric systems remain functional even if there is a single failure of a component.

LILCO witness Raymond E. Fortier described the application of the single failure criterion for fluid systems at Shoreham as follows:

> First, the fluid systems are designed for a single failure of active components. Also, fluid systems are designed for single failure of passive components such as pump seals, valve stem seals, and measuring devices . . .[353]

LILCO claims that such design satisfies the regulations with respect to the single failure criterion.[354] The County contends, however, that the

[349] LBP-83-57, *supra*, 18 NRC at 484-86, FF C-35 to C-40 (slip opinion at 317-19).
[350] FF C-35 to C-37 (slip opinion at 317-18).
[351] *See* Tr. 3725 ("I think I would feel better if they all had them.") (Bridenbaugh).
[352] 10 C.F.R. Part 50, Appendix A, Definitions and Explanations.
[353] Tr. 3633.
[354] Tr. 3634 (Fortier).

criterion requires that fluid systems remain functional where there is a failure in an active component *and it is also assumed* that there is a passive failure that cannot be detected via periodic testing or functional observation.[355] The Licensing Board rejected this interpretation of the criterion.[356] We affirm.

To begin with, the Board's interpretation is consistent with the language of Appendix A, which requires, with one exception, assumption of the failure of a single active component or a single passive component, but not both simultaneously. The County's interpretation would transform the rule essentially into a "double failure" criterion, i.e., the failure of an active component along with the assumed failure of a passive component.[357] Moreover, as the Licensing Board observed, the County could not point to any study or example supporting its interpretation of the single failure criterion.[358] In such circumstances, we have no basis for upsetting the Board's interpretation.

D. Anticipated Transient Without Scram

A scram is the shutting down of a nuclear reactor, either automatically or manually by the reactor operator. At times, events will occur that should produce a scram, but do not. An anticipated transient without scram (ATWS) occurs when the reactor trip system — or scram system — fails to operate as required and the reactor consequently does not

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[355] Suffolk Brief at 109. An active component is one which requires mechanical movement to perform its safety function. A passive component is not required to have such movement to perform its function. Failure of a valve to open upon receipt of an initiation signal would be an example of an active failure. Leakage from a valve stem would constitute an example of a passive failure. Tr. 3640-41 (Fortier).

[356] LBP-83-57, *supra*, 18 NRC at 482.

[357] *See ibid. See also* Tr. 3561-62 (Minor).

[358] FF C-21 (slip opinion at 312). The County contends that its proposed approach "is a methodology that has been used in electrical system evaluation," citing to testimony at pp. 3562 and 3574 of the transcript. *See* Suffolk Brief at 109-10. The testimony does not support that assertion. The County's witness conceded that he could point to no specific examples when his interpretation had been employed and was able to suggest only "the likelihood that some plants have considered at least portions of this type of analysis in conducting their PRA analysis . . . , and considering certain failure mechanisms in their safety systems that would probably get into the assumption of certain valve failures." Tr. 3573-75 (Minor). Similarly, the County claims that "even LILCO's witness confirmed that a limited number of passive failures should be assessed along with a single active failure," citing to testimony at p. 3648 of the transcript. Suffolk Brief at 109. We disagree with the County's reading of the testimony. As we construe it, the witness testified that the conditions under which a single failure of a passive component in a fluid system should be considered have not been established. That does not relieve an applicant, however, of the obligation for considering passive failures in the design of a facility. LILCO did so by analyzing the three most likely passive failures, i.e., pump seals, valve stem leakage, and measuring devices. Tr. 3648 (Fortier). We do not understand the witness to suggest that LILCO undertook anything analogous to a "double failure" analysis of the type advocated by the County. *See generally* Tr. 3634 (Fortier). In any event, neither the County nor its witness has demonstrated that its interpretation has been applied as a regulatory requirement.

shut down. Some ATWS events obviously have serious safety significance.[359]

In 1981 the Commission proposed various modifications looking to the prevention or mitigation of ATWS events.[360] At the same time, it noted that certain changes — installation of a recirculation pump trip on boiling water reactors (BWRs) and changes in operating procedures and operator training, for example — were already underway, and found that there were no substantial safety risks in operating over the next two or four years while additional changes were being implemented.[361] Recently, the Commission made its ATWS rule final.[362] It has required the installation or modification of certain equipment and has recommended the establishment of a reliability assurance program to enhance the effectiveness of the reactor trip system.[363]

At issue on the appeal is whether LILCO has taken adequate measures to protect the public pending full implementation of the requirements set out in the Commission's final rule. The County claims that the Board erroneously concluded that LILCO has taken such measures. Specifically, the County argues that the Board did not demonstrate why the interim measures are a sufficient substitute for a redundant, automated standby liquid control (SLC) system; that it did not have sufficient evidence to find that the interim measures are satisfactorily implemented; and that it did not adequately explain why it rejected several of the County's concerns.[364] We have reviewed the Board's decision and find no fault with its determinations.

The County believes, first and foremost, that General Design Criterion 20 of 10 C.F.R. Part 50, Appendix A has not been met in that no interim measures are sufficient to compensate for the lack of an automatically initiated and totally redundant SLC system that meets the single failure criterion. The need for such system was considered by the Commission — and rejected — during the course of the rulemaking.[365] That being so, there is no basis for concluding that such system is needed as an interim measure.

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[359] *See* 46 Fed. Reg. 57,521 (1981).

[360] *Ibid.*

[361] *Id.* at 57,522.

[362] *See* 49 Fed. Reg. 26,036 (1984).

[363] *Id.* at 26,038-41.

[364] Suffolk Brief at 110.

[365] The final rule requires installation of an automatically initiated SLC system only if the plant were already designed and built to include that feature. There is no requirement for a redundant system for any facility. *See* 49 Fed. Reg. at 26,042-45.

Shoreham interim operating procedures for mitigating the consequences of an ATWS were based on guidance developed by General Electric and reviewed by the NRC staff.[366] The Licensing Board found these procedures adequate.[367] The County claims that there was insufficient evidence to show that the interim measures are acceptable. Principally, it argues that the staff testimony indicating approval of the interim measures is unreliable because the staff witness did not personally evaluate the Shoreham ATWS procedures.[368]

We reject the County's claims. Although the staff witness was not responsible for the formal staff evaluation of Shoreham's ATWS procedures, he nonetheless reviewed the Shoreham ATWS submittal[369] and was familiar with, and approved, the criteria used to evaluate the interim procedures.[370] Moreover, it is evident from the decision that the Board itself reviewed the procedures in detail.[371] In the circumstances, the County has failed to undermine the Board's conclusion that the interim measures are acceptable.

The County also argues that the Board failed to address specific recommendations that the County believes would improve ATWS protection. As we discussed, the Licensing Board specifically found the current procedures to be satisfactory[372] and we must therefore assume that it found additional modifications unnecessary. Nevertheless, we have reviewed the County's suggestions and find them unpersuasive.

First, the County contends that the ATWS procedures should be revised to require immediate verification of sodium pentaborate injection.[373] Plainly, the prompt injection of sodium pentaborate is important to slow the chain reaction and thus lower the power level in the reactor in the event of an ATWS. But there is no need to single out this item for separate and immediate verification. Verification of all "Immediate Operator Actions" is required in Step 4.1 of the ATWS procedure.[374] Moreover, all operators are trained to look for expected results of any action they have just initiated.[375]

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[366] LBP-83-57, *supra*, 18 NRC at 500.

[367] *Id.* at 503-04.

[368] Suffolk Brief at 111. The County also asserts that certain criteria upon which the staff based its review were not part of the record. *Ibid.* The County fails to explain this assertion. We note that ATWS criteria are contained in section 15.3 of the SER. *See* Tr. fol. 9255. Thus, we are unable to conclude that the County's assertion is correct or, if true, is significant.

[369] Tr. 8967, 8983 (Hodges).

[370] Tr. 8966 (Hodges).

[371] LBP-83-57, *supra*, 18 NRC at 500-02; FF D-6 to D-12 (slip opinion at 339-44).

[372] LBP-83-57, *supra*, 18 NRC at 503-04.

[373] Suffolk Brief at 111-12.

[374] *See* Attachment 1 to Tr. fol. 8870 (Calone, *et al.*).

[375] Tr. 9029, 9035 (Calone).

The County urges that the operator be instructed to raise the water level above the top of the active fuel.[376] This instruction is already provided in the ATWS procedure as an immediate operator action under certain conditions and as a final plant condition, and the need to keep the fuel covered with water is also listed in the discussion section of the procedure.[377]

The County contends that the procedures should be modified to require that the SLC system achieve about eighty-six gallons-per-minute flow.[378] This requirement was adopted by the Commission as part of the final rule. The implementation date remains open, however, pending further Commission guidance.[379] In light of the other steps to be taken on an interim basis, we see no need to compel adoption of these procedures in advance of any timetable the Commission may establish generally.

The County claims that the current procedures are ambiguous and that the operator should be explicitly directed first to attempt to scram the reactor manually.[380] The Licensing Board found no ambiguity in the procedures,[381] and we agree. As the Board explicitly found, the first three immediate operator actions, as set out in the procedures, are to arm and depress the manual scram pushbutton, place the mode switch in shutdown, and verify that all rods are inserted.[382] In short, the operator is instructed first to scram the reactor manually. If the reactor does not scram at that stage, the operator would need to take certain further steps, described in the procedures as conditional immediate operator actions. It is these actions that the County appears to believe are ambiguous. It argues, in this connection, that LILCO's witness testified that an operator would decide to initiate the SLC system pumps without attempting other means of manually scramming the reactor.[383] We disagree with the County's reading of the testimony. As we read it, operators would *concurrently* undertake further efforts to scram the reactor manually while initiating the conditional immediate operator actions, such as starting the SLC system pumps. The Board found, based on the evidence, that the possibility of misleading instructions is eliminated in training and that this arguable ambiguity does not cause problems in

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[376] Suffolk Brief at 111.
[377] *See* Attachment 1 to Tr. fol. 8870 at 3-5 (Calone, *et al.*).
[378] Suffolk Brief at 111.
[379] 49 Fed. Reg. at 26,045.
[380] Suffolk Brief at 112.
[381] *See* LBP-83-57, *supra*, 18 NRC at 501; FF D-6 (slip opinion at 339-40).
[382] FF D-6 (slip opinion at 340).
[383] Suffolk Brief at 112-13.

practice.[384] It suggested — but did not require — that this aspect of the procedure nonetheless be clarified by LILCO in consultation with the staff, and we endorse both its suggestion and its refusal to require such clarification as a condition of the license.

Suffolk County believes that the ambiguities and omissions it perceived in the emergency procedures raise broader questions about the adequacy of the operator training for ATWS events.[385] In particular, the County appears concerned that the staff did not specifically review the ATWS training. It is true that the training itself was not reviewed. Rather, the staff will rely on the operator testing to verify that training has been satisfactory.[386] Nonetheless, LILCO testified about training procedures and, relying on such testimony, the Board found training adequate to protect the public.[387] Nothing in Suffolk County's highly general allegations warrants overturning the Board's determination.

Finally, the County contends that, because there is a ten-minute rule of thumb applied to the design of safety-related systems used to mitigate accidents, LILCO improperly relies on an operator taking action within forty seconds of an ATWS event. The County asserts that LILCO should perform an analysis of the effects of delaying manual initiation of the SLC system for ten minutes after the onset of a severe ATWS event.[388]

We see no need for such analysis. First of all, the ten-minute rule of thumb is not a requirement but is merely an assumption used in analyzing certain transients for design purposes.[389] Moreover, the record shows that the procedures are adequate. LILCO's witness testified that there will be several alarms that will alert the operator that a scram is imminent or has occurred.[390] The "immediate actions" incorporated in the emergency shutdown procedure call for a manual scram and verification of a rapid neutron flux decrease.[391] The ATWS is therefore recognizable within seconds of occurrence, and the operator will continue to attempt manual insertion of the control rods until the threshold for SLC system initiation is reached. Such sequence should not require ten minutes for operator action. Nor are there other demands on the operator that would

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[384] LBP-83-57, *supra*, 18 NRC at 501.
[385] Suffolk Brief at 114.
[386] Tr. 8968 (Hodges).
[387] LBP-83-57, *supra*, 18 NRC at 503; FF D-13 (slip opinion at 344-45).
[388] Suffolk Brief at 113.
[389] *See* Tr. 9239 (Eckert).
[390] Tr. 9065 (Calone).
[391] Applicant Exh. 6, Tr. fol. 1699.

take priority over SLC system initiation.[392] As a consequence, we find the current procedures acceptable and see no need to employ a "ten-minute" requirement.

E. Seismic Design

The effects of the vibratory ground motion of an earthquake must be considered in the engineering design of a nuclear power plant.[393] Earthquake motion is described in terms of displacement (the distance a point on the ground moves); velocity (the speed at which the point moves); and acceleration (the rate at which that velocity changes). In order to determine the effect of these motions on a nuclear power plant and the adequacy of the structural design, a "response spectrum" is developed. A response spectrum is defined in the regulations as

> [A] plot of the maximum responses (acceleration, velocity or displacement) of a family of idealized single-degree-of-freedom damped oscillators against natural frequencies (or periods) of the oscillators to a specified vibratory motion input at their supports.[394]

As we noted in our *Diablo Canyon* opinion, response spectra tend to have jagged peaks and valleys which are evened out when the spectra are combined for engineering analysis and design purposes. When so "smoothed" they are sometimes called "design response spectra."[395]

Reg. Guide 1.60[396] was issued by the staff in 1973 to provide the industry with an acceptable methodology for defining these design response spectra. As we have noted earlier, regulatory guides do not constitute regulatory requirements.[397] With regard to design response spectra, in fact, the staff encourages that they be developed on a site-specific basis rather than by application of the spectra reflected in the guide, and may even request site-specific spectra for certain sites.[398]

Such site-specific spectra were developed for Shoreham (before, it might be noted, Reg. Guide 1.60 was issued).[399] They differ in some respects from the spectra that would be obtained from application of

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[392] Tr. 9031 (Calone).

[393] *See* 10 C.F.R. Part 100, Appendix A, § VI(a)(1).

[394] 10 C.F.R. Part 100, Appendix A, § III(f).

[395] *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-644, 13 NRC 903, 924 n.40 (1981), *review declined*, CLI-82-12A, 16 NRC 7 (1982).

[396] "Design Response Spectra for Seismic Design of Nuclear Power Plant," Reg. Guide 1.60 (Rev. 1) (Dec. 1973).

[397] *See* note 341 and accompanying text, *supra*.

[398] Tr. 4184-85 (Rothman).

[399] *See* FF E-21 to E-22 (slip opinion at 353-54).

Regulatory Guide 1.60. In particular, the Safe Shutdown Earthquake (SSE) design response spectrum at certain frequencies is less conservative than that developed using Regulatory Guide 1.60. Following its review, the Board concluded that the Shoreham SSE design response spectrum was developed in accordance with the Commission's regulations and is adequately conservative.[400]

The County does not identify deficiencies in the analysis actually employed at Shoreham. Rather, it argues that Part 100, Appendix A of the Commission's regulations requires the SSE spectrum to define the maximum vibratory accelerations predicted for a facility and that, to the extent the site-specific SSE spectrum is less conservative than that set out in Reg. Guide 1.60, LILCO has failed to demonstrate that the site-specific SSE spectrum is sufficiently conservative.[401] The Board found that it was inappropriate to compare the spectra produced by the site-specific methodology and Reg. Guide 1.60.[402] We agree.

All of the witnesses who testified on the issue explained that there was neither any need for nor any merit in comparing the site-specific spectrum with that contained in Reg. Guide 1.60.[403] The SSE spectrum derived for Shoreham reflects actual site characteristics. Reg. Guide 1.60 spectra are designed for applicability at essentially any location in the country and are unnecessarily conservative for Shoreham.[404] The County in effect advocates that we require compliance with site-specific criteria or Reg. Guide 1.60, whichever is more conservative. We do not believe that the Commission's regulations contemplate such an approach.

F. Mark II Containment

Contention 21 related to alleged deficiencies in Shoreham's primary containment.[405] As to one part of the contention — regarding the operation of the residual heat removal system in the steam condensing mode — the Board retained jurisdiction to review a staff analysis before making a decision whether to permit Shoreham to operate at power

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[400] LBP-83-57, *supra*, 18 NRC at 506-10.
[401] Suffolk Brief at 115-16.
[402] LBP-83-57, *supra*, 18 NRC at 509.
[403] *See* Tr. 4176 (staff witness Rothman); Tr. 4178 (applicant witness Wong); Tr. 4140 (applicant witness Lucks). The County presented no witnesses on this issue.
[404] *Id.* at 4178, 4184 (Wong, Lucks). This is because the Shoreham site has a deep soil profile. Reg. Guide 1.60 includes data from sites that have rock or shallow soil profiles, which tend to attenuate the effect of earthquakes less than deep soil. Tr. 4179-84 (Lucks); Tr. fol. 3970 at 6 (Wong).
[405] *See* LBP-83-57, *supra*, 18 NRC at 511; Suffolk Brief at 117.

levels in excess of five percent of rated power.[406] But it was satisfied that it could reach a decision on all other aspects of the contention.

The County challenges this determination in view of the pendency of several additional staff reviews. It asserts that the relevant issue is whether, before completion of these reviews, there is adequate information on which the Board could have based its decision.[407] In the County's view, "the absence of complete analyses and review of those analyses result in an insufficient basis for a licensing decision."[408] Although agreeing with the County's statement of the issue, we disagree with its conclusion respecting it. There may be circumstances in which staff analyses must be reviewed by a licensing board before any final decision is reached.[409] None of the illustrations offered by the County, however, presents such a situation.

We agree with the Licensing Board's conclusion that the mere pendency of confirmatory staff analyses regarding litigated issues does not automatically foreclose board resolution of those issues. As we noted in connection with our discussion of post-accident monitoring in section IV(B), certain matters may be left to the staff for post-hearing resolution where the Board can make the findings requisite to issuance of the license. With this guideline in mind, we now turn to the County's examples.

1. Vacuum breakers are devices installed between the suppression pool (wetwell) and the upper zone (drywell) of the primary containment. They are designed to equalize pressure between the two areas.[410] Two problems arose in connection with the vacuum breakers, and modifications were made to resolve both. The Board concluded that such modifications were acceptable.[411] Nonetheless, LILCO is undertaking additional measures to strengthen further the valve component of the vacuum breakers. Qualification of the redesigned valve has not yet been completed, however, and the County insists that no final determination regarding vacuum breakers can be made until all modifications have been reviewed.

We believe the Board reasonably resolved this matter in LILCO's favor at this stage. The staff reviewed and accepted the modifications and generic qualification testing of the vacuum breakers when the initial

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406 LBP-83-57, *supra*, 18 NRC at 520.
407 Suffolk Brief at 118.
408 *Ibid.*
409 *See, e.g., Three Mile Island, supra*, 17 NRC at 885-88.
410 Tr. 9827 (Eltawila).
411 LBP-83-57, *supra*, 18 NRC at 516-17; FF F-31 to F-36 (slip opinion at 373-75).

changes were made. The staff concluded, and the Board agreed, that the plant could then operate safely. The fact that additional modifications are contemplated does not undermine that conclusion. As staff witness Eltawila observed:

> Let me make it clear right now that if Shoreham decided to go right now without any additional tests, they can go based on our assessment of what we did for Susquehanna. So the additional modification that Shoreham is doing is nice, but it's not necessary at this time . . . . The valve was tested with some modification and it performed satisfactorily, so the additional modification that is contemplated right now will improve the valve performance.[412]

2. John Humphrey, a former General Electric employee, raised a number of concerns related to the Mark III containment design. Twenty-two of them are potentially applicable to the Mark II containment used at Shoreham.[413] The staff made a preliminary assessment of these concerns. It concluded, however, and the Board agreed, that only one of the twenty-two concerns, i.e., operation of the residual heat removal system when in the steam condensing mode, had potential safety significance. As to it, there was insufficient information to analyze the effect of the discharge from the relief line.[414] The Board retained jurisdiction to review that item. In doing so, it accepted the staff's additional conclusion that there would be no erosion in the safety margin that already exists at Shoreham resulting from any of the other "Humphrey concerns."[415] The County does not contradict that conclusion. In these circumstances, we find no merit in the County's argument that the mere pendency of staff reviews prevents resolution of the issue.

3. During the course of its testing program for the Mark III containment, General Electric identified certain loss-of-coolant accident (LOCA) loads that had not been included in the original design review of the Mark II containment.[416] In 1975, the staff required each Mark II owner to reassess its containment design in view of this new information.[417] The amplified response spectra (ARS) that were generated from the reassessment were compared with those developed for the plant's design basis loads.[418] Had the revised spectra fallen completely within the design basis, that would have definitively demonstrated that

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[412] Tr. 9826-27.
[413] FF F-37 (slip opinion at 376).
[414] FF F-38 to F-43 (slip opinion at 376-79).
[415] FF F-38 (slip opinion at 376), Tr. 9856-57 (Fields).
[416] LBP-83-57, *supra*, 18 NRC at 512.
[417] *Id.* at 511-12.
[418] FF F-64 (slip opinion at 386).

all structures and components were embraced within the original design.[419] At some frequencies, however, the ARS produced in the confirmatory assessment turned out to be higher than the design basis response spectra.[420] But it does not automatically follow that the design of the structures, systems and components is inadequate. LILCO's witness testified that such difference was not significant because the newly developed spectra did not result in the loads for which the plant was actually designed being exceeded.[421] The staff reviewed the reassessment insofar as it concerned the piping systems and supports (and, as far as we can tell from the testimony, has no difficulty with the analyses). It had not yet completed its review of the equipment, however.[422]

The Board, without awaiting completion of the staff's review, accepted LILCO's conclusion, upon analysis, that the plant design (including the equipment) could fully accommodate the newly developed spectra.[423] The County does not challenge the substance of that determination. It argues simply that the Board should have awaited completion of the staff's work. The staff is satisfied with the Board's resolution of the issue and tells us that the confirmatory analysis is unlikely to indicate any problems.[424] Given the uncontroverted evidence in the record offered by LILCO, and the staff's judgment regarding the expected outcome of its review, we believe that the Board's resolution of the issue is reasonable.

4. As part of the confirmatory analysis of the Mark II containment, LILCO selected some thirty piping systems in the plant as a representative sample.[425] The Board examined the sample and concluded that there was no evidence to contradict LILCO's testimony that the piping systems it selected are representative.[426] Presumably out of an abundance of caution, however, the staff asked LILCO to perform a 100 percent evaluation of all piping systems attached to three locations on the containment wall. The staff testified that it regarded the further analysis as confirmatory because it had not seen any piping system stresses or support loads which exceeded or failed the code allowables.[427] The Board found that no additional analysis was necessary, and concluded that LILCO had adequately demonstrated the safety of the piping. In so doing, it rejected the County's suggestion that LILCO perform a 100 percent reanalysis of

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[419] Tr. 9973 (Malovrh).
[420] FF F-65 (slip opinion at 386).
[421] *See ibid.*; Tr. 9973-76 (Malovrh).
[422] Tr. 9972-73 (Terao); Tr. 9973-75 (Malovrh).
[423] LBP-83-57, *supra*, 18 NRC at 525-26.
[424] Staff Brief at 114. *See also* NUREG-0420 (Supp. 3) (SER) (Feb. 1983) at 3-1.
[425] FF F-66 (slip opinion at 387).
[426] LBP-83-57, *supra*, 18 NRC at 526.
[427] FF F-67 (slip opinion at 387).

all piping.[428] We believe there is ample evidence in the record to support the Board's conclusion that the piping systems are safe.

5. LILCO is required to perform preoperational and periodic tests to detect leakage paths between the drywell and the wetwell areas of the containment.[429] The results are to be measured against acceptance criteria that are considered to be conservative.[430] A high pressure test — intended to simulate the pressures resulting during a large loss of coolant accident — is performed only once, during the preoperational test period.[431] The County argues that the drywell seal could deteriorate over time after the preoperational test is conducted and that the only way to verify the adequacy of the seal is to review the predictive validity of the test itself.[432] The Board reviewed the staff's justification for the adequacy of the tests, noting that the County had not discussed any alleged deficiencies.[433] It resolved the issue in LILCO's favor. We see no basis for overturning that result. In our opinion, the County has not undermined the adequacy of the tests. Moreover, we note that the high pressure test is performed at 35 psig (pounds per square inch gage).[434] The seals have an internal volume that is maintained at a pressure of approximately 60 psi.[435] In any event, that pressure is monitored during the life of the plant. Thus, any deterioration in the seals would be readily detectable.[436]

G. Safety Relief Valve Tests and Challenges

Safety relief valves (SRVs) are used in boiling water reactor (BWR) power plants to relieve excess pressure in the reactor vessel by releasing steam from that vessel to the suppression pool.[437] In view of concerns that grew out of the accident at Three Mile Island, the staff issued NUREG-0737[438] which, among other things, provided guidance for reducing the incidence of stuck open relief valve (SORV) events in all reactors. As the Board recounted, LILCO participated in a BWR Owners

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428 LBP-83-57, *supra*, 18 NRC at 526.
429 FF F-45 to F-49 (slip opinion at 379-81).
430 FF F-47 to F-48 (slip opinion at 380).
431 LBP-83-57, *supra*, 18 NRC at 521.
432 Suffolk Brief at 119.
433 LBP-83-57, *supra*, 18 NRC at 522.
434 Tr. 9872 (Metcalf).
435 Tr. 9875 (Metcalf). We note that LILCO witness James E. Metcalf stated that the seals are pressurized to "approximately 60 pounds per square inch" without indicating whether this value was in terms of gage or absolute pressure. Regardless of the term intended by the witness, however, the difference in the pressure values would not be sufficient to alter our discussion of this matter.
436 *Ibid.*
437 FF G-3 (slip opinion at 391).
438 "Clarification of TMI Action Plan Requirements" (Nov. 1980).

Group study that recommended three actions in furtherance of NUREG-0737: use of Target Rock two-stage SRVs, use of an operating procedure providing for manual implementation of low-low set relief, and lowering of the valve reclosure set point.[439] The staff reviewed these recommended actions and found them to be sufficient and in compliance with the guidance contained in NUREG-0737. The Board agreed.[440] We affirm.

NUREG-0737 provides that —

> Challenges to the relief valves should be reduced substantially (by an order of magnitude).[441]

The use of more reliable two-stage valves instead of three-stage valves is estimated to result in a marked reduction in the number of SORV events.[442] The County asserts that LILCO may not claim credit for this improvement because the decision to use two-stage valves *at Shoreham* was made before NUREG-0737 was issued.[443] The Board rejected this argument[444] and so do we. We agree with the staff that the argument is overly formalistic and ignores the historical context of NUREG-0737.[445] The three-stage valve was typical of that used at the time NUREG-0737 was issued[446] and the two-stage valve was thus the type of improvement contemplated by NUREG-0737. To adopt the County's argument would be tantamount to penalizing LILCO for committing to the improvement at an early stage on its own initiative.

The County also contends that the order of magnitude improvement claimed by LILCO results from a combination of reducing valve failures and challenges to the valves while NUREG-0737 requires an order of magnitude improvement resulting solely from a reduction in challenges.[447] The Board found the County's interpretation too restrictive. Despite the literal wording of NUREG-0737, the Board concluded that improved valve reliability could be considered in measuring compliance with NUREG-0737.[448] We find the Board's construction of the requirements of NUREG-0737 to be eminently sensible.

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[439] LBP-83-57, *supra*, 18 NRC at 530.
[440] *Id.* at 528-32.
[441] NUREG-0737, II.K.3.16-1.
[442] LBP-83-57, *supra*, 18 NRC at 531.
[443] Suffolk Brief at 123.
[444] LBP-83-57, *supra*, 18 NRC at 531.
[445] Staff Brief at 122.
[446] *See* Tr. 8634-37 (Smith, Hayes).
[447] Suffolk Brief at 122.
[448] LBP-83-57, *supra*, 18 NRC at 531.

Staff witness Marvin W. Hodges, who is the author of the NUREG-0737 item dealing with relief valves, testified that the reduction of stuck open relief valve events was the intended goal.[449] Even the County's witness admitted that it would be logical to consider both challenges and failure rates in an effort to reduce the occurrence of SORV events.[450] We agree with the Board that the purpose of this task item is to reduce valve failures and all modifications to achieve this purpose should be included in determining if the "order of magnitude" reduction of valve failures has been achieved.[451]

H. Emergency Planning Issues

LILCO filed its application for an operating license in 1975 but the case languished until LILCO asked the Board in the fall of 1981 to bring the prehearing process to an end.[452] Hearings were eventually scheduled for May 1982. As of that date, LILCO had prepared its onsite emergency plan but Suffolk County had decided to abandon its earlier offsite emergency efforts and begin anew. In the interest of expediting the litigation of emergency planning questions, the Licensing Board decided to bifurcate the hearing into two phases: Phase I, dealing with onsite issues, plus those offsite issues that could be litigated in the absence of the County's plan, and Phase II, comprising all remaining offsite issues.[453] Following a number of procedural skirmishes, including efforts at redrafting litigable contentions, the Board ruled on the admissibility of onsite emergency planning contentions, accepting some and rejecting others.[454]

At the conclusion of discovery, prefiled testimony was submitted. At that time, however, the Board was still in the midst of hearings dealing with other health or safety issues at Shoreham. As a consequence, the Board proposed that, to expedite consideration of Phase I emergency planning issues, the parties conduct cross-examination, redirect examination, and recross-examination initially by means of public pre-

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[449] Tr. 8491, 8509-10, 8614-15 (Hodges).

[450] Tr. 8795-97 (Bridenbaugh).

[451] The County observes that the reduction of SORV events may not be realized in view of the performance of two-stage valves at the Hatch 1 and Browns Ferry 2 plants. *See* Suffolk Brief at 124 n.60. As the Board noted, however, these incidents related to a problem of a failure of the valve to open rather than close and were thus unrelated to the requirements of NUREG-0737. The Board found, in any event, that the valve opening problem was remediable. *See* LBP-83-57, *supra*, 18 NRC at 531-32.

[452] *See* Appendix A of the Licensing Board's decision (slip opinion at A-16 to A-17).

[453] *See generally* Suffolk Brief at 88-89.

[454] *See* LBP-82-75, 16 NRC 986 (1982).

hearing depositions without the Board present. As the Board observed in a memorandum memorializing the proposal:

> The depositions would be conducted as if the parties were examining on the prefiled direct testimony at the evidentiary hearing. The depositions would be filed with the Board, with the portions which each party seeks to move into evidence so noted. The witnesses would thereafter appear at the hearing before the Board to answer any Board questions and respond to questions from the parties. The questions from the parties are expected to be well-focused and primarily follow-up questions to the depositions and any Board questions. However, within reasonably set time limitations, parties may orally highlight salient facts in the depositions by re-asking some of the deposition questions at the hearing.[455]

The County objected to the proposed procedures on the ground that the Board lacked the requisite authority to direct that initial examination of the prefiled testimony be undertaken through public depositions. Following the receipt of written views from all interested parties, including the County, the Board rejected the County's argument.[456] The Board convened a conference of counsel shortly thereafter to clarify and discuss implementation of its ruling. At that time counsel for the County indicated that his client would not participate in the examinations that the Board had ordered. As a result, the Board found the County in default and ordered its Phase I contentions dismissed.[457]

On appeal, the County presents three allegations of error. First, it claims that the Board erred in bifurcating emergency planning issues into two phases.[458] Second, it asserts that the Board erred in denying admission of certain contentions.[459] Third, it argues that the Board erred in requiring the use of evidentiary depositions.[460] In this latter connection, the County contends:

> Since the order for evidentiary depositions was illegal, the subsequent default ruling was likewise illegal.[461]

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[455] Memorandum Advising SOC [Shoreham Opponents Coalition] and NSC [North Shore Committee] of Board Proposal to Require Depositions and of Opportunity to File Views (Nov. 9, 1982) at 1-2 (unpublished).

[456] *See* LBP-82-107, 16 NRC 1667 (1982).

[457] LBP-82-115, 16 NRC 1923 (1982).

[458] Suffolk Brief at 91-94.

[459] *Id.* at 94-95.

[460] *Id.* at 96-98.

[461] *Id.* at 97-98. We note in this regard that the County rests its challenge to the default determination on the legality of the Board's procedural ruling; it does not contest the dismissal of its contentions as the appropriate sanction for default.

We find that the Board's employment of evidentiary depositions was both lawful and reasonable. Thus, in disagreement with the County, we find the Board's default ruling unassailable.

The County's argument regarding the Board's proposed procedure has a single theme — i.e., that section 189 of the Atomic Energy Act, 42 U.S.C. § 2239, provides parties with an opportunity for a hearing and such hearing must be an oral presentation before a Licensing Board.[462] The County's brief is wholly bereft of authority to support its position.[463] The Board's decision, on the other hand, is thoughtful and well documented.

As the Board notes, section 189 does not in terms specify the nature of the hearings that must be held. But section 181 of that Act, 42 U.S.C. § 2231, brings into play the procedural ground rules established by the Administrative Procedure Act (APA), 5 U.S.C. § 551 et seq. We may assume, without deciding, that section 189 requires that a proceeding involving an application for a facilities license under 10 C.F.R. Part 50 of the Commission's regulations must be conducted in accordance with the formal hearing requirements of the APA.[464] For, the APA expressly authorizes agencies in licensing cases such as this to adopt procedures for the submission of all or part of the evidence in written form as long as the parties are not prejudiced.[465] The right to submit rebuttal evidence and conduct cross-examination, moreover, is not unlimited; it is bounded by a need for a full and true disclosure of the facts.[466]

To be sure, the receipt of an initial round of cross-examination or rebuttal in written form is novel in NRC proceedings. However, Suffolk County makes only the most generalized, undocumented claim of prejudice, i.e., that the Board's procedures will necessarily lead to a less than full Board consideration of the facts, including a failure to assess witness credibility. The Board was committed to review the evidentiary depositions carefully and take such procedural steps (including oral cross-examination) as were necessary to ensure full development of the record and a fair and thorough resolution of any matters the County wished ultimately to raise. Had the County continued to participate in the matter, it might have been able to show that prejudice had, in fact, resulted, or that additional oral cross-examination before the Board was needed.

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[462] *Id.* at 96.

[463] The County cites only to 10 C.F.R. § 2.71a (which we assume to be a reference to 10 C.F.R. § 2.718) for the proposition that licensing boards have discretion to control the course of a proceeding.

[464] *See Kerr-McGee Corp.* (West Chicago Rare Earths Facility), CLI-82-2, 15 NRC 232, 247-56 (1982), *aff'd City of West Chicago v. NRC*, 701 F.2d 632 (7th Cir. 1983); *Union of Concerned Scientists v. NRC*, 735 F.2d 1437, 1444 n.12 (D.C. Cir. 1984).

[465] 5 U.S.C. § 556(d). Hearing boards routinely receive direct testimony in written form.

[466] *Ibid.*

. . . and adopt" the Board's definition of the term "important to safety" is *vacated.*[472]

It is so ORDERED.

FOR THE APPEAL BOARD

Barbara A. Tompkins
Secretary to the
Appeal Board

[472] Our *sua sponte* review of the record on those matters considered by the Board in its partial initial decision but not embraced by the appeals reveals no error warranting corrective action.

(The Board, of course, would likewise have been accorded an opportunity to assess the County's concerns in this regard.) The County's decision to withdraw from participation in these matters deprives its argument on appeal of any substance.[467]

V. NEW YORK STATE'S APPEAL

The State of New York has filed an appeal limited to a single argument, i.e., that the Board should not authorize issuance of a low power license "until a full determination on all relevant offsite emergency planning issues is made."[468] Earlier in this proceeding, the County filed a motion to terminate the case entirely in light of its decision not to adopt or implement an offsite emergency plan for Shoreham. The Board denied the motion[469] but nonetheless asked the Commission to decide whether the uncertainty surrounding offsite emergency planning should affect issuance of a license for low power operation.[470] The Commission concluded that it should not.[471] We are, of course, bound by the Commission's earlier determination in the absence of any significant changes in circumstances. We have carefully reviewed the State's arguments and its request for relief and find nothing in its presentation that could warrant our departure from the Commission's earlier determination.

For the reasons stated, we *affirm* the Board's decision in principal part, and *remand* for further consideration consistent with this opinion those portions dealing with Unresolved Safety Issue A-47, housekeeping, and environmental qualification of electrical equipment. The condition imposed by the Licensing Board requiring LILCO to "acknowledge

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[467] Given our conclusion that the Licensing Board did not err in holding the County in default on the Phase I issues, we need not reach the County's claims regarding the bifurcation of the proceeding or Board rulings on the admissibility of its Phase I contentions.

[468] Brief of Mario M. Cuomo, Governor of the State of New York in Support of Suffolk County Exception Nos. XII-1 through XII-6 to the September 21, 1983 Preliminary Initial Decision (Dec. 20, 1983) at 12.

[469] LBP-83-22, 17 NRC 608 (1983).

[470] LBP-83-21, 17 NRC 593 (1983).

[471] CLI-83-17, 17 NRC 1032 (1983).

Atomic Safety and Licensing Boards Issuances

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Cite as 20 NRC 1181 (1984) LBP-84-40

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Peter B. Bloch, Chairman
Dr. Jerry R. Kline
Mr. Glenn O. Bright

In the Matter of

Docket Nos. 50-440-OL
50-441-OL
(ASLBP No. 81-457-04-OL)

CLEVELAND ELECTRIC ILLUMINATING COMPANY, *et al.*
(Perry Nuclear Power Plant, Units 1 and 2)

October 4, 1984

In this Memorandum and Order the Licensing Board denies Intervenor's motion for summary judgment and dismisses its contention finding that Applicants are not required to install an automated standby liquid control system under Commission regulations dealing with anticipated transients without scram.

RULES OF PRACTICE: SUMMARY DISPOSITION

Summary disposition may be granted against the party requesting summary disposition when all the relevant facts are agreed and the law dictates a result opposite the moving party's position.

ANTICIPATED TRANSIENTS WITHOUT SCRAM: AUTOMATED STANDBY LIQUID CONTROL SYSTEM

The Commission's regulations do not require an automated standby liquid control system to be installed in boiling water reactors that were not designed and constructed to incorporate such a system. 10 C.F.R. § 50.62(c)(4).

MEMORANDUM AND ORDER

(Denying Motion for Summary Disposition on OCRE Issue No. 6 and Dismissing the Contention)

Intervenor Ohio Citizens for Responsible Energy submitted its motion for summary disposition to us on July 6, 1984.[1] The motion seeks disposition in OCRE's favor of Issue No. 6 which states:

> Applicant should install an automated standby liquid control system to mitigate the consequences of an anticipated transient without scram.

OCRE's motion is based on the new ATWS Rule entitled: Requirements for Reduction of Risk from Anticipated Transients Without Scram (ATWS) Events for Light-Water-Cooled Nuclear Power Plants. 49 Fed. Reg. 26,036 (1984) (to be codified at 10 C.F.R. § 50.62(c)(4)). Section (C)(4) of the newly published rule which was effective on July 26, 1984, states in pertinent part:

> The SLCS initiation must be automatic and must be designed to perform its function in a reliable manner for plants granted a construction permit after July 26, 1984, and for plants granted a construction permit prior to July 26, 1984, that have already been designed and built to include this feature.

POSITIONS OF THE PARTIES

OCRE argues that the plain language of the new rule now requires that the Perry standby liquid control system (SLCS) be configured for automatic activation because the plant is being designed and built with the capability of automatic initiation and that automation can now be

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[1] All parties have adequately briefed us on the rules governing motions for summary disposition and while affirming that we are aware of them we do not repeat them here. We turn immediately to the issues presented.

achieved at low cost (about $100,000 of additional investment over a manually activated system according to OCRE).

Applicants replied in opposition to the motion on July 30, 1984. Their opposition is grounded on a close reading of the new rule which applies not only to plants granted a construction permit after July 26, 1984, but also to: "plants granted a construction permit prior to July 26, 1984 that have already been *designed and built* to include this feature" (emphasis in Applicants' reply). Thus in Applicants' view if Perry has not already been designed and built to include an automatic SLCS the motion for summary disposition must fail and Issue No. 6 should be dismissed.

In support of their position the Applicants state two facts as to which there exists a genuine issue to be heard: (1) Perry has not already been designed to include automatic initiation of its SLCS and (2) Perry SLCS has not already been built to include automatic initiation. The Staff SER and its own FSAR are referenced to establish that Perry is designed for manual initiation of the SLCS. OCRE's own words are used against them on the question of whether the plant is built for automatic initiation. In the Applicants' view OCRE's assertion that automatic initiation can be had at low cost (of construction) leads inevitably to the conclusion that it has not now been built for automatic initiation.

The Staff also replied in opposition to OCRE's motion on July 30, 1984. The Staff in essence agreed that resolution of the motion depended on interpretation of the "designed and built" language of the new rule but opposed summary disposition because in its view OCRE had not demonstrated affirmatively that Perry was designed and built for automatic activation of the SLCS. Thus, in the Staff's view, material issues of fact remained in controversy. Beyond this, however, the Staff had little assistance to offer since it could not itself attest to whether the Perry SLCS has been designed and built with an automatic initiation feature.

The Board concluded at this point that it needed further interpretation of the meaning of the "designed and built" language of the new ATWS rule and of how that language applies to Perry. It therefore requested orally that all parties submit additional information on these questions. OCRE, the Applicants and the NRC Staff responded on September 7, 1984.

OCRE replied with a lengthy recount of the history of the ATWS issue dating back over a decade. (OCRE Attachment 2.) That history shows that the concept of automatic initiation of BWR SLCS dates back to a proposal by GE in 1974. It also shows that the Staff was actively considering automated activation in NUREG-0460, Vol. 3 (1978) and later

in NUREG-0460, Vol. 4 (1980) wherein it considered a range of alternatives for the ATWS problem, two of which (3A and 4A) would have required an automatic SLCS. The Staff published for comment on November 24, 1981, three proposed ATWS rules, two of which would have required automatic SLCS.

OCRE's history of the ATWS issue skillfully outlines the developing consensus over a long period of time in favor of automated SLCS for newly constructed plants. The history also reflects a developing consensus that some form of exemption from backfitting of automated systems would be needed. At various stages, proposals were made to include automated initiation only for those existing BWRs that already have the capability to automate this system or plants that already have been designed to include this feature. It further reflects the fact that the motivation for exemption from the automation rule is traceable to an unfavorable generic value/impact analysis for conversion of existing plants that did not already have this feature. In short, the value/impact analysis shows that the value of the risk reduction in existing plants was less than the cost of conversion of manual systems to automatic[2] in existing plants. The costs of installation, however, were dominated by cost of downtime for installation and costs of spurious trip, factors which might not apply fully at Perry.

OCRE presented this history for the purpose of aiding the Board in interpreting the new ATWS rule and not to induce us to recast the generic value/impact analysis which stands behind the rule. Thus, we do not interpret OCRE's argument to be on its face a challenge to the new rule or the foundation on which it rests.

OCRE argues instead that the history of the ATWS rule demonstrates that the phrase "designed and built" should be interpreted flexibly and not literally. Only the added incremental investment of $100,000 at Perry need be made to capture the incremental safety improvements expected for other reactors when the rule was adopted. This is less than the generically determined sum that was used in the value/impact analysis which undergirds the rule. OCRE does not dispute that a literal evaluation of Perry's present state would lead to the conclusion that the plant now stands with a manually activated system designed and built. Instead it says that with opportunities for automation so close at hand a flexible interpretation of the ATWS rule would lead to a conclusion that we should require the system to be automated under the intent of the rule

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[2] The supplementary information that was published with the ATWS rule states that risk reduction attributable to automation amounts to a factor of about 7 but that the cost of conversion for existing plants is about $24 million and that the value/impact analysis does not favor conversion in existing plants. 49 Fed. Reg. at 26,036.

which is to capture the additional increment of safety attributable to automation.

OCRE also argues that a literal interpretation of the rule could lead to an opportunity for its evasion on the part of utility CP holders simply by not building their facility with an automatic SLCS. We see no merit in this argument. It is clear from the rule itself that one instance where exemptions to CP holders will be granted will be for reactors that are in an advanced stage of construction. That is all that concerns us here. For other CP holders having reactors not so advanced in construction there will be ample opportunity for the Staff to scrutinize designs and construction and to properly enforce the rule.

The Applicants also responded fully to the Board's request for additional information. Their submittal included the affidavits of Gary R. Leidich on As-Built Status of SLCS Initiation; Frank R. Stead on the Design of the Initiation Function of the Standby Liquid Control System; and Dalwyn R. Davidson on SLCS Initiation. All are qualified engineers employed by or consultant to CEI.

The Applicants argue that the ATWS rule should be interpreted narrowly and literally. For automatic initiation of the SLCS to be required the system must be both designed and built for automatic initiation. Otherwise an automatic system is not required by the rule.

Applicants then go on to demonstrate through the affidavits of their employees or consultant that the Perry SLCS is not designed and built for automatic initiation but in fact is designed and built (or virtually complete) for manual initiation.

The affidavit of Frank Stead details the design history of the Perry SLCS. We need not duplicate that entire history here. Suffice to say that the design for manual initiation dates back to the CP stage for Perry and was discussed in both vendor's designs and the PSAR. The manual system was again discussed in the FSAR and in subsequent revisions including the current version. We conclude that there is no doubt whatever that CEI intended to design and did design a manually activated SLCS system for Perry.

During the design process the Applicants and their vendor were aware that the NRC Staff was considering an ATWS rule that might require an automatic SLCS. CEI therefore undertook several design studies which resulted in identification of design modifications that could be made to the Perry system in the event that automatic systems were ultimately required by the Staff. None of this design work altered CEI's own view that the manually activated system was their technically preferred system, however. Rather, the design modification work was undertaken simply so that CEI could be prepared to convert to automatic initiation if

necessary without serious schedule delays. Throughout the design process extending to the present time, however, the Applicants continued to present their design for a manually activated system to the Staff and the Advisory Committee on Reactor Safeguards (ACRS). We conclude that the design efforts undertaken by CEI to design an automatic SLCS initiation were done on a contingent basis because of uncertainty as to what a final ATWS rule might require.

Because of these design efforts the Perry SLCS has at present the capability to convert from manual to automatic initiation. The affidavit of Dalwyn R. Davidson, a consultant to CEI and formerly a Senior Vice President employed by CEI, confirms that he stated in a letter to the NRC Staff on August 13, 1982, that "although the design includes both manual and automatic initiation capability, only manual initiation will be functional." It was conveyed to NRC in this letter that CEI stood ready to convert its system to automatic initiation if the then-forthcoming ATWS rule should require it but it was the intent of CEI to make its manual systems functional (operational).

The affidavit of Gary Leidich, a General Supervising Engineer employed by CEI, establishes the present state of construction of the SLCS system. The SLCS system at Perry is virtually complete. The system itself consisting of tanks, valves and pumps would not change whether the method of activation is ultimately manual or automatic. The electrical control system is the only feature that distinguishes one mode of activation from the other.

As of July 26, 1984, the SLCS system was essentially complete and the manual initiation feature was at least 90% complete. Various subsystems were turned over by Construction to Nuclear Testing in July and August of this year and manual testing of the SLCS is now possible from motor control centers.

If automatic initiation of the SLCS were now to be required, many items of equipment over and above those required for manual initiation would have to be installed. This would be needed to bring plant status indications from the plant to the control system logic and then to send activating signals to the SLCS pumps and valves. A few cables which could serve an automatic system have been installed but not connected. The Redundant Reactivity Control System (RRCS) panels having capability for conversion to automatic initiation have also been installed. Otherwise a substantial list of needed circuits and relays have not been installed and at present the system does not stand in a configuration for automatic initiation.

The Staff submitted a complete response to the Board's request for further information, which was accompanied by the affidavit of George

Thomas who is a Nuclear Engineer employed by NRC and of John R. Grobe who is a Senior Resident Inspector for operations at the Perry Plant. Reporting on the views of the Reactor System Branch of the Office of Nuclear Reactor Regulation, Mr. Thomas states that "designed and built" means (a) necessary documentation exists to enable construction of a complete SLCS with a clear indication of the type of initiation and (b) physical installation of hardware has occurred, such as piping, valves, electrical cables, and panels in the plant, to the extent that construction is substantially complete.

Mr. Thomas goes on to state that he has reviewed the documentation of the SLCS system at Perry and that the most recent submissions establish that CEI has elected to follow the design for manual initiation. Moreover, although Perry was designed to have an automatic initiation option, it was not built with that option.

Mr. Grobe states that he personally inspected the Perry SLCS system on August 27-30, 1984, and has also personally examined SLCS documents at the plant. The documents which cover the period of June 30, 1977 to February 1984 represent the major milestones in the development and implementation of the current SLCS design which uses only manual initiation. His inspection of the SLCS system confirms that it is virtually complete with only a few items outstanding and that two subsystems of the SLCS were turned over to Nuclear Testing this past Summer. The SLCS is scheduled for preoperational testing in November/December 1984 and turnover to the operations department in January/February 1985.

Mr. Grobe's inspection reveals that the system as built would not support automatic initiation. To convert to automatic initiation would require the additional installation, modification or deletion of approximately forty cables, ten relays and numerous wires, switches, indicating lights and annunciators. Thus, he concludes that the SLCS at Perry Unit 1 has been designed and built to function as a manually initiated system.

BOARD ANALYSIS

The Board concludes at the outset that there is no remaining material issue of fact to be heard on Issue No. 6. The Applicants' and Staff's filings establish without contradiction that the Perry Unit 1 SLCS is now designed and built for manual initiation and that it is not designed and built for automatic initiation. Under the new ATWS rule which took effect July 26, 1984, those facts alone are sufficient to compel us to deny OCRE's motion for summary disposition and to dismiss Issue No. 6 from the proceeding.

However, the fact that a conversion of the system could now apparently be made at a cost of about $100,000, which is low relative to the cost of the SLCS system or to the plant as a whole, is also uncontradicted on our record. Thus, while a literal interpretation of the ATWS rule compels denial of the motion, the special circumstances of the Perry case may present us with an opportunity to capture the marginal increment of safety attributable to automatic SLCS initiation at what appears to be a bargain price. We therefore turn to a consideration of whether the flexible interpretation of the ATWS rule urged by OCRE is permissible in this case.

Our own analysis of the ATWS rule starts with the assumption that all of the provisions of the SLCS rule apply with equal force and weight. In promulgating this rule the Commission has affirmatively decided that some reactors are included within its reach and that others shall be exempt, and that no greater weight attaches to one side of that equation than to the other. We conclude therefore that the issue before us does not involve an important unconsidered or unresolved issue of reactor safety. In determining that any reactors at all could be exempt from the rule it is clear that one inevitable consequence of an exemption would be to forgo the increment of safety attributable to automation. This is an acceptable outcome under the rule.

Second we examine the likely effect of the rule. Reactors that will surely qualify for exemption under the ATWS rule fall into two classes: (a) those which are already operating and that have manually initiated systems and (b) reactors in an advanced stage of construction for which an automated SLCS has not been designed and built. (We leave it to future cases to determine whether reactors which are not in an advanced stage of construction and which do not have either automatic or manual initiation designed and built would be compelled to install an automated SLCS.) The facts we have reviewed show that there is absolutely nothing unique about the circumstances surrounding Perry Unit 1. It now stands in an advanced stage of construction with a manually activated SLCS designed and built. Thus it stands in a class of reactors for which an exemption from automation was affirmatively intended.

A corollary to our conclusion that the issue before us is not a substantive one of unreviewed reactor safety is that the provision governing exemption in the ATWS rule is effectively procedural in nature. The provision for exemption is simply a nonbackfitting provision; in short, a deliberately chosen grandfather clause. As such it reflects a considered instruction from the Commission to its Staff and licensing boards not to backfit automatic systems on certain classes of reactors. Given that instruction there appears to be little or no latitude or flexibility remaining

once it is determined that a reactor falls into an exempt class. As we have already concluded, Perry falls foursquare into such an exempt class.

We see nothing inherently contradictory or inconsistent in any of this. It is well known in technology that improvements of any kind including safety improvements may come in small steps as well as large ones. It would be exceedingly difficult to adopt and incorporate the small increments of reactor safety as they get developed if each time it was done a wholesale backfit of the entire industry was also required. Thus a requirement to exempt plants from backfitting is as much in the interest of safety as one compelling it. It is therefore perfectly consistent with the public interest in safety to incorporate marginal improvements into new construction while exempting previously constructed plants. No inference is warranted that plants having automatic initiation are safe while those having manual initiation of SLCS are not. We infer from the SLCS rule that both modes of activation are adequate to meet safety standards but that automation simply adds incrementally to that safety.

Were we inclined to grant OCRE's motion based on the analysis thus far we would be unable to do so based on an uncritical acceptance of its estimate of $100,000 for conversion of the SLCS. A full, rigorous site-specific value/impact analysis would be required before we could take such a step. We entertain considerable doubt whether a site-specific value/impact analysis should even be undertaken at this late stage on the construction of Perry. Our doubts are based not only on our consideration of the meaning of the ATWS rule but also on the fact that the low costs of conversion in this case may be deceptive not only for Perry but for any plant similarly situated. When the Commission Staff concluded that the generic value/impact assessment did not favor backfitting of automated systems for certain classes of reactors the costs it considered were at that time necessarily forward costs. Contributing to those costs were design costs, downtime costs to permit conversion and costs of spurious trip of the SLCS. In Perry's case, design costs for an automated system exist because of the uncertain regulatory situation previously existing but they would now appear on the ledger necessarily as sunk costs. The costs of delay are also partly sunk and the cost of spurious trip likely would remain unchanged.

While sunk costs are irretrievably expended it remains a fact that had Perry not voluntarily expended them the present forward cost of conversion would appear larger than it now does. At the very least, design costs would now have to be expended had that not been done earlier. Costs of delay which are now partly sunk costs would also enter the ledger as forward costs had they not already been expended. It is there-

fore not self-evident that a rigorous analysis would confirm OCRE's position in this matter.

We conclude from these brief considerations that we should not now recast a site-specific value/impact analysis under conditions different from those under which the Commission has already done generically. It is clear that such an analysis would founder in tangled controversy over the proper consideration of sunk costs and forward costs under circumstances where no important unresolved safety questions hung in the balance. The controversy would thus be empty and sterile. We believe that that would frustrate an important purpose of the rule which is in fact to resolve important issues generically rather than by adjudication on a case-by-case basis.

We learn one more lesson from our analysis of the Perry situation and that is that regulatory uncertainty itself has costs. The cost of regulatory uncertainty is justified so long as experts still grapple with issues and a fair solution still eludes them. When the problems are solved, however, as they now are for the issues before us, there is no further justification for regulatory uncertainty.

Moreover, the mandates now provided in the ATWS rule were not arrived at easily. OCRE's own history reveals that they are a result of over a decade of arduous technical and legal effort. That is not a situation where a board should lightly exercise flexibility based on its impressions from one case. Given the mature state of analysis of this problem and the clear language of the SLCS rule we believe that it would serve no one's interest to engender further controversy and regulatory uncertainty by rendering an *ad hoc* judgment in this case. Clearly we serve no one's interest by telling Applicants in clear language what is required of them and then clouding those instructions with yet another value/impact analysis struck at the 11th hour.

We see nothing in the Perry case that creates any unique problems that were not considered in the ATWS rule. Perry's dilemma arises from nothing more principled than a roll of the dice. It is merely coincidental that Perry stood with a virtually complete SLCS at the same time the new rule was adopted and that most of its costs were sunk and its forward costs of conversion necessarily smaller. Any plant similarly situated would give the deceptive impression of low forward cost for conversion of the SLCS system at that point. To conclude that the system should be converted would be to frustrate the clear intent of the rule and we shall not do it.

Based on our analysis of the issues we conclude that a fair interpretation of the ATWS rule does not permit the flexibility urged by OCRE and that OCRE's motion for summary disposition of Issue No. 6 in this

case should be denied. We also find that no further disputed issues of material fact exist that must be resolved in a hearing. Accordingly, we conclude that OCRE's Issue No. 6 should be dismissed from this proceeding. We are aware in so finding that we forgo whatever marginal increment of safety is attributable to automatic initiation of the SLCS. That is an acceptable result under the ATWS rule which is necessitated by a balancing of all relevant factors.

Order

For all of the foregoing reasons and based on a full review of the record, it is ORDERED[3]

(1) OCRE's motion for summary disposition of Issue No. 6 is denied.

(2) Issue No. 6 is dismissed from this proceeding.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Jerry R. Kline
ADMINISTRATIVE JUDGE

Glenn O. Bright
ADMINISTRATIVE JUDGE

Bethesda, Maryland

BLOCH, CHAIRMAN, DISSENTING

The question of whether or not Cleveland Electric Illuminating Company, *et al.* (Applicants) should be required to install an automatic standby liquid control system is a close question that turns on the interpretation of the Commission's final rule on anticipated transients without scram ("ATWS"). 49 Fed. Reg. 26,036 (1984). Since there are no factual issues in dispute, the issue turns entirely on interpretation of

[3] The dissenting opinion of Judge Bloch is attached to this Decision.

legal materials, and summary disposition for one side or the other is mandatory.[4]

My dissent stems from my belief that legal materials should be interpreted to effectuate the purpose of the framer rather than by mechanical rules of word interpretation. The applicable section of the final rule states:

> The SLCS [standby liquid control system] initiation must be automatic and must be designed to perform its function in a reliable manner for plants granted a construction permit after July 26, 1984, and for plants granted a construction permit prior to July 26, 1984, that *have already been designed and built to include this feature.*[5]

The facts about the ASLCS at Perry are not in dispute. Management has consistently characterized its system as manual, both in its FSAR and before the ACRS. However, Applicants applied prudent management practices and took steps to assure that they would be able to comply with an ASLCS requirement, if necessary, without a delay in startup. To do this, the design drawings for one 4-day period were changed to show an ASLCS, which is therefore completely "designed." Some features of automatic initiation, including certain printed circuit cards and memory chips, have been installed in the plant. However, necessary wiring has not been installed and key-lock switches in the control room would have to be replaced were ASLCS to be installed.[6] The total remaining cost of installation is about $100,000.[7]

Although the total cost of automating the SLCS is not in our record, our best estimate from available data is that — excluding downtime for installation and for unnecessary activation — it is about $3.3 million.[8]

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[4] This issue was raised by Ohio Citizens for Responsible Energy's (OCRE's) July 6, 1984 motion for summary disposition of Issue No. 6: "Applicant should install an automated standby liquid control system to mitigate the consequences of an anticipated transient without scram."

[5] 49 Fed. Reg. at 26,045 (emphasis added).

[6] These facts are all set forth by Applicants in their Response to ASLB Request for Information on the ATWS Rule and the Perry SLCS. I would like to acknowledge Applicants for the straightforward and objective presentation of their position in this filing.

[7] To confirm this fact, found on page 11 of OCRE Brief on the History and Intent of the ATWS Rule, September 7, 1984, I telephoned Applicants and OCRE on September 27, 1984, and ascertained that the estimate was contained in an interrogatory response filed by the Applicants. Applicants' counsel pointed out during the call that estimates of building costs often are subject to inflation due to unanticipated difficulties. We accept that statement, but we also note that the original estimate was one made by Applicants and may have contained some costs in anticipation of difficulties. In any event, the estimate seems to be a rough cost figure on which Commission action may be based.

[8] *See* SECY-83-293, "Amendments to 10 C.F.R. 50 Related to Anticipated Transients Without Scram," William J. Dircks, Executive Director for Operations, July 19, 1983, at 5, which estimates costs of $3.5 million to $5.5 million per plant. This contrasts with the Final Rule, which contains Supplementary Information (slip op. at 12) that the cost is $24 million per plant. The higher figure apparently includes costs related to unnecessary initiation of the ASLCS. (None of the estimates include cost savings from necessary initiation of the ASLCS.)

Hence, our best estimate is that the automated system is about 97% designed and built.

The majority of the Board interprets the phrase "designed and built" to mean that the ASLCS must be completely finished. Although that is a permissible interpretation, based on a notion that the Commission was setting up a mechanical prohibition against all backfitting, I would not interpret those words so inflexibly.

A similar issue of interpretation arose in an earlier phase of this proceeding. At that time, Intervenors argued that Appendix B, Criterion XIII, required "prompt" resolution of all deficiencies. They argued that a 1-month delay is not "prompt." However, we decided that prompt should be interpreted in light of the entire program of closing deficiencies and that delays on some deficiencies did not negate promptness. In that instance, we applied a reasonableness test that was sensitive to the fact that people who write rules necessarily draft language that should be applied reasonably to particular facts.

I believe that a reasonable interpretation of "designed and built" would require that the total project, including its design and construction and possible costs for downtime during installation, be reasonably completed.[9]

The requirement for an automated standby liquid control system was included in a rule whose summary states, "[t]his [the various provisions of the rule] will significantly reduce the risk of nuclear power plant operation." One of the provisions that would reduce risk for boiling water reactors is the ASLCS, which was not required for existing plants because of the costs. The purpose of the ASLCS is to provide for automatic operation of the boron poisoning system as preferable to operator action. It is characteristic of operator experience that the need for emergency action is rare. Hence, operators may be inclined to interpret ambiguous signals as *not* requiring emergency action, particularly because unnecessary activation of the SLCS may result in substantial costs for the employer. By contrast, machines are not affected by these conflicting motivations and will make tough decisions in appropriate circumstances without fear of reprisal.

The language used by the Commission in the Supplementary Information to the ATWS rule, covering the grandfathering of existing plants, makes it clear that the grandfathering was based on a weighing of costs and benefits; the Commission decided that existing plants should not be

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[9] The majority opinion apparently would apply this requirement of 100% built even if everything was done but for the last few bolts. Possibly, in those circumstances they would apply a reasonableness test in order to avoid silliness. However, I would argue that if a reasonableness test is applicable then (as surely it is) then it also is applicable now.

required to incur the great costs for downtime for installation and for backfitting, in addition to the operating costs that may result from unnecessary activation.

The Supplementary Information accompanying the rule, slip op. at 12, considers "downtime for installation in existing plants" to be an important factor affecting the decision not to require backfits. Similarly, the Staff of the Commission, in Enclosure D to SECY-83-293, at 32, stated that the Utility Group's estimate for the cost of an ASLCS is "dominated by downtime for installation in existing plants." Hence, I conclude that the Commission did not consider a situation such as has occurred at Perry, and the first authority in a position to make an informed decision about whether Perry should be grandfathered is the Licensing Board. We should accept that responsibility, by making a reasonable interpretation of the existing regulation consistent with its history, rather than by pretending that the Commission already took responsibility because of a meaning the Commission never considered but that the Board chooses to attach to the Commission's words.

Someone should decide this issue on a reasoned basis. The Commission's expectation of high backfit costs for an ASLCS does not fit this case, where only $100,000 of additional costs are left[10] to be incurred.[11] The phrase "designed and built" should not be interpreted to preclude the application of the ASLCS requirement in this instance.

A safety improvement applied to all future plants because of its importance should not be excluded from Perry because a small residue of work is yet undone. The community around the plant should not be deprived of this added protection by wooden application of language to a situation in which there is no sound reason to reach a different result than there is for plants required to have an ASLCS.

Peter B. Bloch, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland

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[10] I do not accept the majority's discussion of sunk costs. Costs that are already incurred, regardless of the motivation, are indications of the extent to which a system has been designed and built. Sunk costs are irrelevant to a value/impact analysis of installation of the ASLCS in this plant at this time.

[11] This issue has been raised at an early time so that Applicants may choose to install the ASLCS rather than to risk incurring downtime costs in the future. Consequently, should this issue be decided adversely to Applicants in the future, I do not think downtime (which could be avoided by making the change now) should be considered as a legitimate cost. It is based on this conclusion that a change in circumstances at the time of appeal would not affect the outcome of this issue, that Judge Bright and I decided that it is not appropriate to certify this issue to the Commission at this time.

Cite as 20 NRC 1195 (1984) **LBP-84-40A**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Sheldon J. Wolfe, Chairman
Dr. Jerry R. Kline
Dr. George A. Ferguson

In the Matter of

Docket Nos. 50-338-OLA-1
50-339-OLA-1
(ASLBP No. 83-481-01-LA)
Docket Nos. 50-338-OLA-2
50-339-OLA-2
(ASLBP No. 83-482-02-LA)

VIRGINIA ELECTRIC AND POWER COMPANY
(North Anna Power Station, Units 1 and 2)

October 15, 1984

In Case OLA-1, involving an application for an amendment to the North Anna operating licenses to permit the receipt and storage of 500 spent fuel assemblies from the Surry facility, the Licensing Board rules that certain contentions, as recast by the Board into a consolidated contention, are admitted as issues in controversy, and admits the intervenor as a party. In Case OLA-2, involving an application for an amendment to the operating licenses to permit the expansion of the fuel pool storage capacity at the North Anna facility, the Licensing Board rejects the contentions, denies the petition for leave to intervene, dismisses the case, and authorizes the Director of Nuclear Reactor Regulation to issue an amendment to the North Anna operating licenses which revises the technical specifications to permit the expansion of the spent fuel storage capacity.

RULES OF PRACTICE: ADMISSIBILITY OF CONTENTIONS

Section 2.714 of 10 C.F.R. does not require the petition to detail the evidence which will be offered in support of each contention, and, in passing upon whether an intervention petition should be granted, it is not the function of a licensing board to review the merits of a contention. *Mississippi Power and Light Co.* (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-130, 6 AEC 423, 426 (1973).

MEMORANDUM AND ORDER
(Ruling on Contentions)

Memorandum

I. BACKGROUND

In Docket Nos. 50-338-OLA-1 and 50-339-OLA-1, the Applicant applies for an amendment to the North Anna, Units 1 and 2, operating licenses to permit the receipt and storage of 500 spent fuel assemblies from the Surry Power Station, Units 1 and 2 (Case OLA-1). In Docket Nos. 50-338-OLA-2 and 50-339-OLA-2, the Applicant applies for an amendment to the operating licenses to permit the expansion of the fuel pool storage capacity for North Anna, Units 1 and 2 (Case OLA-2). Concerned Citizens of Louisa County (CCLC) has filed petitions for leave to intervene in these two cases.[1]

By agreement of counsel and/or Board directive, oral argument upon CCLC's proposed contentions was not heard during the course of the special prehearing conference held on February 16, 1983. (*See* Order of February 18, 1983 (unpublished)). In a letter dated October 20, 1983, the Applicant advised that all counsel were agreed that, once the Staff had issued its Environmental Analysis and Safety Evaluation Report, within certain time frames they would meet in an effort to agree upon a statement of contentions and that contentions that could not be agreed upon would be submitted to the Board. On July 3, 1984, the Staff issued

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[1] In separate Notices of Hearing dated December 3, 1982, the Board, among other things, scheduled a joint special prehearing conference to be held on February 16, 1983, and noted that after this conference it might decide to consolidate the two cases. As reflected, *infra*, in Case OLA-1, a consolidated contention, as recast by the Board, is admitted as an issue in controversy and CCLC is admitted as a party-intervenor in that case. However, we reject as issues in controversy the contentions submitted in Case OLA-2, and deny CCLC's petition for leave to intervene in that case.

its Proposed Finding of No Significant Impact, the Environmental Assessment (EA), and the Safety Evaluation Report (SER) relating to the two requested amendments.

Under date of July 30, 1984, CCLC submitted five contentions relating to Case OLA-1 and three contentions relating to Case OLA-2. After Applicant and the Staff filed responses, a supplemental special prehearing conference was held on September 7, 1984. Because CCLC orally argued in general with respect to its contentions that Table S-4 relied upon by the Staff in the EA was inapplicable and that the Staff should have issued instead a final environmental impact statement, the Board requested that counsel submit briefs as to whether there have been any licensing board, appeal board, Commission and federal court rulings on the question of whether Table S-4 applies only in construction permit proceedings or whether that Table is applicable also in operating license amendment cases. Counsel simultaneously filed briefs on October 21, 1984, and thereafter simultaneously filed reply briefs.

II. CONTENTIONS

A. Case OLA-1[2]

1. Contention 1

In substance, Contention 1 alleges that the proposed license amendment constitutes a major federal action significantly affecting the human environment and thus should not be granted prior to the preparation of an environmental impact statement. As bases for this contention, petitioner CCLC asserts that the transportation of spent fuel by truck presents (a) a risk of accidents causing great health and environmental damage, (b) the risk of sabotage and (c) the risk of error by VEPCO employees in preparing the casks, which, for example, if not properly sealed, might break open in transit.

The Applicant, with respect to basis (b), and the Staff, with respect to bases (a) and (c), responded that, contrary to 10 C.F.R. § 2.714(b), these bases had not been set forth with reasonable specificity. We disagree — the purposes of the basis-for-contention requirement as set forth

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[2] During the course of the supplemental special prehearing conference, CCLC withdrew Contention . Further, on August 14, 1984, CCLC submitted a revised basis for Contention 4, with respect to which the Board issued a protective order on September 26, 1984. After reviewing physical protection system documents, which are subject to the protective order, CCLC will notify the Board that it withdraws this contention if it concludes that there are no inadequacies. (*See* Order of September 13, 1984 (unpublished)).

by the Appeal Board have been met by CCLC.[3] Certainly, § 2.714 does not require the petition to detail the evidence which will be offered in support of each contention, and, in passing upon whether an intervention petition should be granted, it is not the function of a licensing board to review the merits of a contention.[4] Moreover, we do not understand that CCLC is challenging the values set forth in Table S-4. Rather it is urging that Table S-4 is inapplicable in operating license amendment cases, that said Table applies in construction permit cases and in certain operating permit cases but is to be used only for cost-benefit analysis purposes, and that the Staff should prepare and issue a detailed environmental impact statement evaluating the effects upon the environment which would result from the proposed shipment of 500 spent fuel assemblies from Surry to North Anna. While, as requested, counsel have submitted briefs which have served to clarify their positions with respect to the applicability of Table S-4, *inter alia*, we do not at this stage decide the merits of this contention.

Contention 1, as hereafter rewritten by the Board and consolidated with Contentions 3 and 5, is admitted as an issue in controversy.

2. *Contention 3*

In substance, Contention 3 alleges that neither Applicant nor Staff has adequately considered the alternative of constructing a dry cask storage facility at the Surry Station. CCLC's bases for this contention are that, contrary to the National Environmental Policy Act, 42 U.S.C. § 4332(2)(E), consideration was not given to this alternative method which is feasible, can be effected in a timely manner, is the least expensive and safest method for at least 50 years, and can be used on or off site.

The Staff responded that its EA had adequately discussed alternatives. Further, the Staff in substance urged that the National Environmental Policy Act does not obligate a federal agency to search out possible alternatives to a course which will neither harm the environment nor bring into serious question the manner in which this country's resources are being expended. The Applicant argues that the dictates of NEPA do not apply since CCLC has neither contended nor suggested that there are any unresolved conflicts over the alternative uses of available resources,

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[3] *See Philadelphia Electric Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20-21 (1974).

[4] *Mississippi Power and Light Co.* (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-130, 6 AEC 423, 426 (1973).

and that in the absence of such an unresolved conflict, alternatives need not be analyzed where the environmental impacts are negligible.

We conclude that CCLC has set forth bases for this contention with reasonable specificity. As noted above, in our discussion with respect to Contention 1, we do not reach the merits of contentions at this stage of the proceeding. Accordingly, as hereafter rewritten by the Board and consolidated with Contentions 1 and 5, Contention 3 is admitted as an issue in controversy.

3. Contention 5

Contention 5 as proposed by CCLC reflects in a summary fashion that which it proposed in Contentions 1 and 3. For the same reasons advanced in opposing Contentions 1 and 3, the Applicant and Staff have opposed the admission of Contention 5 as an issue in controversy. For purposes of clarity, succinctness, and a more efficient proceeding, the Board has rewritten Contention 5 and admits it as CCLC Consolidated Contention 1. Consolidated Contention 1 reads as follows:

> The Staff's Environmental Assessment is inadequate and an Environmental Impact Statement should be prepared. The bases for this contention are two-fold. First, the Environmental Assessment, in relying upon the inapplicable values in Table S-4, did not evaluate the probability and consequences of accidents occurring during the transportation of spent fuel casks from the Surry Station to the North Anna Station or which might be occasioned by acts of sabotage or by error of Applicant's employees in preparing the casks for shipment. Second, contrary to the National Environmental Policy Act, 42 U.S.C. § 4332(2)(E), consideration was not given to the alternative method of constructing a dry cask storage facility at the Surry Station which is feasible, can be effected in a timely manner, is the least expensive and safest method for at least 50 years, and can be used on or off site.

Accordingly, Consolidated Contention 1 is admitted as an issue in controversy and CCLC is admitted as a party-intervenor in Case OLA-1.

B. Case OLA-2

1. Contentions 1, 2 and 3

Contentions 1, 2 and 3 in this case are identical to Contentions 1, 3 and 5 proposed by CCLC in Case OLA-1. However, with respect to Contention 1, CCLC additionally argues that the environmental impacts of the proposed amendment modifying the North Anna spent fuel pool cannot be evaluated apart from the environmental impacts associated with the proposed amendment to ship Surry-to-North Anna spent fuel;

that, since the two modifications were requested almost simultaneously, it is clear that the North Anna spent fuel modification was basically designed to accommodate the 500 spent fuel assemblies shipped from Surry; and that the effects of the two proposed modifications must be summed in order to evaluate the significance of both proposed actions.

With respect to Contention 1, Applicant argues that the proposed amendment to modify the spent fuel pool capacity has a manifest independent utility — i.e., that even if no spent fuel assembly was ever shipped from Surry, the North Anna enlarged spent fuel pool would accommodate its own spent fuel assemblies and thus would extend the full core reserve loss date from 1989 to 1998. It urges that the approval of the spent fuel modification request would in no way prejudice the resolution of the separate and distinct transshipment of spent fuel issue involved in Case OLA-1. Thus, Applicant submits (and Staff concurs) that the Appeal Board's two-part test has been met.[5] As discussed above, at this stage of the proceeding we do not consider the merits of a contention. However, additionally, Applicant urges in substance that there is no basis set forth with reasonable specificity in support of Contention 1. We agree that Contention 1 lacks a basis. While CCLC urges that environmental effects of the two proposed modifications must be summed in order to evaluate the significance of both proposed actions, there can be no summing inasmuch as CCLC has not filed a contention objecting on the merits, either technical or environmental, to the spent fuel modification.

Moreover, in that Contentions 2 and 3 either are directed solely to the transshipment of Surry spent fuel assemblies or to an alternative thereto, Applicant also urges that these two contentions lack bases. In sum, the Staff concurs. We agree that these two contentions lack bases.

We do not admit as issues in controversy Contentions 1, 2 and 3 in Case OLA-2 because they lack bases, and we deny CCLC's petition for leave to intervene in that case.

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[5] In *Duke Power Co.* (Amendment to Materials License SNM-1773 — Transportation of Spent Fuel from Oconee Nuclear Station for Storage at McGuire Nuclear Station), ALAB-651, 14 NRC 307, 313 (1981), the Appeal Board stated:

> [I]t is settled that the agency may confine its scrutiny to the portion of the plan for which approval is sought *so long as* (1) that portion has independent utility; and (2) as a result, the approval does not foreclose the agency from later withholding approval of subsequent portions of the overall plan. . . .

Order

1. In Case OLA-1, Consolidated Contention 1, as recast by the Board, is admitted as an issue in controversy and Concerned Citizens of Louisa County is admitted as an intervening party. Pursuant to § 2.714a, Applicant and/or the NRC Staff may appeal this part of the Order to the Atomic Safety and Licensing Appeal Board within ten (10) days after service of this Order.

2. In Case OLA-2, the contentions of Concerned Citizens of Louisa County are not admitted as issues in controversy, the petition for leave to intervene is denied, and the case is dismissed. Pursuant to § 2.714a, Concerned Citizens of Louisa County may appeal this part of the Order to the Atomic Safety and Licensing Appeal Board within ten (10) days after the service of this Order.

3. With respect to Case OLA-1, within ten (10) days after the service of this Order, the parties shall confer and advise this Board whether, pursuant to § 2.749, any party plans to file a motion for summary disposition. Taking into account any necessity for discovery, the parties shall suggest to the Board a due date for the filing of any motions for summary disposition.

4. With respect to Case OLA-2, the Director of Nuclear Reactor Regulation is authorized to issue an amendment to Facility Operating Licenses No. NPF-4 and No. NPF-7 which revises the technical specifications to permit the expansion of the spent fuel storage capacity for North Anna Units Nos. 1 and 2 from 966 to 1737 fuel assemblies and

identifies a new nominal center-to-center spacing between fuel assemblies of 10-9/16 inches.

THE ATOMIC SAFETY AND
LICENSING BOARD

Dr. Jerry R. Kline
ADMINISTRATIVE JUDGE

Dr. George A. Ferguson
ADMINISTRATIVE JUDGE

Sheldon J. Wolfe, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 15th day of October 1984.

Cite as 20 NRC 1203 (1984) LBP-84-41

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Ivan W. Smith, Chairman
Dr. Dixon Callihan
Dr. Richard F. Cole

In the Matter of

Docket Nos. STN 50-454-OL
STN 50-455-OL
(ASLBP No. 79-411-04-OL)

COMMONWEALTH EDISON COMPANY
(Byron Nuclear Power Station, Units 1 and 2)

October 16, 1984

In this Supplemental Initial Decision, the Licensing Board concludes that the Applicant has demonstrated its ability or willingness to comply with applicable NRC regulations to maintain a quality assurance and quality control program, and to observe on a continuing and adequate basis the applicable quality control and quality assurance criteria plans. The Board authorizes the Director of Nuclear Reactor Regulation, upon making all requisite findings, to issue full-power licenses for Byron Nuclear Power Station, Units 1 and 2.

LICENSING BOARDS: AUTHORITY

As a general rule, the authority of licensing boards is limited to deciding matters in controversy among the parties. An operating license for a nuclear power plant may be issued at such time as the NRC renders the findings required by 10 C.F.R. § 50.57(a), and the Commission, subject to the immediate effectiveness provisions of 10 C.F.R. § 2.764, has

vested the Director of Nuclear Reactor Regulation with the authority to make such findings.

LICENSING BOARDS: DELEGATIONS TO STAFF

A licensing board may delegate a matter or issue to the NRC Staff when it is clear that the NRC Staff can adequately resolve it.

APPEARANCES

On behalf of Applicant, Commonwealth Edison Company: **Joseph Gallo, Michael I. Miller, Bruce Becker, Martha E. Gibbs, Michael Goldfein,** and **Mark Furse, Esquires**

On behalf of the Intervenors, DAARE/SAFE, and Rockford League of Women Voters: **Douglass Cassel, Jr., Howard Learner, Vicki Judson,** and **Timothy Wright, Esquires**

On behalf of Intervenor, Rockford League of Women Voters: **Betty Johnson**

On behalf of the Nuclear Regulatory Commission: **Stephen H. Lewis** and **Michael N. Wilcove, Esquires**

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SUPPLEMENTAL INITIAL DECISION
(Operating License)

Overview of Supplemental Initial Decision

On January 13, 1984, this Board denied the application for an operating license for the Byron Nuclear Power Station in Ogle County, Illinois, because the Intervenors had prevailed on their quality assurance contention. In today's Supplemental Initial Decision we conclude that, with respect to those quality assurance issues within our jurisdiction, there is no impediment to an operating license.

This overview is for those who have no need to work with the large body of findings and conclusions upon which the Supplemental Initial Decision is based. It is not a part of the Supplemental Initial Decision. It is incomplete. Therefore it may not fairly represent the merits of any party's case.

THE JANUARY 1984 INITIAL DECISION

Our Initial Decision denying the license was based principally upon findings that the NRC Staff had determined that there were widespread failures among contractors at Byron to demonstrate in accordance with NRC requirements that their quality assurance inspectors were properly

trained, qualified and certified. Although no significant construction or hardware defects were discovered, our concern about possible deficiencies in inspector competence precluded a finding that the quality of work at Byron was satisfactory.

The solution proposed by Commonwealth Edison was to be a reinspection program consisting of a sampling of inspectors' work with the primary purpose of validating the inspectors' qualifications. Also, all inspectors then working were to be properly recertified. The Staff accepted the reinspection program as possible satisfaction of its concerns about inspector qualifications. To a limited degree the Staff also looked to the program to resolve additional concerns about worker competence and pending work-quality allegations. However, the Staff was unable to assure the Board that the reinspection program would achieve its intended goals, and testified that, until the Staff was satisfied with the results of the program, it would not authorize the operation of the Byron Station. The Staff's final determination could not be made for some 3 months following Commonwealth Edison's report of the results of the reinspection program, and, as it later turned out, about 9 months following the close of the evidentiary record. The Staff proposed that the Board leave to the Staff the responsibility of evaluating the results of the reinspection program and the final determination of whether the program provided the assurance of safety required to authorize operation of the Byron Station.

We made findings respecting several of the contractors performing safety-related work at Byron and determined that the poor quality assurance programs of some of them demonstrated that the Applicant had failed in its responsibility to oversee the quality assurance activities of its contractors. We found that Systems Control Corporation, a supplier of electrical and control-related equipment, had a fraudulent and unreliable quality assurance program. But, since information available then indicated to us that all of Systems Control's work was to be reinspected, we found that we could properly leave the results to the Staff for final approval or disapproval. Reliable Sheet Metal, the heating and ventilating contractor, was also undergoing a 100% reinspection program which could be left to the Staff's oversight. There were indications that a few other contractors had quality assurance problems, but since those problems were not litigated in this proceeding, the Board had no evidentiary basis or authority to be involved with the results of their respective reinspection programs.

Hatfield Electric Company is the Byron electrical contractor. We found that Hatfield had a long and bad quality assurance record and

stated that we were particularly concerned with repeated examples of inadequate quality-related record keeping. Although we recognized that a reinspection program could provide assurance that the Hatfield quality assurance program was adequate, we could not find that the reinspection program would be effective. We were, of course, greatly influenced by the fact that the NRC inspectors could not testify that the reinspection program would do what it was intended to do. We did not know if the sampling rationale for reinspection was reliable. Half of the Hatfield inspectors were found to need more on-the-job training and about half needed retesting. Not all of these suspected inspectors' work was being reinspected, and some of the original inspection attributes were not subject to reinspection.

In view of these misgivings, we could not find that the quality of Hatfield work was sufficient to provide reasonable assurance of safety. We made similar, but less severe, findings with respect to the Hunter Corporation, the piping contractor at Byron.

The Board also concluded that, as a matter of law, we could not delegate to the NRC Staff the responsibility of determining after the hearing that the reinspection program would provide the requisite assurance that Hatfield's and Hunter's work met the standards of safety required for operation of the Byron Station. Intervenors were entitled to have these matters resolved in the adjudicatory context and they had prevailed on the quality assurance contention. Therefore we denied without prejudice the application for the Byron operating license.

However, it should be noted that the Applicant had prevailed on many other quality assurance issues. In particular we found no organizational inability or unwillingness to maintain an adequate quality assurance program and noted that the Applicant seemed to be catching up with its quality assurance responsibilities. Moreover there was no finding that the quality assurance inspectors had performed incompetently — only that there was insufficient assurance of their competence. In addition the Applicant carried its burden on many other safety issues; for example, the seismic features of the Byron site, emergency planning, and steam generator tube integrity.

APPEALS AND REMAND

Appeals followed. On May 7, 1984, the Appeal Board (ALAB-770, 19 NRC 1163), neither affirming nor reversing our decision, sent the proceeding back for a further evidentiary hearing on the quality assurance issue. We were instructed that the remanded proceeding must address whether the reinspection program was adequate to resolve concerns

about the capability of the Hatfield and Hunter inspectors and the quality of the work by those contractors. The Appeal Board also directed an inquiry into whether the program had sufficient independence and whether the sampling methodology and recording of discovered deficiencies were sufficient. We were directed to determine whether newly certified inspectors were competent, and whether all identified discrepant conditions have been properly resolved.

Acting on new information that, contrary to our initial belief, some of Systems Control's work had not been inspected, the Appeal Board directed further exploration of our earlier disposition of the Systems Control issue. Finally, we were authorized to include any other question in the remanded proceeding relevant to the ultimate issue of whether Byron has been constructed properly. Accordingly, we directed the parties to include the relevant activities of Pittsburgh Testing Laboratories, Applicant's independent testing contractor, in their evidentiary presentations.

REMANDED PROCEEDING AND FINDINGS

During the hearing on remand the Board received evidence on four broad issues:

1. The design, implementation and results of the Byron reinspection program.
2. Inferences of inspector capability — Hatfield, Hunter, and PTL.
3. Inferences of work quality — Hatfield and Hunter.
4. The adequacy of work by Systems Control Corporation.

The reinspection program was formulated to verify the effectiveness of quality control inspector qualification and certification practices of Byron contractors from the beginning of construction in 1976 until September 1982. It was designed to reinspect, by reinspectors known to be qualified, some original inspections and to analyze differences (discrepancies) in the results. Inspectors whose work was to be reinspected were selected as a sample from a roster listing all inspectors chronologically according to the date of their initial qualification. For most contractors, and Hunter, Hatfield, and PTL in particular, the first, fifth and every fifth inspector thereafter were selected. The NRC added inspectors to the sample whose qualifications were suspect. This process captured about 26 to 27% of Hatfield, Hunter, and PTL inspectors, which we find to be a sufficient and representative sample.

The first 90 days of an inspector's identifiable and reinspectable work was reinspected. The inspections were grouped into "subjective" and "objective" attributes. If the reinspector agreed with at least 95% of the

original inspector's calls for objective attributes or 90% for subjective attributes, the original inspector was deemed qualified. The work of any inspector who initially failed to pass either acceptance criterion was subjected to an expanded inspection process wherein the inspector either passed based on a reinspection of a second 90-day period, or if the inspector still failed, all of his identifiable and reinspectable work was reinspected. Also, if an inspector failed, the sample of inspectors was expanded by as much as 50% for the attribute in question. We find that the selection of the work to be reinspected and the scheme for expanding the sample upon the failure of an inspector was adequate.

All Hatfield, Hunter, and PTL inspectors passed the 95% acceptance criterion for objective attributes during their first 3 months of inspections. For the visual-weld subjective attribute, Hatfield and Hunter each had one inspector and PTL had three inspectors whose first 3 months of work failed to meet the 90% acceptance criterion. The Hatfield and Hunter inspectors, and two of the PTL inspectors had no further work, so their qualifications were considered indeterminate, but the reinspection results for those inspectors were retained in the data base. A substitute was selected for each by formula and each substitute passed. These are satisfactory results.

Intervenors presented the testimony of an expert statistician who stated that, since the reinspection program was flawed as a statistical project, no inference of inspector qualifications can be made. He stated that where, as here, there was no pure probability sample, the engineer must clearly justify the engineering-judgment assumptions underlying his sampling. In his view, those assumptions were not justified or explained in the reinspection program. For example, when the NRC added suspected inspectors to the sample, the results might have been biased nonconservatively because the assumption of conservatism was not tested. Intervenors' statistical expert was not convincing. The program was designed using engineering judgments and techniques primarily and statistical sampling concepts secondarily where appropriate. The acceptance criteria and underlying assumptions were fully explained and we find them to be rational.

Intervenors also presented the testimony of a human factors expert who testified that the program was flawed for several other reasons including a tendency of bored inspectors to fall off in performance following training, a tendency by reinspectors to mimic the work of the original inspectors, and a bias of the reinspectors favoring the original inspectors because of employment privity. None of the human factors theses were convincing in the context of the entire evidentiary record.

The Board therefore concluded that the Hatfield, Hunter, and PTL inspectors had been shown to be competent by the program. Exactly how competent was a minor subissue. In any event, the inspectors passed the Appeal Board's test that the reinspection program must support a presumption that the inspectors had the competence to "have uncovered any construction defects of possible safety consequence." We have, therefore, a presumption of adequacy of Hatfield, Hunter, and PTL's work derived from a presumption of inspector competence.

The Applicant did not, however, rest with an indirect presumption of work quality. Although the program was not designed to be a work quality inspection effort, Sargent & Lundy, the Byron architect-engineer, evaluated the results of the program for its direct work-quality implications.

The Board received evidence of this evaluation with respect to Hatfield and Hunter's work. Because PTL, as an inspection arm of Applicant, did no construction work of its own, and its inspections were generally of a nature differing from contractors' direct inspections, the quality of the work inspected, or overinspected by PTL, was not examined as a major issue.

There were 87,783 Hatfield reinspections made and 3661 discrepancies were initially identified. Of these, 1251, or 34%, were within design parameters and were not actually discrepant; 2010, or 55%, were of such a minor nature that they could be dispositioned as acceptable, based on engineering judgment; 400, or about 11%, were analyzed by calculation to determine their significance. None of these Hatfield discrepancies had design significance and none reduced design margins below the level required by conservative design practice.

There were 73,349 Hunter reinspections and 793 discrepancies were initially identified. Of these, 639, or about 81%, were within design parameters and were not actually discrepant; 75, or 9%, were of a minor nature and were dispositioned as acceptable, based on engineering judgment; 79, or 10%, were analyzed by calculation to determine their significance. None of these Hunter discrepancies had design significance and none reduced design margins below the level required by conservative design practices.

Intervenors' expert statistician testified that the results of the reinspection program are not valid for inferences of work quality. He expressed concern about such perceived mathematical-statistical defects such as a failure to demonstrate homogeneity between the work reinspected and the work not reinspected, lack of homogeneity between inspectors sampled and those not sampled, failure to consider "clustering," and inappropriate aggregation of inspection elements. The Board, however,

was satisfied with the preponderance of the evidence demonstrating a general similarity in the work and inspectors captured in the program to the work and inspectors not captured. The inspectors sampled constituted a large portion of all Hatfield and Hunter inspectors. Most of the inspection attributes that could be reinspected were reinspected, and the inspection program spanned almost all of the relevant construction period. A large amount of inspections covering a broad range of Hatfield and Hunter work was reinspected. These facts, coupled with the surprising fact that none of the Hatfield and Hunter discrepancies had design significance, provide additional assurance of the quality of Hatfield and Hunter's work.

The Board was initially skeptical of Sargent & Lundy's report that no discrepancies with design significance were discovered from more than 160,000 Hatfield and Hunter reinspections, and from a substantial number of perceived discrepancies evaluated. In major part, the explanation lies in the very generous design margins inherent in the design process. Structures are designed to withstand stresses over and above those expected. Connections, for example, are designed in groups rather than individually with the most highly stressed connection dictating the design. The code writers incorporated yet another design margin, and a structure designed to a code might carry twice the design load without failure. Another example is the stepping of the available sizes of supporting devices. There cannot be, of course, infinite numbers of sizes for items such as bolts and hangers. Therefore, in practice, such supporting devices are employed in stepped capacities and larger-than-design sizes are often installed.

The reinspection program and the evaluation of the results lead to several conclusions:

1. The high agreement rates between the original inspectors and the reinspectors known to be qualified permit the inference that the original inspectors were competent.
2. The original inspectors presumably therefore did not overlook construction defects of possible safety consequence.
3. A very large number of broadly based Hunter and Hatfield reinspections, partly because of very generous design margins, revealed no design-significant discrepancies. Thus the reinspection program supports a direct inference of adequate Hatfield and Hunter work.
4. The absence of any design-significant discrepancies leads to the conclusion that, despite the existence of discrepancies, the original inspectors had sufficient competence not to overlook design-significant construction defects. This conclusion,

however, has limited value as a demonstration of inspector competence. The greater the sum of the design margins, the less it challenges the inspectors' competence to discover design-significant defects.

Quality of work was the central issue in that phase of the remand hearing which dealt with Systems Control. All parties agree, and we find, that the Applicant has met its burden of proof on SCC. SCC supplied Byron with items which house or support electrical equipment. As we noted above, the issue of the adequacy of SCC-supplied equipment was remanded to us after it became clear that the reinspection of SCC work, review of which we had delegated to the Staff, was not as thorough as we had thought.

Eventually, welding nonconformances reported in late 1983 and early 1984 led the Staff to require the Applicant to demonstrate the safety of all the SCC equipment at Byron. It was this demonstration which the Applicant presented in the remand hearing. The Applicant's many reinspections and evaluations, along with a very few welding repairs, prove the safety of all but one kind of SCC equipment, which at the close of the remand hearing was still being reinspected and evaluated. Because this continuing program of reinspection is extensive — potentially 100% — and because the Staff has found the design of the program to be adequate, we are delegating to the Staff the determination of the adequacy of this equipment. No party objects to this delegation.

SUPPLEMENTAL INITIAL DECISION

Findings of Fact and Conclusions of Law

I. INTRODUCTION

1. On January 13, 1984, this Board issued its Initial Decision denying Commonwealth Edison Company's (Applicant, Edison or CECo) application for a license to operate the Byron Nuclear Power Station (Byron). LBP-84-2, 19 NRC 36. Although we ruled in Applicant's favor on seven of the eight issues in controversy, we found that CECo had not met the burden of proof on the issue of quality assurance.

2. As set forth in Intervenors' Contention 1A, Applicant was required by the contention to demonstrate its "willingness and ability to implement and maintain an adequate quality assurance program."

3. Our Initial Decision summarized our findings with respect to CECo's quality assurance program by stating that CECo has "failed in

its responsibility to assure that its contractors carried out their delegated quality assurance tasks" (*id.* at 43); that we had not concluded that CECo "is institutionally unable or unwilling to maintain a reliable quality assurance program," but rather that CECo "began to deal effectively with its contractors' problems too late, but is catching up" (*id.* at 44); that there were "widespread failures in the contractors' quality assurance programs" at Byron (*id.*); and that although we had not found widespread hardware or construction problems, "we are not confident that such problems would have been discovered" (*id.*).

4. In the first set of hearings on the quality assurance issue in March and April 1983, we did not notice an item of noncompliance found in the March 1982 NRC Construction Assessment Team inspection regarding the certification practice for quality control inspectors by contractors at Byron. Our attention was drawn to this matter as a result of studying and granting Intervenors' motion to reopen the hearing record. Testimony was adduced in August 1983 on (1) the training and certification of a former QC inspector of the Hatfield Electric Company, (2) the very recently completed program of recertifying inspectors to revised criteria based on American National Standards Institute (ANSI) N45.2.6-1978, and (3) the structure and preliminary results of a reinspection program designed to show that inspectors who conducted inspections prior to the revised certification procedures were adequately qualified. On the basis of the evidence before us with respect to this last issue we denied the operating license application expressing reservation both about the reinspection program itself and the quality of the work of two site contractors, in particular, Hatfield and Hunter Corporation. I.D., 19 NRC at 213-16, ¶¶ D-429 to D-441.

5. When the evidentiary record was closed the reinspection program was still in progress, and a final report on its results was not published until February 1984 followed by a June 1984 supplement. In our Initial Decision we expressed several reservations regarding the adequacy of the Byron quality control inspector reinspection program (BRP), which had not been eliminated by evidence presented at the August 1983 reopened hearing. We noted that it had not been established that the program used a statistically significant and representative sample. I.D., 19 NRC at 200-01, 214, ¶¶ D-382 to D-384, D-436. We also expressed concern about documentation deficiencies which were discovered during a CECo audit of the Byron quality control inspector reinspection program (BRP). I.D., 19 NRC at 199-201, 214-15, ¶¶ D-379 to D-382, D-438. These concerns, together with the fact that the testimony of the Region III Staff indicated that it was not satisfied completely with some aspects of the program's structures and that it would not be able to judge the

success of the reinspection program until its results were known, caused us to deny without prejudice the operating license application.

6. Following appeals, the Appeal Board remanded this proceeding to us with instructions to receive further evidence on the reinspection program as it applied to Hatfield and Hunter and to render a supplemental initial decision. The Appeal Board agreed with our decision that the record was insufficient to warrant issuance of an operating license, but held that further hearings should be conducted to allow a full exploration of the reinspection program to determine whether there is reasonable assurance that Byron has been properly constructed. Memorandum and Order, ALAB-770, 19 NRC 1163, 1178 (1984).

7. Additionally, the Appeal Board noted the recent disclosure of deficient welds on cable pan hangers supplied by Systems Control Corporation (SCC) and that CECo had apparently not fully met commitments to perform source inspections of SCC equipment. These matters raised questions concerning the overall adequacy of equipment supplied by SCC. To resolve these questions the Appeal Board determined that further exploration of these issues on the evidentiary record was warranted. *Id.*, 19 NRC at 1179, 1180. The adequacy of Applicant's oversight of Systems Control's quality assurance program was, by implication, also a matter warranting further inquiry.

8. Finally, the Appeal Board stated that the Licensing Board would have discretion to include within the scope of the reopened evidentiary record any other topics which it deemed relevant to the ultimate question whether reasonable assurance exists that the Byron facility has been properly constructed. *Id.*, 19 NRC 1182 n.72.

9. Thereafter Applicant identified various issues from our decision that it perceived to be of concern to the Board and as to which the Board might require an evidentiary showing. These issues included Region III Staff's acceptance of the reinspection program; the basis for the determination of inaccessible and nonre-creatable inspection attributes in the reinspection program; the relationship of deficiencies identified during the reinspection program to a trend analysis; the number of Hatfield inspectors requiring recertification and retraining at the inception of the reinspection program; Hunter documentation practices regarding discrepant conditions identified during the reinspection program; further evidence regarding possible fraudulent practices by contractors in the certification of quality control and quality assurance personnel; the disposition of allegations open as of the close of the record in August 1983; Applicant's general control of its site contractors; and supplemental evidence regarding Hunter "tabling" practices and any pattern of nonconformances by Hatfield. The Board accepted Applicant's list of issues and

added the issue of whether CECo's commitment to repair any defects identified during the reinspection program had been effectively satisfied.[1]

10. We also ruled that certain issues proposed by Intervenors should be litigated and that the NRC Staff should present evidence on certain worker allegations, which the Staff had expected would be resolved by the reinspection program, and that the Staff present evidence on any other allegation which it deemed to have independent and important relevance to the reinspection program. Finally, we ruled that Pittsburgh Testing Laboratory (PTL), Applicant's independent testing contractor, should be added as one of the contractors to be examined with respect to the reinspection program.

11. Applicant presented the testimony of twenty-two witnesses in four segments. The first segment described the formulation and implementation of the reinspection program and its results with respect to the qualification of the Hatfield, Hunter, and PTL QC inspectors. The second and third segments of the testimony addressed the questions of the significance of the discrepancies discovered during the reinspection program and the adequacy of the Hatfield and Hunter work. Finally, evidence was presented concerning other issues, namely, the adequacy of the hardware furnished by Systems Control Corp., CECo oversight of Systems Control, the use by Hunter of a "tabling" practice and the adequacy of cable installed by Hatfield that had been subjected to excessive stress or overtensioning, a subissue added by the Board.

12. The NRC Staff submitted three witness panels who addressed the remanded issues. In addition, Mr. James Keppler, administrator of NRC's Region III, provided an overview and insight with respect to the Region's judgment concerning the adequacy of the BRP. Mr. William Forney, who was formerly NRC senior resident inspector at Byron, also testified. An affidavit prepared by him which described his differences with the testimony of an NRC Staff witness panel with respect to the conclusions to be drawn from the results of the BRP was at the Board's insistence received into evidence as his direct testimony.

13. Intervenors presented three witnesses. One witness questioned the adequacy of the engineering evaluations performed by Sargent & Lundy of the discrepancies discovered during the BRP. The remaining two witnesses challenged the adequacy of various assumptions used by Edison in the formulation of the BRP and the applicability of statistical

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[1] The Appeal Board characterized this issue as whether "all identified discrepant conditions . . . [have] been properly resolved." ALAB-770, *supra*, 19 NRC at 1179. Repair was not the only basis on which discrepancies were dispositioned.

principles to the results of that program. Intervenors proffered the testimony of two other witnesses, one an expert in reliability engineering and the other, an Authorized Nuclear Inspector at Byron, both of whose testimony the Board declined to receive. The Board also declined to receive portions of Intervenors' engineer's testimony concerning design issues, and portions of Intervenors' statistician's testimony concerning higher reliability requirements for inspections of greater safety significance.

14. All testimony was presented during the course of 3 weeks of hearings held in July and August of this year. All parties demonstrated a highly responsible attitude of cooperation with the Board and with each other. Only those issues which were genuinely and materially in dispute were litigated. Each party filed proposed findings and conclusions of law in prearranged format which permitted the Board to focus efficiently and reliably on the important issues and the areas of disagreement. To a very large extent the underlying facts are not in dispute. The Intervenors and Staff adopted Applicant's undisputed proposed findings.[2] The Board in turn was able to accept in many cases the agreed-upon findings exactly as presented.

II. APPLICABLE LAW AND REMAND ORDER

15. An operating license for a nuclear power plant may be issued at such time as the NRC renders the findings required by 10 C.F.R. § 50.57(a). The Commission, subject to the immediate effectiveness provisions of 10 C.F.R. § 2.764, has vested the Director of Nuclear Reactor Regulation with the authority to make the findings under § 50.57(a). 10 C.F.R. § 2.760a. As a general rule, our authority is limited to deciding matters in controversy among the parties. 10 C.F.R. §§ 2.104(c) and 2.760a. It was in the context of this regulatory regime that Contention 1A was decided against the Applicant.

16. We were unable to make these findings in our Initial Decision of January 13, 1984, largely because of outstanding questions raised by an item of noncompliance contained in NRC Staff Inspection Report 82-05. Specifically, noncompliance item 82-05-19 questioned the qualifications of contractor QC inspectors certified under procedures which the Staff deemed defective. The Appeal Board agreed that the record pre-

[2] At the Board's request, counsel for Applicant provided their proposed findings of fact and conclusions of law in both hard-copy and magnetic-disc form.

viously before us was insufficient to support the issuance of an operating license, and remanded the record to us:

> to permit a full exploration of the significance of the [reinspection] program in terms of whether there is currently reasonable assurance that the Byron facility has been properly constructed. Stated otherwise, the focus of the inquiry should be upon whether, as formulated and executed, the reinspection program has now provided the requisite degree of confidence that the Hatfield and Hunter quality assurance inspectors were competent and, thus, can be presumed to have uncovered any construction defects of possible safety consequence. [Footnotes omitted.]

Memorandum and Order, ALAB-770, *supra*, 19 NRC at 1178.

17. Further, subsequent to our Initial Decision, new information regarding another item of noncompliance resurrected questions we had deemed closed in our Initial Decision. Noncompliance 80-04-01, contained in a December 30, 1980 inspection report, asserted that Applicant had failed to take prompt and effective corrective action with respect to deficient equipment supplied to the Byron Station by Systems Control Corporation (SCC). While we had been willing to delegate the closure of this item of noncompliance to the NRC Staff, the Appeal Board, as a result of the new information, directed that we hold further hearings on this issue as well.

18. Noncompliance 80-04-01 has not been closed. However, the testimony of the NRC Staff and Applicant indicates that only one discrete issue remains to be resolved. A program for resolution of the one outstanding issue, by way of a 100% inspection of certain components, is in progress and the NRC Staff expressed confidence that this program will satisfy its concerns.

19. We may delegate a matter in issue to the NRC Staff when it is clear that the NRC Staff can adequately resolve it. (*See generally* our discussion in the Initial Decision, 19 NRC at 210-12, ¶¶ D-419 to D-427, and cases cited therein.) The nature of the program for resolution of the outstanding SCC issue, as discussed below, presents an appropriate case for delegation to the NRC Staff and we ruled to that effect at the close of the remand hearings. Tr. 11,169-71.

III. THE INCEPTION AND PURPOSES OF THE BYRON REINSPECTION PROGRAM

20. An intensely contested set of subissues was woven throughout the remanded proceeding concerning the history, purposes, design, results and uses of the reinspection program. For example, while the Applicant viewed the program as one intended to test the qualifications of

inspectors, the results of the program were also used to draw inferences directly about the quality of the work at Byron. Intervenors challenge the adequacy of the program for both uses. The Staff does not entirely agree with the Applicant on the original purposes and the meaning of the reinspection program. Therefore, to place these issues in proper context, we pay particular attention in the following sections to the inception and structure of the program as well as its implementation and results.

21. A special inspection was conducted at Byron during the Spring of 1982 by an NRC Construction Assessment Team (CAT). The CAT findings were published in IE Report Nos. 50-454/82-05 and 50-455/82-04. One of the findings (noncompliance 82-05-19) questioned the adequacy of the onsite contractors' programs for certifying QC inspectors. The CAT inspectors found deficiencies in (i) the contractors' evaluations of initial inspector capabilities, (ii) the documentation of initial certification, and (iii) the criteria used to establish inspector qualification. Applicant's Exh. 8; Del George, ff. Tr. 8406, at 6. Although there was no finding that these deficiencies had compromised the quality of construction, the NRC Region III Staff adopted the position that the site contractors' QC inspector qualification programs had to be upgraded and that the quality of the inspections already completed required verification. Del George, ff. Tr. 8406, at 5.

22. In response to noncompliance 82-05-19 and comments in the cover letter to the CAT Inspection Report (Applicant's Exh. 8), CECo initiated a recertification program between June and September 1982 for quality control inspectors then conducting inspections at Byron and made necessary revisions to site contractors' QC inspector certification procedures. The recertifications were in compliance with CECo's commitment to Regulatory Guide 1.58 which invokes and supplements ANSI N45.2.6-1978. Beginning on September 30, 1982, these upgraded procedures were used to certify inspectors. This action solved the Staff's concern with respect to the qualification of QC inspectors certified after September 30, 1982. However, it did not address whether the inspectors who performed QC inspections prior to that time were qualified. The BRP was constituted to address this latter concern. Hansel, ff. Tr. 8901, at 4; Del George, ff. Tr. 8406, at 7-11; Little, ff. Tr. 9510, at 7-10.[3]

23. To verify the effectiveness of inspector qualification and certification practices used by site contractors between January 1976 and

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[3] A full discussion of the recertification program is contained in ¶¶ D-385 through D-393 of our Initial Decision.

September 1982, the BRP was structured to reinspect the original QC inspections and to analyze any discrepancies (differences between the results of the original inspections and the reinspections) to determine their significance. The data would then be used to draw inferences about the qualification of the total inspector population on a contractor-by-contractor basis. Thus, the original purpose of the BRP was not to validate directly work quality at Byron. Given the concerns about work quality raised in our Initial Decision, however, Applicant determined that the BRP data could also be used as one basis for determining the quality of the construction work. Del George, ff. Tr. 8406, at 6, 7. The Staff agreed with this use. Little, ff. Tr. 9510, at 4.

24. The NRC Staff's characterization of the purpose of the BRP is stated differently. The Region III panel testified that the primary purpose of the BRP was to determine whether QC inspectors had overlooked significant safety-related hardware deficiencies. *Id.*; Little, Tr. 9577. However, Mr. William Little also agreed, on behalf of the panel, that determining whether QC inspectors had overlooked significant deficiencies was equivalent to determining whether they were competent. Little, Tr. 9582-83; *see also* Keppler, ff. Tr. 10,135. William Forney, former Region III Senior Resident Inspector at Byron, who made the original CAT findings, testified for the Staff in August 1983 that the purpose of the BRP was "to determine whether or not [the contractors] have used qualified inspectors."[4] Forney, Tr. 7991. In sum, we cannot discern any practical differences in the views of the purposes of the program by Applicant and the Staff. The important point is that there is no dispute about either the problem that the program was designed to correct or its results.

IV. THE STRUCTURE OF THE PROGRAM

25. Contrary to Intervenors' assertion, the reinspection program was not designed by one official lacking expertise. It was formulated by the Director of Nuclear Licensing, Mr. Louis O. Del George, and his department, the Project Construction Department and the Quality Assurance Department. Del George, ff. Tr. 8406, at 5. Moreover, there was substantial input from the NRC Senior Resident Inspector and Region III officials, as will be noted below.

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[4] We note that Mr. Forney's most recent testimony seems to contradict this characterization. Mr. Forney testified at the reopened hearing that in his opinion, the fact that inspectors have not failed to discover significant deficiencies is not necessarily a demonstration of their competence. His reasoning is discussed in § VIII, below.

26. The BRP was formulated to address the qualifications of QC inspectors who performed inspections for eight onsite construction contractors during the period January 1976 through September 1982. In general, the adequacy of the original inspection results was determined by reinspection using qualified QC inspectors. Inspectors were selected for reinspection by a sampling technique and the first 90 days of their identifiable and reinspectable work was reinspected. The subject matter of the inspections was grouped into two work categories called "subjective" and "objective" attributes. If the reinspector agreed with at least 95% of the original inspector's calls for objective attributes or 90% for subjective attributes, the inspector was deemed qualified. The work of any inspector who initially failed to pass either acceptance criterion was subjected to an expanded inspection process wherein the inspector either passed or failed based on a reinspection of a second 90-day period. If the inspector still failed, all of his identifiable and reinspectable inspections of the attributes in question were reinspected. These program elements will be discussed in detail below.

a. Selection of Contractors

27. The first element of the BRP was the selection of site contractors whose QC inspectors would be subjected to reinspection. However, the selection of contractors was not a material issue in this proceeding. Of the contractors who performed onsite construction work, the significant ones were captured in the program. Their work represented 93% of the safety-related work at Byron. In any event, these remanded proceedings were limited to Hatfield, Hunter, and PTL, and these contractors were included in the BRP.

b. Selection of Inspectors

28. The second element of the BRP was the selection of inspectors for reinspection. The inspection work of the original QC inspectors of Hatfield, Hunter, and PTL was reinspected on a sampling basis. Del George, ff. Tr. 8406, at 11. Edison and the NRC Staff agreed that a 100% reinspection effort was not necessary since a properly structured sampling plan permits sound judgments to be drawn concerning the total population based on the sample results. Hansel, ff. Tr. 8901, at 10; Del George, Tr. 8482-83; Little, ff. Tr. 9510, at 4. Whether CECo's program was soundly structured, however, is a matter sharply disputed by Intervenors. That issue was extensively litigated.

29. The names of inspectors for Hatfield, Hunter, and PTL were compiled on rosters and listed chronologically by date of certification.

The fifth and every fifth inspector thereafter on the roster were initially included in the BRP. In addition, the NRC Staff Senior Resident Inspector, Mr. Forney, reviewed the sample and added both the first inspector certified and two to four additional names to each contractor's group of inspectors. This selection method resulted in 27%, 26%, and 27% of Hatfield, Hunter, and PTL QC inspectors, respectively, being included in the program. Del George, ff. Tr. 8406, at 11, 12, 30, 31, 33.

30. The table contained in Mr. Del George's testimony shows that Applicant (and Mr. Forney) with respect to Hatfield, Hunter, and PTL, at least, made certain the inspectors selected were sufficient in number and spanned the range of inspection activities for the entire 6 years of interest, i.e., the beginning of construction to September 1982. The table also shows that inspectors were chosen from each year of work activity. Del George, ff. Tr. 8406, at 13.

31. To qualify to have his work reinspected, an inspector had to perform at least fifty reinspectable inspections during the period subject to reinspection. In mounting their argument about the statistical soundness of the selection process, Intervenors correctly point out that this finding could also be stated "[t]o have a chance of being included in the reinspection program an inspector had to perform, etc." Intervenors' Proposed Finding 33. In the case of PTL, twenty-five inspections or more for an inspector were determined to be acceptable because of the limited number of inspections for the typical inspector. Where reinspection was initiated for the original inspector but it was subsequently learned that the "minimum quantity" was not available, all reinspections actually performed for the original inspector were nevertheless included in the BRP data base. Del George, ff. Tr. 8406, at 16, 17.

32. In commenting on the "minimum quantity" of inspections needed to qualify an inspector for selection in the sample, Intervenors suggest that a weakness in the program is demonstrated because "CECo introduced no evidence to show that inspectors who performed fewer than the minimum number of inspections would be likely to perform as well as inspectors who stayed on the job longer." Intervenors' Proposed Finding 33. Thus we address for the first time in this decision an effort by Intervenors to take the inspector qualification issue where the Board will not follow. The reinspection program was formulated and implemented as a device to validate the qualifications of suspect inspectors. It was not a direct work-quality inspection. It will be necessary to make this point repeatedly in the sections below. The length of service of the inspectors is irrelevant to the issue of their initial training. Intervenors' point can be made and has been considered in the context of whether an inference of adequate work quality can be drawn from the results of the

program. Keeping the two concepts separate has been a major task of the Board in managing the proceeding on remand.

33. The Staff concluded that the sample size of inspectors whose work was reinspected was sufficiently large and provided an adequate basis for evaluating the qualifications of inspectors whose work was not reinspected. The Staff enhanced the adequacy of the selection methodology by adding two to four inspectors for each contractor. Little, ff. Tr. 9510, at 4, 5.

34. The inspector sampling scheme was the result of an engineering judgment that for a small population of inspectors, a sample size in excess of 20% would provide a reliable indicator of the quality of the total population of the Hatfield, Hunter, and PTL inspectors, provided the sample covered the entire period of interest from January 1976 through September 1982. The engineering judgment of both CECo and Staff personnel which led to the selection of the sample of inspectors whose work was reinspected is responsive to our concerns regarding the statistical significance and reliability of the inspector sample expressed in our Initial Decision, even though there was not a rigorous application of mathematical statistical theory to the inspector selection process. It would appear, therefore, that a sufficient and representative number of inspectors was captured by the sampling process to provide confidence that inferences could be drawn with respect to the qualification of the Hatfield, Hunter, and PTL inspectors not captured in the BFD. This judgment is reinforced by the nature of the selection process used by the NRC Staff to add inspectors to the program. The list of inspectors to be reinspected was biased by Mr. Forney to include the inspectors thought to be most likely to be determined to be unqualified. Little, Tr. 9817-19.

35. As the opening shot in the battle between Intervenors' statistician and the Applicant's and Staff's engineers, Intervenors proposed:

> Neither the staff, nor the Applicant, however, tested the assumption that the staff had added the worst inspectors to the list. What little data is available in the record (covering Hunter weld inspections) shows that the overall discrepancy rate for inspectors added by the NRC was less than the overall discrepancy rate for the inspectors chosen by taking every fifth inspector. The NRC selected inspectors had an overall discrepancy rate of 1.5% (9 out of 594) (for these elements), less than half of the discrepancy rate of 3.3% (103 out of 3134) for those not chosen by the NRC. Ericksen, ff. Tr. 11,045, Attachment D, Supp. Applicant and staff have failed to show that the deviation from random selection of inspectors was conservative. In fact, available data indicates that the NRC's additions may have introduced a non-conservative bias in the results.

Intervenors' Proposed Finding 34A.

36. By way of background, Mr. Forney, the Senior Resident Inspector, who selected the additional inspectors for the sample, testified in August 1983 that he selected them after a review of the records of a number of inspectors "whom I felt were at least marginally experienced." Tr. 7994. It may be that his choice of the words "at least" imparts some ambiguity to his testimony. But when considered against the background of Mr. Forney's role in the noncompliance citation and his continuing concern about inspector qualifications, we inferred that he intended to state that he added inspectors to the sample whose experience was so marginal that inadequacies in training would not be masked. Were this not the case, we would have noted that fact in our Initial Decision of January 13, 1984. There we found simply that he selected his candidates "on the basis of their experience." I.D., 19 NRC at 201, ¶ D-383.

37. Moreover, Mr. Little, the senior Region III official with direct responsibility for the reinspection program, testified that the purpose was to identify inspectors with weak-appearing certifications and to bias the roster of sampled inspectors in the direction of including those most likely to be found unqualified. Tr. 9818-19.

38. Applicant reads Intervenors' respective proposed findings to be a suggestion that Mr. Forney intentionally selected inspectors who were likely to score well in the reinspection program. Reply Findings at 9 (apparently noting Intervenors' Proposed Finding 35). The better reading of Intervenors' argument is that, while acknowledging that Mr. Forney intended to conservatively bias the sample by adding the most suspected inspectors, this is a matter of unexplained engineering judgment. The argument goes on that, in the presence of data to the contrary, Mr. Forney's assumptions may have introduced a nonconservative bias into the results. Intervenors' Proposed Findings 34A, 35.

39. Dr. Eugene P. Ericksen, Intervenors' expert statistician, testified that whenever one generalizes from a sample to a population, one is making a statistical statement. Tr. 11,074. Therefore, he states, in the absence of a probability sample, an engineer must clearly state the justification underlying his assumptions instead of making general assertions of engineering judgment. Ericksen, Tr. 11,048-49. One of the problems with CECo's statistical inferences, according to Dr. Ericksen, is that CECo did not test the assumption that the NRC Staff added inferior inspectors to the sample. Intervenors' Proposed Finding 36 *citing* Ericksen at Tr. 11,083.

40. Intervenors' argument can be summarized as follows: The NRC Senior Resident Inspector added suspected inspectors to the one-in-five sample formula. Some of these inspectors scored better than

those not chosen by the NRC. Also, Applicant and Staff did not test the assumption that those inspectors selected by the NRC would impart a conservative bias. Therefore, since the reinspection program depended upon neither a probability sample nor tested assumptions, the inferences to be drawn from the results are not reliable.

41. While we grant that Intervenors' statistical argument is made in the larger context of several asserted unjustified assumptions in the sampling methodology, we believe that the mini-debate about the inspectors selected by the NRC affords an easily understood insight into Dr. Ericksen's and Intervenors' approach to nuclear engineering.

42. Mr. Forney performed a completely rational task. Recognizing that the 82-05-19 finding centered about the incomplete certification packages of the contractors' inspectors, which packages he had personally reviewed during the CAT inspection, he wanted to be sure that those about whom he had special concerns were captured in the sample. If Mr. Forney were correct in his suspicions that certain inspectors may do less well on the reinspection program, the sampling was biased in an appropriately conservative direction. But assume for argument that, despite his experience and his knowledge of the certification files of individual inspectors, it turned out that the inspectors selected generally scored better than others in the reinspection. True, if it were a purely statistical program based upon probability samples, he would have influenced the result nonconservatively. But the program, as we discuss throughout this decision, was a deterministic endeavor, using statistical concepts where appropriate and using engineering judgments and techniques where the result could be improved. Even if he could not predict from the certification files which inspectors would score poorly, his innocent selections would, in a statistical sense, have a harmless effect on the results.

43. The only basis upon which we could accept Dr. Ericksen's thesis that Mr. Forney could have biased the sample nonconservatively is to make the absurd assumption that Mr. Forney possesses some quirk of thought process that would lead him to select the best inspectors while believing that they had the worst certification packages.

44. Moreover, Dr. Ericksen's reasoning is dangerous to Intervenors' own case. If the NRC could not reliably predict from the inspector certification packages that the inspectors with the poorest credentials would perform poorly, perhaps the underlying concern of Region III in demanding a reinspection program was unfounded; perhaps CECo was right from the outset, that the inspectors were qualified notwithstanding the state of their personnel files. We do not, however, make this finding. As Intervenors point out, there is sparse evidence about the per-

formance of the inspectors selected by the NRC for the reinspection sample.

45. In sum, Dr. Ericksen was presented with a logical circumstance: that inspectors perceived to be the worst were added to the sample. The fact that he could not deal with this rationally generated data in applying his statistical expertise diminishes the value of his opinion.

46. Dr. Ericksen further testified that generalizations to a population from a sample are straightforward if one utilizes a probability sample, a sample drawn from a population in which all elements have a known non-zero chance of being selected. Ericksen, ff. Tr. 11,045, at 8; Ericksen, Tr. 11,073. Dr. Ericksen also concluded that since certain inspectors had "no chance" of being included in the sample, there was an inadequate statistical basis from which to draw inferences about these inspectors. Ericksen, ff. Tr. 11,045, at 8.

47. Dr. Martin Frankel, an expert statistician testifying on behalf of Applicant, agreed that the inspector sample does not qualify as a "probability sample," mainly because of the addition of designated inspectors whose qualifications were considered suspect by the NRC Staff. Frankel, ff. Tr. 11,120, at 7-8. Although the sample of inspectors does not meet the criteria for a probability sample, Dr. Frankel believes that inferences to the total population of inspectors can be drawn if supported by the judgments of individuals with appropriate substantive knowledge. *Id.* We agree. The persons with the substantive knowledge who urged inferences to the total population appeared at the remand hearing, presented their prepared testimony, and were subject to extensive examination by the parties and the Board as we discuss with respect to each subissue. While Dr. Ericksen is correct in that unexplained bald assertions of engineering judgment cannot be a justification for deviating from a probability sample, in general we do not find that bald assertions have been made. It would be contrary to the weight of the evidence to reject inferences drawn from the results of the BRP by experienced engineers employed by Applicant and Staff, as well as by independent consultants, based on Dr. Ericksen's unrealistic application of statistical theory. We accept the validity of the inspector sample in the BRP and conclude that the results form an adequate basis for inferences to the qualifications of inspectors whose work was not reinspected.

c. Selection of Inspector Work to Be Reinspected

48. The third element of the BRP involved the selection of the part of each inspector's work which would be reinspected. This work was

categorized into discrete work activities called attributes. All safety-related work attributes that were re-creatable, accessible, and identifiable to a sampled inspector were to be reinspected. An attribute was considered re-creatable if it could be traced to a specific inspector and the condition or state originally inspected was capable of reinspection at a later time. An attribute was accessible for reinspection if extensive dismantling were not required for the reinspection to be performed. However, attributes were deemed accessible if reinspection could be accomplished through the erection of scaffolding or through the removal of paint, insulation or fireproofing. Del George, ff. Tr. 8406, at 17-19.

49. Intervenors urge a finding, with which we agree, that "for Hatfield, all welds for which the original inspector could not be identified were excluded from the program." Proposed Finding 38A *citing* Ericksen, ff. Tr. 11,045, Table 1, at 1. But then we are requested to conclude that

> This may have been a nonconservative bias, since one can reasonably question whether those welds for which there was no adequate record identifying the welder are likely to be of less reliable quality than fully documented welds for which the welder can be identified.

Proposed Finding 38A. Here again the issues have been confusingly blended — perhaps unintentionally. Intervenors have wandered from the reliability of the reinspection program as a validation of inspectors' qualifications to questioning the use of the results to infer work quality. The identification of the *inspector*, not the *welder*, is the relevant consideration.

50. Approximately 80% of Hatfield's total inspections performed at Byron (up to the date its revised certification procedures were implemented) were reinspectable. For Hunter, this figure was approximately 70%. Tuetken, ff. Tr. 8408, at 25, 26. Appreciably less than 50% of the inspections performed by PTL prior to the implementation of its revised certification procedures were reinspectable. *Id.* This is because PTL performed mainly concrete and soil inspections, which are not re-creatable. Tuetken, Tr. 8664. It is undisputed that placement of work in either an inaccessible or nonre-creatable category was supported by proper documentation which showed appropriate reasons why a certain inspector's work could not be reinspected. Hansel, ff. Tr. 8901, at 17; Hansel, Tr. 8982.

51. Finally, some attributes for work to be reinspected were not captured in the BRP. This was the case for two of eleven Hatfield inspection attributes and five of forty-eight Hunter inspection elements. The two Hatfield attributes (cable pan covers and cable pan identification) were

not reinspected because they were not inspected by any inspector sampled in his/her first 90 days. The five Hunter inspection elements not reinspected were not captured because this work had not been initiated before September 1982. Del George, ff. Tr. 8406, at 17, 18.

52. The first 90 days of each selected inspector's work was reinspected. Hansel, ff. Tr. 8901, at 11; Del George, Tr. 8490. Both Edison and the NRC Staff agree that the first 90 days of work is an appropriate period to evaluate to determine inspector qualification. They reason that, if training has been inadequate to produce a qualified inspector, the first 90 days covers the time when an inspector is most likely to make mistakes as a result of that inadequate training. Therefore, in the judgment of CECo and the Staff, a conservative bias was factored into this element of the BRP. Hansel, ff. Tr. 8901, at 11, 12; Hansel, Tr. 8948; Del George, Tr. 8790-91; Little, ff. Tr. 9510, at 5; Little, Tr. 9646. The selection of the first 90 days as the initial period to be sampled was based on the issue of the adequacy of QC inspector certification identified in noncompliance 82-05-19 and was not modeled upon any independent review at other plants because the Staff and Applicant were not specifically aware of other independent reviews focused on the issue of QC inspector qualifications. Little, Tr. 9609-11; Del George, Tr. 8472.

53. Applicant's witness Del George stated that he evaluated the nature of nonreinspectable work but in his prepared testimony he was mistaken in his analysis of what items were and were not reinspected. For example, he reported that piping and component support temporary attachment, piping component inspection and whip restraint component inspection were reinspected. Del George, ff. Tr. 8406, Attachment B at 11 of 14. After Intervenors informed the Applicant of numerous data errors, however, the Applicant stated that portions of these items were nonre-creatable and thus were not reinspected. Ericksen, ff. Tr. 11,045, Amended Attachment B, at 6.

54. The validity of the first 90 days criterion is disputed by Intervenors' witness Dr. Dev. S. Kochhar, a human factors expert from the University of Michigan. He has engaged in research and consultation on how human factors affect the performance of quality control inspectors. According to Dr. Kochhar, inspector performance can be expected to attain its highest proficiency level in the period immediately following completion of training. He testified that in general newly trained inspectors perform better initially because the novelty of the job causes them to be more attentive. As the novelty wears off, sensory stimulation and performance effectiveness decline. This is because of the dull, repetitive

nature of the inspection task. Thus, in Dr. Kochhar's opinion, reinspection of only the first 90 days of inspectors' work is likely to have caused a nonconservative bias in the BRP results. The better course, according to Dr. Kochhar, would have been to reinspect the work of inspectors over the full range of their tenure at Byron. Kochhar, ff. Tr. 10,538, at 7-10.

55. Both Applicant and Intervenors agree that the question presented is whether Dr. Kochhar's testimony persuades us that the first 90 days (as opposed to a longer period) is "appropriate." Applicant's Proposed Finding 43, Intervenors' Proposed Finding 42. Once again, the dual use of the reinspection program must be addressed. Dr. Kochhar readily agreed in his oral testimony that if the purpose of the program is to evaluate the adequacy of the inspector's training, one would reinspect a period of the work prior to the time his job experience might mask any lack of acceptable training. Tr. 10,571. Intervenors, however, remain ambivalent on the issue. They request us to find that:

> the BRP would have more accurately examined inspector performance and qualifications if the reinspections had tested inspector performance over an extended range of the work period.

Proposed Finding 48A *citing* Kochhar, ff. Tr. 10,538, at 9-10.

56. They also propose that we find that:

> While the selection of this period was understandable for purposes of validating inspector training and pre-employment qualifications, it is nonconservative for purposes of generalizations concerning the levels of inspector performance over time at Byron, and for purposes of any inferences concerning work quality made on the basis of the BRP sample.

Intervenors' Proposed Finding 49A.

57. We agree with the implications of Dr. Kochhar's testimony, that the reinspection program would not fulfill its intended purpose if examining a longer period of inspectors' work produced results less relevant to the adequacy of his initial training. We believe that Intervenors have tacitly conceded this point.

58. In any event, Dr. Kochhar's fall-off theory is irrelevant to the issue pervading our Initial Decision and the proceeding on remand, i.e., whether the reinspection program reliably demonstrated that the inspectors were properly trained and tested and qualified at the beginning of their inspection work. The period of interest for that issue is obviously the first few months of their employment as inspectors.

59. Intervenors would have us accept Dr. Kochhar's testimony as relevant to two other issues. First, aside from the adequacy of training,

the program is not conservative for validating inspector competence over time. Second, it is not valid for any inference concerning the quality of work.

60. Applicant is only partially correct in its reply that the issue of inspector competence over time has never been an issue in the proceeding. It is true that it was never in itself directly in issue. But since we are asked to look at the results of the program as an inference of work quality, inspector performance over time necessarily relates to work quality over time. If, as stated by Dr. Kochhar, inspector competence can be expected to fall off after the 90-day test period, the strength of the inference that work quality during the 6 years of construction captured by the program would be weakened. Therefore we must consider Dr. Kochhar's testimony on its merits where relevant.

61. At the outset, Dr. Kochhar's view that inspectors performing a dull repetitive task might experience a fall-off tendency in accuracy following their initial enthusiasm is probably correct. No party disputes the existence of such a phenomenon. It is a common human experience. The question is, how much and when does proficiency fall off, and are there compensating factors?

62. Dr. Kochhar testified that his experience with inspection activities has been limited, primarily, to assembly-line or batch-manufacturing operations involving a Firestone Tire and Rubber Company assembly-line operation where inspectors inspected three or four major attributes on tires which passed by at a controlled rate. Kochhar, Tr. 10,548. Dr. Kochhar's laboratory experiments involved television monitors on which simulated products moved across the screen at controlled rates. The subject inspectors were required to identify any faults or defects in the products as they moved across the screen. Kochhar, Tr. 10,550. Aside from his review of the BRP, Dr. Kochhar has no experience at all with nuclear plant inspection activities. Kochhar, Tr. 10,547.

63. Evidence was adduced that the duties of the inspectors at Byron might differ significantly from the duties of an assembly-line inspector. Even though the duties of the Byron workers were not carefully analyzed in that context and the issue cannot turn on those differences, we believe that the differences are material. *See* Applicant's Proposed Findings 45-46. But, as we explain in the following paragraphs, the issue turns primarily on the fact that Dr. Kochhar has experience with only very short-term studies, and his extension of the phenomenon to 90 days does not impress us as logical.

64. Dr. Kochhar testified that none of his own experiments lasted more than 2 or 3 hours. Kochhar, Tr. 10,558. He is not aware of any studies which have examined this job performance phenomenon over an

extended period of time, i.e., more than a few days. Kochhar, Tr. 10,558-59. He testified that his predictions concerning long-term job performance are based on a simple analogy to daily performance. Kochhar, Tr. 10,568, 10,592. Yet Dr. Kochhar also testified that, based on what he has read in the literature, it is likely that the predicted downturn in inspector performance would begin after only a couple of days. Kochhar, Tr. 10,562. If true, even according to Dr. Kochhar, any downturn in inspector performance at Byron would have occurred within an inspector's first 90 days and would be reflected in the results. Dr. Kochhar was unable to quantify the effect of the alleged nonconservative bias on the results of the BRP. Nor was he able to say when, if ever, an inspector who was initially performing his tasks competently would become incompetent. Kochhar, Tr. 10,595.

65. As noted above, Dr. Kochhar testified that he applied his theory to long-term inspector performance by superimposing the daily pattern. Tr. 10,568, 10,592. In our view, this application is too speculative to accept.

66. Intervenors concede that performance will not continue to decline indefinitely, that over time a plateau is reached. Proposed Finding 49. Observation of persons performing repetitive, routine, unstimulating tasks over short and long periods of time is not confined to the experimenter's laboratory or to the human factors engineers. It is a very common part of ordinary human activity experienced by most of us. Moreover, Staff and Applicant witnesses, including Messrs. Little and Hansel, have relevant background in supervising and evaluating the performance of inspectors. Little, Tr. 9646-48; Hansel, ff. Tr. 8901, at 2.

67. Our judgment is that the fall-off phenomenon in the type of work at issue in this proceeding would probably take place within no more than a few days, probably within a few hours, and possibly even during on-the-job training before the actual inspections. Moreover, Dr. Kochhar seems to ignore the positive influence of experience. Improvement in performance caused by experience on the job might even cancel out any fall-off effect from boredom. Were this not the case, Dr. Kochhar certainly would have discovered and produced literature to that effect, and it would be a commonly observed phenomenon.

68. In sum, Dr. Kochhar's fall-off thesis is too speculative and, to us, too illogical to accept.

d. Inspector Qualification Acceptance Criteria

69. In order to evaluate the performance, and thus the qualifications, of the original inspectors, it was necessary to establish appropriate acceptance criteria. To facilitate the establishment of such criteria, the

reinspection of QC inspections was divided into two attribute categories: objective and subjective. Hansel, ff. Tr. 8901, at 13; Del George, ff. Tr. 8406, at 19, 20.

70. An attribute is subjective if its inspection requires qualitative interpretation by the inspector. Visual weld examination was the only subjective attribute in the BRP. An attribute was classified as objective if its inspection was not significantly affected by qualitative interpretation. Del George, ff. Tr. 8406, at 19, 20. The types of inspections included in this category, such as dimensions that should not change and verification of materials and shape, are repeatable and require very little exercise of judgment by the inspector. Hansel, ff. Tr. 8901, at 13; Del George, ff. Tr. 8406, at 18, 20. Nonetheless, inspection of objective attributes involves an element of subjective judgment. Kochhar, Tr. 10,542-43.

71. For inspections involving objective attributes, the acceptance level was set at 95%, which means that the reinspector agrees with the original inspector's findings in 95% of the reinspected inspections. Hansel, ff. Tr. 8901, at 13; George, ff. Tr. 8406, at 19, 20.

72. Both Applicant and NRC Staff witnesses testified that the 95% acceptance level for objective attributes was reasonably conservative and recognized that unintentional human error precludes total agreement. Del George, ff. Tr. 8406, at 23; Little, ff. Tr. 9510, at 8. We agree.

73. For inspections involving subjective attributes, the acceptance level was set at 90%. Hansel, ff. Tr. 8901, at 13; Del George, ff. Tr. 8406, at 23-25. The 90% acceptance level for subjective attributes recognized the likelihood for reasonable disagreement between inspectors and reinspectors where judgmental decisionmaking was involved in the inspection. Del George, ff. Tr. 8406, at 24; *see also* Little, Tr. 9560, 9574. As John Hansel testified, the inspection agreement rate on a piece of hardware can range from 20% for a very complex piece to 80% for a very simple piece. Hansel, Tr. 8942. Mr. Hansel ranked visual weld inspections in the 70 to 80% agreement range. Hansel, Tr. 8943.

74. Intervenors challenge Mr. Hansel's testimony because of an asserted failure to distinguish between inspector agreement rates and defect detection rates. Nevertheless Intervenors agree that the 90% subjective attribute rate is acceptable, albeit not demonstrably conservative. Thus we need not resolve the dispute. The 90% agreement rate is acceptable to the Board.

75. If an acceptance criterion was not met for the first 3 months of an inspector's job performance, inspections during the second 3 months of the individual's inspection tenure were reinspected for the attributes for which the inspector failed the acceptance criterion. If the results of the second 3-month period did not meet the acceptance criterion, the

inspector was judged to be unqualified. In this event, 100% of the inspections performed by that inspector of the type found to fail the acceptance criterion were reinspected. In addition, the original inspector sample population for the particular contractor involved was expanded by as much as 50% for the attribute in question, depending on the number of inspectors still available for inclusion in the program. Applicant's selection of inspectors added to the sample was made from an overall list of inspectors certified in the specific area where the unqualified inspector was identified. Del George, ff. Tr. 8406, at 26, 27.

76. If an inspector had no inspections beyond 3 months and did not meet an acceptance criterion, the next inspector certified chronologically was substituted and his first 3 months of work was reinspected. The qualification of the original inspector in such a case was considered indeterminate, but his results were retained in the program data base, and all observed discrepancies were evaluated for design significance. Del George, ff. Tr. 8406, at 27.

77. The Board finds that the mechanisms used to expand the reinspection process in the event that inspectors failed to pass the applicable acceptance criterion were reasonable. Furthermore, we agree it was prudent to include the results of all reinspections in the BRP, including those of the inspectors characterized as indeterminate.

V. IMPLEMENTATION OF THE PROGRAM

a. Meetings with Contractors

78. Implementation of the BRP began in February 1983. At that time Applicant's representatives met with the contractors whose work was to be reinspected. The contractors whose inspectors were the subject of the BRP had no input into the formation of the program. Tuetken, Tr. 8845.

79. The basic instructions given to the contractors were (i) the reinspections were to be conducted employing the acceptance criteria used at the time of the original inspections; (ii) individuals involved in the reinspection of work could not be the same inspectors who performed the original inspection, and (iii) the need for removal of fireproofing, paint and insulation did not render an item inaccessible for purposes of reinspection. Tuetken, ff. Tr. 8408, at 4, 5.

80. As the BRP proceeded, weekly meetings were held between the participating contractors and the CECo project construction department to discuss and resolve questions concerning the ongoing program, establish methods for recording results, and determine action to be taken on

discrepancies observed in the reinspection effort. A series of written interpretations regarding implementation of the BRP were created, as necessary and disseminated to all contractors for their guidance. Tuetken, ff. Tr. 8408, at 5; Shewski, ff. Tr. 8423, at 4. *See* Tuetken, ff. Tr. 8408, Attachment A, at 5.

b. Physical Reinspection Activities

81. Physical reinspection activities began in the middle of March 1983. Tuetken, ff. Tr. 8408, at 6.[5] The BRP was performed by reinspectors who were properly recertified to ANSI N45.2.6-1978 before commencing reinspections.[6] Del George, ff. Tr. 8406, at 20, 21; Tuetken, ff. Tr. 8408, at 16, 17. The proper certification of the reinspectors was confirmed on the basis of extensive overview inspections by Applicant's project construction and quality assurance departments and the NRC Staff. Del George, Tr. 8789; Ward, Tr. 9691-92.

82. Reinspections were performed to the same or more stringent criteria than had been used in the original inspection. Del George, ff. Tr. 8406, at 21. If design requirements or inspection criteria had been relaxed subsequent to the initial inspection, acceptability of the work performed by the original inspector was evaluated according to the earlier, stricter criteria. Del George, ff. Tr. 8406, at 20-22. A further conservatism was introduced whenever the reinspectors, having been trained to 1983 standards, were required to apply less stringent earlier criteria. Mr. Tuetken testified that in many cases it was simply not possible to ignore the influence of the current standards. Tuetken, Tr. 8706-07.

83. More than 80,000 man-hours of actual reinspections were performed, and more than 160,000 additional man-hours were spent in

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[5] The Appeal Board noted that the reinspection program only covered inspectors certified up to September 1982 and the recertification program was not completed until early 1983. It therefore questioned whether Applicant had ensured that inspectors certified between those dates were capable of performing their tasks. ALAB-770, *supra*, 19 NRC at 1178-79. To address this concern, Mr. Richard P. Tuetken explained that the reinspection program examined the first 3 months of work performed by inspectors who were certified before the date the revised certification procedures were implemented. The first 3 months of work of at least a small number of inspectors who were certified during the summer of 1982 were included in the BRP and this 3-month period extended beyond September 1982. Tuetken, ff. Tr. 8408, at 18; *see also* Connaughton, ff. Tr. 9510, at 16-17.

[6] In our Initial Decision, we identified a concern about the number of Hatfield inspectors that required recertification and/or retraining at the inception of the BRP. I.D., 19 NRC at 214, ¶ D-436. In response, Mr. Kevin Connaughton explained that as of September 30, 1982, Hatfield employed 46 inspectors all of whom required additional training, testing, and/or documentation to comply with the new QC inspector certification requirements. Mr. Connaughton also explained that there is no particular significance to the number of Hatfield inspectors requiring recertification inasmuch as they were required to meet new, more prescriptive certification standards irrespective of whether they had previously received adequate testing and on-the-job training and all of them were included in the population considered in the BRP. Connaughton, ff. Tr. 9510, at 18-19.

construction, clerical, and administrative support work related to the BRP. More than 202,000 inspection points were reinspected. Tuetken, ff. Tr. 8408, at 19; Behnke, ff. Tr. 9336, at 14.

84. Each contractor used its own QC inspectors as reinspectors. Del George, ff. Tr. 8406, at 21; Hansel. Tr. 8928. However, steps were taken to ensure that no inspector reinspected his own work. Hansel, ff. Tr. 8901, at 15; Hansel, Tr. 8917. Supervisors assigned work to reinspectors only after verifying that the inspector performing the reinspection was not the original inspector. Tuetken, ff. Tr. 8408, at 20.

85. In most cases, a reinspector knew whose work he was reinspecting. *Id.* at 21. However, a sample audit by Mr. Hansel found no evidence or patterns indicating the presence of a buddy system or any attempt to alter the results. Hansel, ff. Tr. 8901, at 16; Del George, Tr. 8480; *see also* Little, Tr. 9854-57. There was no evidence that reinspectors were concerned and/or influenced by the potential economic consequences to their employer of adverse program results. Hansel, Tr. 8928-33.

86. Independent third-party reviews were conducted by Level III inspectors of all visual weld inspections which were found discrepant. Tuetken, ff. Tr. 8408, at 19, 20. Third-party reviewers examined 3136 weld discrepancies identified by Hatfield reinspectors, and determined that 1150 of these should have been accepted by the reinspectors rather than rejected. The third-party reviewers examined 121 weld discrepancies identified by Hunter and determined that 12 should have been accepted rather than rejected. For PTL the third-party reviewers examined 999 weld discrepancies identified by reinspectors, concluding that 94 should actually have been accepted. These third-party review results confirm that the reinspectors of Hunter, Hatfield, and PTL generally evaluated weld inspections consistently and conservatively. Tuetken, ff. Tr. 8408, at 30. This judgment was confirmed by the NRC Region III Staff. Ward, ff. Tr. 9510, at 10-11; Ward, Tr. 9691-92, 9776; Del George, ff. Tr. 8406, at 25.

87. Mr. Kavin Ward, the Region's welding expert, testified that he found no instance where a reinspector had missed a deficiency. Indeed, in his opinion, in many cases the reinspectors were overly conservative, classifying welds as unacceptable even though they were in fact acceptable under the AWS Code. Ward, Tr. 9774-76; Ward, ff. Tr. 9510, at 10-12; *see also* Little, ff. Tr. 9510, at 14-16. Mr. Ward estimated that reinspections were overly conservative in about 10% of the cases. He based his judgment on having inspected 330 (about 1%) of the more than 31,000 Hatfield-, Hunter-, and PTL-reinspected welds. Ward, Tr. 9868, 9911.

88. To verify the accuracy of the reinspections, Edison directed PTL to perform a special unit concept inspection to determine whether PTL's inspectors would independently arrive at the same results as the contractors' QC inspectors who were performing the reinspections. Tuetken, ff. Tr. 8408, at 19, 20. PTL performed a sample reinspection of the items inspected during the reinspection program. PTL randomly selected QC inspectors and activities for reinspection; PTL inspectors were able to reproduce the reinspection results for Hatfield and Hunter at a very high rate (*see* Shewski, ff. Tr. 8423, at 21) providing an additional level of confidence that the reinspections by Hatfield and Hunter were reliable and conservative (*id.* at 5).

89. The special unit concept inspection also verified that the reinspection personnel for Hatfield and Hunter were not involved in the reinspection of work that they had originally inspected. In addition, the reproducibility of the results by PTL, whose inspection personnel had no connection with Hatfield and Hunter employees, demonstrated that the reinspectors did not bias their results in favor of the inspectors whose work they were reinspecting. Shewski, ff. Tr. 8423, at 22; Tuetken, ff. Tr. 8408, at 21.

90. Intervenors argue that the PTL inspectors do not inspire confidence because PTL had a cumulative average of 85.3% for all its inspectors whose subjective work was reinspected, and 77% for its inspectors who were reinspected in the expanded sample period. These percentages are below the 90% acceptance criterion for subjective attributes. The averages below 90% reflect the results of two inspectors who did not pass the acceptance criteria established under the program. Del George, Tr. 8504. The special unit concept inspection, however, was conducted by five PTL inspectors who were qualified and certified to the requirements of ANSI N45.2.6. Shewski, ff. Tr. 8423, at 20.

91. Dr. Kochhar testified for Intervenors about his general concern that workplace dynamics and social associations can influence the reinspectors' decisionmaking criteria. Kochhar, ff. Tr. 10,538, at 10. He believes that knowledge by the reinspectors of the identities of the original inspectors could have biased the reinspection results nonconservatively, that is, in favor of conforming reinspections. Dr. Kochhar testified that the reinspection effort should have been undertaken by individuals with no previous involvement at the site to minimize any bias. *Id.* at 11. On cross-examination Dr. Kochhar admitted that he could not state whether such knowledge did in fact lead to nonconservative bias in this particular inspection setting. Nor would he ever attempt to quantify the amount of bias which may have been introduced. Kochhar, Tr. 10,604-05, 10,612. Even so, for some industries, he believes the bias to

be important. Tr. 10,610. Dr. Kochhar admitted that such bias, even if it were introduced, might just as well have led to stricter reinspection rather than leniency. Kochhar, Tr. 10,605.

92. In many instances the reinspectors simply did not know the inspectors whose work they were reinspecting. For Hatfield, almost the entire population of inspectors had turned over by the time of the BRP. Of the five Hatfield original inspectors who remained, only one was included in the program sample. Hansel, Tr. 8926-27. Dr. Kochhar counters these facts however, by stating that, to him, it is not a question whether the individuals concerned are still on the site, but whether there was any personal association between the inspector and reinspector. Kochhar, Tr. 10,608. For Hunter, only the identification number of the original inspector was provided to the reinspector. Hansel, Tr. 8927. Obviously, a person is much less likely to remember a number than to recognize initials. For PTL, offsite PTL inspectors were brought in to perform the reinspections. Hansel, Tr. 8927.

93. In most instances the reinspectors knew the results of the original inspections. Hansel, Tr. 8933-35; Kochhar, ff. Tr. 10,538, at 12. This is because the reinspection program was set up so that the only inspections which were reinspected were those where the items inspected had been found originally to conform to requirements.[7]

94. Dr. Kochhar testified that this knowledge of the original results introduces another source of possible bias because the results of the original inspections could have resulted in a "mimic" effect where reinspectors conform their results to the original inspection results. Kochhar, ff. Tr. 10,538, at 12. Dr. Kochhar testified that this phenomenon is based on the "general human tendency to avoid deviation from a prior determination." *Id.* Dr. Kochhar further testified, however, that he had never personally observed this phenomenon in any of his laboratory experiments; rather his testimony regarding this theory is based on his review of the literature. Kochhar, Tr. 10,620.

95. We accept Intervenors' argument that in order to have maximum confidence in the validity of the reinspection program, the reinspector should be independent of the original inspector. Proposed Finding 70B. The ideal situation would have been for the reinspectors to have no knowledge of the identity of the original inspector or the results of his inspection. Neither separation was completely possible or practical under the circumstances, however. We do not believe the effect was very large, and in any event, the effect was nullified by other factors.

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[7] The single exception is with respect to "as-builts," where the reinspector was simply asked to measure the dimensions of certain components as built. In these cases, the reinspectors' measurements were compared with the measurements of the original inspectors. Kochhar, Tr. 10,619.

96. Intervenors acknowledge that it would have been difficult to undertake a completely independent reinspection program. Proposed Finding 70B. In our view, not only would it have been difficult, but on any large scale, it would have been counterproductive to bring in a totally independent outside inspection contractor. Familiarity with the job and valuable time would be lost to little advantage.

97. We cannot find from this record that the reinspectors knew the identities of the respective inspectors in very many instances. Even in those cases where they might have known who the original inspector was, there is no evidence, nor do we believe that a reinspector would foresake his duties and endanger his own position simply because he could identify the inspector. Moreover, there is no evidence that there would be any benefit even to the original inspector derived from bias in his favor. However, the Board never understood the need in the first instance to supply the reinspector with the name of the inspector, and in hindsight the appearance of independence would have been enhanced if that information had been deleted. It is not, however, a very important matter.

98. Dr. Kochhar's "mimic effect" theory makes more sense in that there probably would be a tendency for a reinspector to expect to see what the inspector saw. Indeed in more than 90% of the cases overall in the program that is what happened. But as Intervenors acknowledge, it would not be possible to shield the reinspectors from the results of the original inspector because, by program definition, the only inspections which were reinspected were those originally found to conform to the requirements. This factor alone tends to diminish any mimic effect.

99. Intervenors' point is that somehow the mimic effect must be taken into account before reliable conclusions about the program results can be made. Proposed Finding 76. There are other factors which tend to offset any mimic effect.

100. As to the mimic effect, Dr. Kochhar agreed that if the inspectors were very thorough and rigid in their reinspection, the effect would be lessened. Kochhar, Tr. 10,621-22. Such thoroughness and rigidity in fact took place. The Staff testified that weld reinspectors were often overly conservative, even to the point of being "gun shy," in their assessment of earlier inspection results. Ward, Tr. 9776, 9790; *see also* Kochhar, Tr. 10,625.

101. The reinspectors knew their work would receive a great deal of attention. They knew particularly that they themselves might be reinspected, by the NRC Staff, by a CECo auditor or by someone like Mr. Hansel. In Mr. Hansel's judgment, the reinspectors were strongly

motivated to perform their jobs properly, even stringently, not to mimic the results of the earlier inspections. Hansel, Tr. 8938-40.

102. The mimic effect would also be offset by the tendency of inspectors generally to justify their existence by finding discrepancies (Kochhar, Tr. 10,625-26), and the tendency of inspectors to exercise more care when inspecting safety-related equipment. Kochhar, Tr. 10,626.

103. In sum, we have accepted none of Dr. Kochhar's human factors concerns as having a material effect on the validity of the reinspection program.

c. Termination of Allen Koca

104. In our June 8 Order (unpublished) setting forth the scope of the reopened proceedings, we denied Intervenors' request to make the circumstances surrounding the termination of Allen Koca, former Hatfield QA supervisor, a mandatory issue to be addressed. However, Intervenors had been granted the right to discover information concerning Mr. Koca's termination (Tr. 8156-61) and we stated that the parties themselves should determine its relevance, if any, to the BRP. Memorandum and Order Following Prehearing Conference, dated June 8, 1984, at 6. In the interest of a complete record, Edison and the Staff presented undisputed testimony concerning Mr. Koca.

105. Intervenors and the Staff have adopted Applicant's proposed findings on the matter, which we also accept as disposing of it. Proposed Findings 75-79.

VI. OVERSIGHT OF PROGRAM IMPLEMENTATION

a. CECo QA Audits and Surveillances

106. CECo's quality assurance department conducted three audits and four surveillances of the BRP. Two of the audits dealt with the activities of all site contractors, including Hatfield and Hunter. The third audit involved only Hatfield. Additional surveillances were performed to close out all audit findings and observations. These audits and surveillances were described in detail in the testimony of Walter Shewski. Mr. Shewski testified that all findings, observations or other concerns raised as a result of these audits and surveillances have been closed by Applicant on the basis of acceptable corrective actions. Shewski, ff. Tr. 8423, at 5-20. We discuss the specifics of the audits in the following paragraphs.

107. Audit 6-83-66 was conducted between June 21, 1983, and July 6, 1983, and examined the following areas for each of the seven contractors involved in the BRP:

- Reinspection sample size of inspectors and inspection items.
- Items determined to be inaccessible.
- Third-party review of potentially unacceptable subjective-type inspections.
- Dispositions of nonconforming conditions discovered during the BRP.
- Adequate documentation of the reinspection program as implemented by the contractors.
- Qualifications of inspection personnel performing reinspection.

Audit 6-83-66 resulted in a single finding. Part A of that finding applied to Hunter, Part B to Hatfield and Part C to PTL. *Id.*, Attachment E, at 8.

108. Part A of the audit finding identified two problems with potential consequences on the analysis of the BRP results. The first problem involved the use of field problem sheets by Hunter rather than discrepancy reports. A subsequent quality assurance surveillance (No. 5189) verified that discrepancy reports had in fact been initiated for the particular discrepancies as required by Hunter's procedures. *Id.*, Attachment F, at 9. The second problem involved the reinspection of bolted connections by Hunter. This item was dispositioned by a letter from Sargent & Lundy which stated that the particular torque values would relax over time and thus could not be reproduced for purposes of the reinspection program. *Id.*

109. Part B of the audit finding determined that Hatfield was using field problem sheets to resolve discrepancies identified during reinspection for conduit and termination attributes. A subsequent quality assurance surveillance (5202 R1) determined, however, that all discrepancies identified on field problem sheets during the BRP by Hatfield were included in the results of the BRP and that Hatfield inspectors were instructed not to use field problem sheets in the future. *Id.*, Attachment G. That surveillance also found that Hatfield NCR No. 674 was written to disposition a deficient item discovered during the reinspection of electrical terminations, which had previously been the subject of a field problem sheet prepared by Production personnel. *Id.*, Attachment G, at 10.

110. Part C determined that PTL had not yet transmitted inspection reports generated during the BRP to the appropriate contractors. These inspection reports described discrepant conditions in work performed by other contractors, but inspected by PTL. PTL was working on the premise that reports with nonconforming conditions would be reported to the

contractors upon completion of the BRP. Upon being advised during the audit to immediately transmit nonconforming reports to the appropriate contractors after concurrence by the independent third-party inspector, PTL began and continued transmitting such reports as they were prepared. No further corrective action was required. *Id.*

111. The second audit, 6-83-93, was conducted between November 14 and November 17, 1983, and examined the following areas for each of the seven contractors involved in the BRP:

- Accuracy of BRP results as reported to the NRC in the Interim Report.
- The design basis for the engineering evaluation of visual weld inspection discrepancies as described in the Interim Report.
- Qualifications of the third-party inspectors.
- Documentation of third-party inspections.
- Basis for project construction department "Interpretations" regarding the BRP.
- Correction of deficiencies identified as a result of the BRP.

Id., Attachment N, at 14.

112. Audit 6-83-93 identified no findings or observations applicable to Hatfield or Hunter. It did, however, result in one finding applicable to PTL. Following implementation of a project construction department interpretation of the BRP, PTL had changed the deficient status of some welds which previously had received third-party concurrences on rejectability without allowing the independent third-party inspector to concur or disagree with the changes. Corrective action for this finding involved the resubmittal to the third-party inspector of the particular reports which changed the deficient status of the rejected welds for reasons other than those addressed by the Interpretation. In addition, the contractors were advised that such second inspections should not be performed without allowing the third party to concur or disagree. This corrective action was documented in CECo surveillance 5696. *Id.*, Attachment O, at 15.

113. The third CECo quality assurance audit, 6-83-124, was directed solely at Hatfield and was conducted between August 24 and September 1, 1983. Its purpose was to verify proper implementation of the BRP by Hatfield. The audit examined welding and Hatfield reinspection methodology for welding. Specifically, field and record reviews were performed to determine that Hatfield had adequate traceability of weld travelers to installations in the field. The reviews were accomplished by retrieving weld travelers from Hatfield for a particular component and then going into the field to determine which weld travelers corresponded to which weld on the component. Since welders identify welds on a

component with a unique identification number assigned to them, traceability of weld traveler to weld could be made. In addition, this audit reviewed the method Hatfield used to identify hangers which had been reworked or renumbered so that a reinspection could be performed if required. This was done by reviewing the inspection history of a component to determine the completeness of inspection as well as identification of the most current inspection. Finally, the audit was performed to verify that Hatfield was properly inspecting combination cable pan hanger welds (hangers shared with the HVAC contractor). This was performed through identification of combination hangers, and review of installation and inspection documentation to support the installation. *Id.*, Attachment P, at 16-18.

114. Audit 6-83-124 resulted in two findings. The first finding was that in some cases the weld traveler cards did not adequately identify the weld in the field for inspection. The second finding was that not all combination hanger inspections had been documented to indicate conclusively that the inspection was completed. *Id.* at 18.

115. Hatfield's corrective action for the first finding was to correlate the weld-traveler inspection data to design-drawing cable pan hanger data using computer data base management techniques to demonstrate traceability of inspection. This use of the computerized data base identified the welders and inspectors who worked on and inspected the component as well as components not inspected. For those components for which no correlation existed between component and inspection data, it was assumed that no weld inspection had ever occurred. An inspection was initiated to complete the documentation and any necessary repairs. This corrective action was documented in CECo QA surveillance 5275. *Id.*, Attachment Q, at 19.

116. Hatfield's corrective action for the second finding involved the identification of all combination hangers for which inspection accountability was indeterminate. The hangers identified were considered as never having been inspected. An inspection was performed and, where required, rework was performed. This corrective action was documented in CECo surveillance 5274. *Id.*, Attachment R, at 19.

117. The audit finding in Audit 6-83-66 regarding the use of field problem sheets by Hatfield and Hunter was one of the matters discussed in our Initial Decision as indicating continuing documentation problems on the part of Hatfield and Hunter. I.D., 19 NRC at 216, ¶ D-444. In the remanded hearing we had the opportunity to place that audit finding in the context both of the overall evolution of documentation requirements for Hatfield and Hunter and oversight of the BRP by the CECo Quality Assurance Department. While we do not condone the use of the

field problem sheets we now do not believe that they undermined the reliability of the results of the BRP, and any adverse effects have been corrected. Moreover, CECo's overall quality assurance effort, including the special audit of Hatfield and the special unit concept inspection of the BRP by PTL, adds to our confidence that the program was conducted in accordance with the program description, that there were no alterations of the results and that the reported results are accurate.

b. NRC Staff Overview

118. Staff oversight of the implementation of the BRP has been extensive. Little, ff. Tr. 9510, at 7. In the reinspection area of greatest concern to the Staff because of its subjectivity and difficulty, i.e., visual weld inspections, the Staff examined a significant number of welds covered in the BRP. Little, Tr. 9637. These inspections were conducted principally by Mr. Kavin Ward, a weld inspector with approximately 38 years of experience in welding and/or weld inspection. Ward, ff. Tr. 9510, Professional Qualifications of Kavin Ward, at 10-11. Mr. Ward testified that he and another Staff inspector visually examined and documented approximately 500 welds which had been reinspected in the BRP, of which approximately 330 had been reinspected by Hatfield, Hunter, or PTL inspectors. *Id.*, Enclosure 1 at 37-38, at 10, 18. In addition, Mr. Ward looked at thousands of other welds during the course of his inspections at Byron, but did not document his examination of those welds. Ward, Tr. 9772-73. The Staff inspectors examined the welds to determine that they had in fact been reinspected and that the reinspector had not overlooked a discrepancy. Mr. Ward testified that he also examined the documentation of welds generated by the BRP as well as the documentation generated by the original weld inspection. He also held discussions with supervisors and lead weld inspectors. Ward, ff. Tr. 9510, Enclosures 1, 2, at 10, 11.

119. Mr. Ward testified that during his oversight inspections he found no case of a reinspector missing a deficiency. To the contrary, Mr. Ward concluded that in many cases the reinspection results were overly conservative because reinspectors were classifying welds and attributes as unacceptable even though, in Mr. Ward's judgment, they were in fact acceptable under the applicable welding code. Nor did Mr. Ward find any instance of a reinspection not being conducted correctly. Finally, Mr. Ward found no deficiencies in the documentation generated by the BRP or by the original inspections. *Id.* at 11.

120. For other than welding attributes, Staff oversight of Hatfield and Hunter included the review of inspection reports, nonconformance reports, deficiency reports, and the observation of work activities,

including in-process inspections. Ward, Love, ff. Tr. 9510, Enclosure 3, at 10-12.

121. The Staff also verified Applicant's oversight of the BRP by reviewing audit and surveillance reports and by interviews with CECo personnel. Love, ff. Tr. 9510, at 11, 12.

VII. METHOD OF EVALUATING RESULTS OF BRP

122. The original inspection record and the reinspection record were compared and evaluated to determine whether any discrepancy between the two records existed. Del George, ff. Tr. 8406, at 20, 21.

123. Acceptable items were defined as those for which the reinspector agreed with the condition recorded on the original inspection record. Without that agreement, the item was graded as unacceptable. *Id.* at 21.

124. All observed discrepancies were recorded and tabulated and subsequently compared to the BRP acceptance criteria. These discrepancies were counted against the original inspector whether or not the observed discrepancy was later demonstrated to be a valid discrepancy when compared to current design or installation parameters and tolerances. *Id.* at 22.

VIII. RESULTS OF THE REINSPECTION PROGRAM AS THEY RELATE TO INSPECTOR QUALIFICATION

125. The BRP results for Hatfield, Hunter, and PTL inspectors demonstrated with few exceptions that the sampled inspectors were qualified. All Hatfield, Hunter, and PTL inspectors passed the 95% acceptance criterion for objective attributes during their first 3 months of inspections. *Id.* at 27, 28; *see also* Hansel, ff. Tr. 8901, at 22.

126. For the subjective attribute (visual weld inspection), Hatfield and Hunter each had one inspector whose first 3 months of work failed to meet the 90% acceptance criterion. PTL had three such inspectors. Because the Hatfield and Hunter inspectors, and two of the PTL inspectors had no further work, their qualifications could not be assessed further and under the terms of the BRP were considered indeterminate. The reinspection results for these inspectors were retained in the BRP data base. A substitution was made for each of these inspectors and each substitute's reinspected work was determined to meet program acceptance criteria. Del George, ff. Tr. 8406, at 28.

127. The performance of one PTL inspector did not meet the 90% subjective acceptance criterion for either his first or second 3-month

period. Therefore, all of this inspector's remaining work was reinspected. In addition, PTL was subjected to an inspector-sample expansion which captured the first 3 months of work for visual welding inspection of all remaining inspectors whose work was accessible. Each of the four additional inspectors passed the 90% acceptance criterion. *Id.* at 28; Shewski, ff. Tr. 8423, at 24; Little, ff. Tr. 9510, at 9, 10.

128. The two PTL inspectors who did not meet the 90% criterion in the first 90 days and the one PTL inspector who failed to meet the criterion for both the first and the second 90 days, had the effect of reducing PTL's cumulative average agreement rate in the BRP. The acceptance criteria were not, however, directed at contractor-wide performance and the cumulative results did not cause the Staff to be concerned about the qualifications of PTL as the independent testing agency at Byron. The focus was on individual inspectors, not the company. Connaughton, Tr. 9666-67.

129. Both Edison and the Staff have concluded that the number of inspectors whose work was reinspected, the amount and type of work reinspected, and the requirement for sample expansion provide a valid basis to draw positive conclusions about the qualifications of the overall population of inspectors, and specifically those for Hatfield, Hunter, and PTL. Del George, ff. Tr. 8406, at 29-53; Hansel, ff. Tr. 8901, at 23; Little, ff. Tr. 9510, at 4; Connaughton, Tr. 9876. Based upon the findings of the BRP that a representative sample of QC inspectors had generally performed competently irrespective of any deficiencies in the practices by which they were certified, the Applicant and Staff conclude, and we agree, that there is reasonable assurance of the capability of Hunter, Hatfield, and PTL inspectors whose work was not reinspected. Del George, ff. Tr. 8406, at 33; Little, ff. Tr. 9510, at 4-6. In particular, we conclude that the Applicant has met the requirement we set out in our June 8, 1984 Memorandum and Order at 12-13 that there be a showing that the results of the BRP provide reasonable assurance that PTL's work presents no safety problems.

130. Intervenors would have us reject the foregoing conclusion and substitute findings from the Byron reinspection program report respecting all eight site contractors subject to the reinspection program. Proposed Finding 99 *citing* Applicant's Exh. R-4, Exh. V-2. Were we to do this we would find, for example, that 16% of the inspectors sampled overall did not achieve either 90% on visual weld inspections or 95% on objective attributes. In other words, the numbers for all eight contractors collectively are not as good as the numbers for Hatfield, Hunter, and PTL. We decline to make such a finding. Although the report cited was received into evidence, its use was limited to issues within the scope of

the remanded proceeding. In particular, only those portions actually referred to by witnesses could be used as a basis for proposed findings, thus our decision. Tr. 11,146. Intervenors have not complied with the spirit of our ruling. We emphasize however that, by excluding those portions of the report beyond the scope of the hearing, we are not making a ritualistic evidentiary or procedural exclusion. The data offered by Intervenors do not have probative value for the purposes of the remanded proceeding. The data have never been probed or explained and are therefore meaningless. We can no more impose upon Applicant conclusions from the summary result of the five contractors whose activities are beyond the scope of the hearing, than we could impose upon Intervenors the summary and favorable results for Hatfield, Hunter, and PTL. It took 14 days of hearing and weeks of evaluation to determine the meaning of the results respecting the three contractors in issue.

131. The fact that certain inspections were inaccessible or not re-creatable does not affect the conclusions, since, as Mr. Del George pointed out, the qualification and certification programs for inaccessible and nonre-creatable attributes were the same as those verified by the BRP. Del George, ff. Tr. 8406, at 22. Hatfield and Hunter QC inspectors were selected and trained in the same manner regardless of the types of inspections they were to perform. Buchanan, ff. Tr. 11,174, at 3, 4; Somsag, ff. Tr. 11,172, at 2-5. The requirements imposed for prior experience, job training, and performance demonstration have the same general scope and technical content for each of these attributes. In addition, the attributes not reinspected are similar in many respects to those captured for reinspection. Del George, ff. Tr. 8406, at 33-35; Muffett, ff. Tr. 9510, at 21-23. Although the BRP reveals less about non-reinspectable PTL attributes than it does about Hatfield and Hunter attributes, additional assurance as to the quality of the PTL inspections is provided by the fact that, throughout the construction of the plant, presently nonreinspectable items inspected by PTL had been audited by CECo and inspected by the Staff, resulting in no discovery of significant problems. Muffett, ff. Tr. 9510, at 22-23; Muffett, Tr. 9870-71.

132. Before arriving at a favorable conclusion on the results of the BRP, the Board very carefully considered whether the Staff's endorsement of the program left room for doubts about its adequacy. The Staff's inability to provide assurance that the program would be effective played an important part in the decision denying the Byron operating license. *E.g.*, I.D., 19 NRC at 206-09. We were consequently very attentive to apparent differences in views of the Staff members.

133. Mr. Forney was the Bryon Senior Resident Inspector and was the initiator of the 82-05-19 noncompliance citation. He testified in

August 1983 that the purpose of the program was to determine whether the contractors used qualified inspectors. Tr. 7991.

134. At the hearing on remand, Mr. Little of the Region III Staff testified that:

> The NRC staff believes that the results of the reinspection program provide adequate confidence in the capability of the Hatfield, Hunter and PTL quality control inspectors whose work was not reinspected, and provides additional assurance to support the Region III staff's position that the overall quality of the work of these contractors is acceptable. However, it should be noted that the Region III staff believed at the time of the Program's inception and believes today that the primary purpose of the reinspection program was to determine whether quality control inspectors who may not have been properly certified prior to September, 1982 had overlooked significant safety-related hardware deficiencies in their inspections.

Little, ff. Tr. 9510, at 4.

135. Mr. Forney, however, apparently had a somewhat different view of the purpose and significance of the program, and the Staff appropriately submitted his affidavit to that effect. Referring to the above-cited Region III testimony by Mr. Little, Mr. Forney stated:

> 8. I reviewed staff testimony on the reinspection program as it was under development, and provided comments where I considered the testimony to require modification or clarification. The comments which I provided were resolved to my satisfaction except for the conclusion(s) which may be drawn regarding the "capability" or qualification of a particular inspector(s). . .
>
> 9. In my view, while the reinspection program was not intended to, and did not directly determine whether CECo contractors at Byron always used qualified inspectors, it provided a good basis to evaluate whether inspectors had overlooked significant safety-related deficiencies. I agree with the staff position to this effect. . . .
>
> 10. In conclusion, I agree that the reinspection program achieved the purpose I understood it to have, namely, to determine whether prior to September 1982 inspectors overlooked significant safety related hardware problems.

Forney Affidavit, ff. Tr. 10,040.

136. Neither the Board nor the parties understood the exact meaning of Mr. Forney's affidavit. We deemed the matter to be important, so Mr. Little and Mr. Forney, joined by Mr. Hayes and Mr. Connaughton, appeared as a panel. Ff. Tr. 10,037. Thus, we had before us the Staff members best able to express the Staff's view of the purposes and significance of the reinspection program and they were examined extensively by the Board and the parties.

137. Based in part upon statements by Mr. Forney, Intervenors argue, contrary to our conclusion above, that we are unable to find that

the reinspection program provides reasonable assurance that the Hatfield, Hunter, and PTL inspectors are qualified. Intervenors' Proposed Findings 99, 104.

138. Mr. Forney did not fully clarify why he explained the purpose of the program differently in August 1983 than in August 1984. This is not especially significant, however, because at the earlier hearing his rather spontaneous answer to a Board question does not seem to be intended to define the limitations and strengths of the program in the detail of his later testimony. Tr. 7991. Of greater importance are the specifics of his view of the program. He believes that the program cannot demonstrate that, across the board, all inspectors are qualified. Tr. 10,042. But, consistent with his affidavit, he states that the primary purpose was to determine whether inspectors, possibly not properly certified, had overlooked significant hardware deficiencies. Tr. 10,042-43. Because the quality of the work at Byron is good, according to Mr. Forney, it might not challenge the competence of the inspectors. Tr. 10,063. Other capability demonstrations would be required to conclusively determine that inspectors are capable. Tr. 10,063-68. The program was never intended to tell "the full abilities of the inspectors." Tr. 10,084. As to inferences of work quality from the program, Mr. Forney stated that an inspector does not have to be a very good one to find a significant safety-related hardware problem. Tr. 10,088-89.

139. The general tenor of Mr. Forney's testimony, in our view, is that the reinspection program was not designed to nor is it capable of determining whether the inspectors met all of the exact requirements of the ANSI N45.2.6 certification standard. We agree. The program would not be the equivalent of the formal testing, documented on-the-job training and experience requirements in making the exact ANSI determinations. The recertification program resolved those aspects of the problem for later inspections. But, as he stated on several occasions, the program could and did determine whether the inspectors were capable of finding significant safety-related hardware problems. He also stated on several occasions that his differences with the Region III position were "miniscule." *E.g.*, Tr. 10,069. We are satisfied that Mr. Forney's reluctance to overstate the inferences to be drawn from the program does not mask a weakness in it nor does it indicate an important difference with the rest of the Region III Staff.

140. We have previously found that the sample selection process for inspectors whose work was to be reinspected was appropriate; that the choice of the first 90 days of an inspector's tenure on the site was a proper time period for checking the validity of an inspector's training and initial qualification; the acceptance criteria for establishing whether

an inspector was qualified, based on the results of the reinspection, are appropriate and conservative; the results of the BRP are accurate and reliable; and there was extensive oversight of the entire BRP by CECo's QA department and the NRC Regional Staff. Based on the results of the BRP, the Board finds that Applicant has provided reasonable assurance that the Hatfield, Hunter, and PTL inspectors who performed inspections at Byron, beginning with the construction of safety-related work in 1976 and extending through September 1982, were qualified, even though their certifications were not in strict accordance with ANSI N45.2.6-1978.

IX. SARGENT & LUNDY DISCREPANCY EVALUATIONS

141. Applicant presented testimony on the engineering evaluation of discrepancies performed by Sargent & Lundy consisting of a panel comprised of John M. McLaughlin, Partner and Manager of the Structural Department at Sargent & Lundy; Ernest B. Branch, Associate and Director of Mechanical Design at Sargent & Lundy; Richard X. French, Partner and Manager of the Electrical Department at Sargent & Lundy; and Anand K. Singh, Associate and Assistant Head of the Structural Analytical Division at Sargent & Lundy. The NRC Staff presented the testimony of William Little, Branch Chief in the Division of Reactor Safety, NRC Region III; Kavin D. Ward, Ray Love and James Muffett, Reactor Inspectors in the Division of Reactor Safety, NRC Region III; and Kevin Connaughton, Resident Inspector at Byron. Intervenors presented the testimony of Charles C. Stokes, an engineering consultant with P/S Associates. In response to questions raised by Mr. Stokes relating to Sargent & Lundy's engineering evaluation of discrepancies, Applicant presented the rebuttal testimony of Bryan A. Erler, Associate and Director of the Structural Division at Sargent & Lundy; Robert W. Hooks, Assistant Division Head of the Structural Engineering Division at Sargent & Lundy; Dennis DeMoss, Mechanical Project Engineer in the Project Management Division at Sargent & Lundy; and Ernest B. Branch, who was part of the original panel.

142. Sargent & Lundy performed an engineering evaluation of discrepancies in work performed by Hatfield involving hardware installation and work performed by Hunter involving hardware installation and related documentation, which were categorized as objective attributes. A total of 63,085 reinspections of Hatfield objective attributes was performed as part of the reinspection program, out of which 2153 discrepancies were identified. Another 3896 reinspections of Hatfield objective attributes were performed under a supplemental reinspection program and

158 discrepancies were identified. A total of 71,510 reinspections of Hunter objective attributes was performed under the reinspection program, out of which 689 discrepancies were identified. French, ff. Tr. 9044, at 4, 6, 12; Branch, ff. Tr. 9051, at 5-7. As we will explain below, 1244 of the Hatfield discrepancies and 614 of the Hunter discrepancies were determined upon evaluation either not to exceed design parameters or tolerances or to involve inconsequential documentation items and were, therefore, not valid discrepancies, as that term was used by CECo in the reinspection program.

143. Sargent & Lundy also performed an engineering evaluation of visual weld discrepancies on welds produced by Hatfield covered by the American Welding Society (AWS) standard and welds produced by Hunter covered by AWS and the American Society of Mechanical Engineers (ASME) Code. The ASME Code governs welding for piping and pressure vessels and the AWS Code governs all other welding. A total of 27,538 Hatfield AWS welds were subjected to reinspection during the original program, out of which 1986 discrepancies were identified. A total of 3725 Hunter welds were reinspected (27% AWS welds, 73% ASME welds), out of which 109 discrepancies were identified, 60 AWS and 49 ASME. McLaughlin, ff. Tr. 9047, at 3-5, 7, 14; Branch, ff. Tr. 9051, at 6, 10-11.

a. Objective Attributes — Hatfield Discrepancies

144. Hatfield installed all the components, materials and equipment associated with the electrical systems at Byron, including the installation of electrical equipment, cable tray and conduit and the pulling and terminating of cable. Hatfield also installed concrete expansion anchors that were initially inspected and reinspected by PTL. This work was divided into the following objective attributes for reinspection: conduit installation, cable termination, cable-tray and cable-tray hanger installation, equipment modification, conduit as-built reconciliation, A-325 bolting, and concrete expansion anchors. (Visual weld inspection, discussed *infra*, was separately characterized as a subjective Hatfield attribute.) French, ff. Tr. 9044, at 5; Summary of Objective Discrepancy Evaluation — Hatfield, ff. Tr. 9239.

145. The 63,085 reinspections of Hatfield objective attributes performed as part of the reinspection program included 2840 reinspections of concrete expansion anchors inspected by PTL.[8] Of the 2153 discrepancies identified, 38 were associated with concrete expansion anchors.

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[8] As indicated *supra*, PTL only provided inspection services; it did not perform any construction work at the Byron site.

Most of the discrepancies were associated with conduit as-built reconciliation. These discrepancies consisted primarily of differences between the installed locations of conduit, conduit supports and junction boxes and the locations shown on the installation drawings. French, ff. Tr. 9044, at 6-8.

146. For the 2153 observed discrepancies, 1713 evaluations were performed. The number of evaluations was less than the total number of discrepancies because some evaluations covered more than one discrepancy. The discrepancies were first compared with current design parameters and tolerances. This involved a comparison of installed component locations and dimensions with the corresponding locations, dimensions, and tolerances shown on the design drawings. The discrepancies found to be outside of design tolerances were evaluated either by engineering judgment or by engineering calculations. French, ff. Tr. 9044, at 6.

147. Engineering judgment evaluations were performed in two ways, by either a review of the component design function to determine whether the function of the component was affected by the discrepancy, or a comparison of the discrepancy to the current design to determine whether the discrepancy had design significance. Engineering calculations were used to resolve the remaining discrepancies. *Id.*

148. Of the total of 1713 evaluations of discrepant conditions, 1244 found the discrepancies to be within current design parameters and tolerances. Applicant concludes that the reason the reinspectors identified these as discrepancies was that the acceptance tolerances established for the reinspection program were more stringent than the tolerances indicated on the installation drawings and used by the original inspectors. *Id.* at 7. Intervenors appear to accept the point that the reinspection criteria were more stringent but continue to argue that uncertainty exists as to how many of the discrepancies should have been detected by original inspectors based on their instructions at that time. Applicant counters, and we agree, that none of the discrepancies covered by the 1244 evaluations should have been detected by the original inspectors because the "discrepant" condition did not exist at the time of the original inspection.

149. Eighty evaluations of discrepancies were deemed acceptable by engineering judgment. Approximately two-thirds of these evaluations involved a review of the component design function to determine whether the function was impaired by the existence of the discrepancy. None of these discrepancies impaired component design function. The balance of these evaluations involved a comparison of the discrepancy to current design requirements to determine significance. None of the discrepancies was significant. *Id.*

150. The remaining 389 evaluations were conducted by reviewing the conduit support, junction box loading, and mounting detail design calculations. The variations in support locations and associated variations in loads were found to be acceptable. *Id.* at 7-8.

151. The detailed engineering evaluation of the discrepancies in Hatfield objective attributes demonstrated that none of the evaluated discrepancies had design significance and, therefore, they had no safety significance. *Id.* at 8.

152. A supplemental program was established for the reinspection of certain Hatfield attributes, namely, equipment setting, equipment modification, A-325 bolt installation and conduit-support bolting. This program was established to provide further assurance that work in these areas was properly done and to complete the data base for attributes where the reinspection program samples were too small to permit meaningful reliability calculations. *Id.* at 9. Intervenors argue that the supplemental reinspection program was established because of shortcomings in the original BRP which were identified by the NRC Staff and others. Applicant correctly states that the supplemental program was initiated to provide further information requested by the Region III Staff and was not encompassed by the requirements of the original reinspection program. Tuetken, ff. Tr. 8408, at 31.

153. With respect to equipment setting, 778 inspections associated with 50 pieces of electrical equipment identified 34 discrepancies. The majority of the discrepancies consisted of equipment anchoring details with weld length and weld spacing deviations. An evaluation of the discrepancies determined that none had design significance. French, ff. Tr. 9044, at 9. With respect to equipment modification, a 100% wiring inspection performed on 1850 elements associated with 50 pieces of safety-related equipment identified 44 discrepancies. The discrepancies were minor wiring variations that did not affect the functioning of the equipment. An evaluation of the discrepancies determined that none had design significance. *Id.* at 10. With respect to A-325 bolting, which was used in the assembly of cable-tray riser supports, inspection of 295 bolts on 50 supports identified 46 discrepancies. The discrepancies were represented by bolts with torque less than the acceptance criteria. The design of the associated connections was reviewed and it was determined that the connections were structurally sound despite the lack of complete bolt torque. Therefore, the discrepancies were determined to have no design significance. In any event, all A-325 bolted connections were retorqued because of the unsatisfactory discrepancy rate. *Id.* at 10-11; French, Tr. 9232-34.

154. With respect to the supplemental reinspection of conduit-support bolting, inspection of 1008 conduit-support bolts on 305 supports identified 34 discrepancies. The discrepancies were evaluated and determined to have no design significance. French, ff. Tr. 9044, at 11. However, two missing conduit clamps were detected during the inspection and, because a missing clamp at a critical location could have design significance, a walkdown was performed of all 8532 critical clamp locations. Ten locations were found with missing bolts or clamps. Based on these results, a walkdown of the remaining accessible conduit clamps and bolts was conducted. An evaluation of the ten cases showed that the discrepant conditions had no design significance. The last of these evaluations to be completed involved a missing clamp on a 6- or 7-foot run of conduit in a hard-to-reach location. Due to the presence of another conduit and a large piece of steel in the area, even without the clamp, the conduit could only move a fraction of an inch. Sargent & Lundy's evaluation demonstrated that the conduit could not be pulled out during a seismic event and that there was no design significance. French, ff. Tr. 9044, at 11-12; French, Tr. 9282-85.[9]

155. Including the supplemental reinspections discussed in ¶¶ 152-154, 66,981 reinspections of Hatfield objective discrepancies were performed. Although 2311 discrepancies were identified, none of the evaluated discrepancies had design significance. French, ff. Tr. 9044, at 12. Accordingly, the quality of the foregoing reinspected Hatfield work is adequate. *Id.*; French, Tr. 9273-74.

b. Objective Attributes -- Hunter Discrepancies

156. Hunter was responsible for the installation of nearly all the mechanical systems at Byron. This work included installation of mechanical equipment and interconnective process piping and supports, and the

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[9] The design significance of another discrepancy was debated during the cross-examination of the Region III Staff Panel. Tr. 9732-47. This discrepancy involved the miswiring of a damper that without correction would not have closed automatically under certain accident conditions. However, it was established that the discrepancy lacked significance since operation of the damper on a manual basis, an acceptable alternative to automatic operation, was not impaired. Moreover, although the discrepancy had been missed by the original inspector, by the time of the BRP, it had already been discovered and repaired during system turnover testing. Intervenors disagree with Applicant's and Staff's position as to the significance of this discrepancy and cite as their basis "the history of manual operations in operating plants such as TMI and the imperfect nature of any testing system." Applicant contends that even with the apparent error of the original inspector, the finding and correction of the faulty wiring termination even prior to the preoperational testing phase is indicative of the in-depth mechanisms of the Byron Program to assure work quality and safety. The NRC Staff expressed the highest degree of confidence that had the faulty connection not been discovered during the construction phase, it would have been caught in preoperational testing (Connaughton, Tr. 9743), or in the highly unlikely circumstance that the discrepancy was undetected in the preoperational phase it would have been caught in the surveillance testing program conducted throughout the life of the plant. Little, Tr. 9743.

supply of miscellaneous piping and welding materials. As noted *supra*, the Hunter work fell into three attributes: hardware installation, related documentation, characterized as objective attributes, and welding, characterized as a subjective attribute. Each objective attribute consisted of a number of elements. For example, the documentation attribute was subdivided into such inspection points as work process sheets, weld material regulation sheets, field inspection reports and discrepancy reports. Branch, ff. Tr. 9051, at 5-6; Summary of Objective Discrepancy Evaluation – Hunter, ff. Tr. 9265.

157. A total of 69,624 reinspections of Hunter objective attributes was performed as part of the reinspection program. Another 1886 Hunter installations of concrete expansion anchors were inspected by PTL. Thus, there were 71,510 total reinspections of Hunter objective attributes. Of this amount, a total of 689 discrepancies was reported. The 689 discrepancies involved 441 documentation and 248 hardware discrepancies. Five of these discrepancies were associated with concrete expansion anchors inspected by PTL. Branch, ff. Tr. 9051, at 6-7.

158. Sargent & Lundy evaluated all 689 discrepancies. The evaluations were performed by the same procedure as described for the discrepancies associated with the Hatfield objective attributes. *Id.* at 7-9. A total of 614 discrepancies in Hunter objective attributes was evaluated by comparison to the design parameters and tolerances. This included all 441 documentation discrepancies and 173 hardware discrepancies. Discrepancies evaluated typically included cosmetic flaws, minor dimensional errors, and documentation errors. The dimensional errors consisted primarily of minor as-built piping and pipe support dimensional errors or incomplete as-built information. Documentation errors consisted primarily of minor data-entry errors and omissions on work reports and process sheets. These discrepancies were evaluated by reviewing corroborating information on the affected documents and other independent documents. The evaluation showed that all hardware discrepancies were within the current design parameters and tolerances. All documentation discrepancies were deemed acceptable based upon reviewing other corroborating documentation. *Id.* at 8. Again, this class of discrepancies, like similar ones for Hatfield, contains discrepancies which are either inconsequential or in conformance with current design requirements, and as such they were not considered valid discrepancies.

159. A total of fifty-four hardware discrepancies was evaluated by engineering judgment. Discrepancies evaluated included dimensional errors and omissions for piping, pipe supports and pipe-whip restraints; hardware substitutions; minor configuration changes; and minor me-

chanical joint bolting deviations. None of these discrepancies impaired component design functions or had design significance. *Id.* at 8.

160. A total of twenty-one hardware discrepancies was evaluated using detailed engineering calculations. Discrepancies evaluated included three as-built pipe support dimensions, four concrete expansion anchors, three pipe-whip restraints, and eleven small-bore pipe bends with excessive ovality. These elements were originally established by engineering calculation, and a new calculation was necessary in order to account for the identified discrepancy. For example, with respect to pipe ovality, which is a measure of the pipe roundness at the point of bending, the eleven pipe bends exhibited average ovality values of 10.5%, which is in excess of the 8% limit of ASME, Boiler and Pressure Vessel Code — § III, Nuclear Power Plant Components — Division I (1974 Ed., Summer 1975 Addenda). Accordingly, calculations were performed verifying the acceptability of the pipe wall thickness and flow area reductions allowed by the ASME Code. Stress intensification effects were evaluated as negligible because all of the pipe bends are at least five pipe diameters in radius. *Id.* at 9.

161. The detailed engineering evaluation of the 689 discrepancies in Hunter objective attributes demonstrated that none of the discrepancies had any design significance and, hence, no safety significance. *Id.* at 10. Accordingly, the quality of the foregoing reinspected Hunter work is adequate. *Id.* at 14; Branch, Tr. 9277-78.

162. The Board finds that, based upon the Sargent & Lundy evaluations of discrepancies in the Hatfield and Hunter objective attributes, none of the discrepancies had design significance and, accordingly, they had no safety significance. With the exception of the miswired damper discussed above, Intervenors agree. Proposed Finding 126.

c. Subjective Attribute AWS Welding — Hatfield Discrepancies

163. The Hatfield AWS welding covered by the reinspection program included the welding of conduit supports, junction-box supports, cable-tray supports, cable-tray holddown welds, and auxiliary steel for electrical supports. McLaughlin, ff. Tr. 9047, at 5.

164. Of the 27,538 AWS Hatfield welds that were subjected to reinspection during the original program, 1986 welds were identified with various discrepant conditions. A total of 169 welds was taken from this group for analysis by Sargent & Lundy. An additional 187 discrepant welds were included as a part of the sample to be analyzed by Sargent & Lundy when, in response to NRC questions, additional inspections were made of welds not initially covered by the reinspection program. Thus, a

total sample of 356 Hatfield discrepant welds was analyzed by Sargent & Lundy. McLaughlin, ff. Tr. 9047, at 7.

165. Of the 356 Hatfield weld discrepancies analyzed by Sargent & Lundy, 50 were selected at random, 50 were selected by a third-party inspector and were identified as the worst discrepant welds. An additional sixty-nine welds were selected on the basis of being highly stressed. The remaining 187 highly stressed welds were included in the sample in response to NRC questions. *Id.* at 7-8, 17. Thus, the sample of 356 Hatfield weld discrepancies analyzed by Sargent & Lundy were biased to examine a sampling of the most highly stressed welds in the reinspection program, where the greatest potential existed for exceeding design margins. *Id.* at 8, 16-17.

166. A review of weld maps for the 356 discrepant Hatfield welds indicated that five of the discrepant welds involved arc strikes, spatter and convexity. Arc strikes and spatter are cosmetic discrepancies which would create a strength problem only if there were a large number in a given weld. The weld maps indicated that arc strikes and spatter were minimal. Convexity is of no consequence when, as in this case, the welds on the structures under consideration are not subject to fatigue loading. Thus, these five weld discrepancies do not reduce the load-carrying capacity of the weld and, therefore, have no structural impact. *Id.* at 10.

167. A detailed engineering evaluation based on the weld maps was conducted with respect to the remaining 351 discrepant welds to determine (i) the effect of the discrepancy on the strength of the weld and (ii) because the discrepant welds were among the several welds joining steel members and components, the effect of strength reductions on these joints or connections. Of the 351 discrepant Hatfield welds, 165 had strength reductions ranging from 10 to 100%. Irrespective of the actual strength reduction, the discrepant portion of the weld was entirely disregarded for evaluation purposes. Three welds had cracks. In the case of welds with cracks, no credit (100% strength reduction) was given in the evaluation for the presence of the weld. *Id.* at 9-11; McLaughlin, Tr. 9161-63.

168. After the weld strength reductions were determined, an evaluation of the ability of the connection to withstand the expected loads or forces was performed. The forces on the connections are made up of two major loadings. The first is the deadweight or static load of the cables and the tray. The second is the seismic load on the connection. With respect to the static load, Sargent & Lundy reviewed the cable loadings to confirm that the loads on the cables were less than that assumed in the original design. Because maximum or bounding loads were used in the

original design of the cable tray and conduit system, the actual loads are expected to be less than design loads. In each case, where Sargent & Lundy calculated the actual load, it found that load to be less than the original design load. McLaughlin, ff. Tr. 9047, at 11-12. The neighboring welds to one of the three cracks, which involved a cable-tray hold-down weld, bore a slight additional load (still within the Code allowable) as a result of the crack. These welds were inspected by Sargent & Lundy. The inspection revealed that none of the neighboring welds was discrepant. Erler, ff. Tr. 11,158, at 5-6. Intervenors argue that the evaluation of the ability of the neighboring welds to withstand the expected loads was a theoretical evaluation, because the neighboring welds were not reinspected for discrepancies unless they happened to be captured in the reinspection program. McLaughlin, Tr. 9155-56. Applicant counters that when a discrepant weld was identified during the reinspection program, the "inspection activity" was expanded to include all welds on the connection containing the discrepant weld(s). *See* Applicant's Reply Finding 132A.

169. Intervenors' point is well taken. The "inspection activity" apparently consisted of checking the reinspection program discrepancy reports to determine if there were discrepancy reports in the other welds to which the load would be transferred. McLaughlin, Tr. 9155. However, to do differently and expand the sample to all welds on a connection when a discrepancy was found, regardless of the original inspector, would be a drastic departure from the planned approach of the reinspection program. It would likely produce results not conducive to conclusions about inspector qualifications, but would lend itself better to conclusions as to work quality. The reinspection program was primarily for the former and accordingly, as Intervenors point out, Sargent & Lundy evaluators had knowledge of discrepancies only for welds included in the reinspection program and assumed nondiscrepant conditions on other welds in their analysis. The exception to this procedure was Mr. Kenneth T. Kostal's evaluation of SCC discrepant welds where all connections and their welds were inspected in instances where Mr. Kostal insisted on establishing the existence of redundant load paths. Kostal, Tr. 10,234-38. Applicant contends, and we agree, this activity was unnecessary but it was ordered by Mr. Kostal because of his desire to answer any conceivable question during cross-examination. Kostal, Tr. 10,238-40.

170. Sargent & Lundy next reexamined the seismic loading and performed a seismic analysis representative of the Byron site, which reduced the load from that determined initially. The seismic loading used in the original design of the cable tray and conduit system was based on a response spectra design method, a very conservative design method used

in the nuclear industry. The reevaluation of the seismic loading on connections was based on a time-history seismic analysis, which, as indicated, is a more refined and accurate determination of the seismic loading. McLaughlin, ff. Tr. 9047, at 11-12.

171. Due to the recurring nature of two types of discrepancies, an additional investigation was performed by Sargent & Lundy to determine their significance. The first recurring discrepancy involved a fit-up gap between the horizontal and vertical cable-tray members. Strength tests performed by Sargent & Lundy demonstrated that, even though the AWS Code required that the capability assigned to this connection be reduced, there was no actual reduction in the joint capacity. The second recurring discrepancy involved the use of a partial penetration weld rather than a fillet weld as called for in the design. Laboratory testing by Sargent & Lundy demonstrated that the as-built partial penetration weld had less than a 10% reduction in capacity when compared to the original design. *Id.* at 12-14.

172. The detailed evaluations described above were conducted on all 356 discrepant Hatfield welds. The results of these evaluations demonstrated that none of the discrepancies exceeded design margin and, accordingly, none had design or safety significance. Accordingly, the quality of this reinspected work is adequate. *Id.* at 12. Intervenors agree. Proposed Finding 135.

d. Subjective Attribute AWS and ASME Welding -- Hunter Discrepancies

173. The Hunter AWS welding covered by the reinspection program included pipe supports and pipe restraints. McLaughlin, ff. Tr. 9047, at 6. The Hunter ASME welding covered by the reinspection program included large-bore butt welds, socket and fillet welds, NF support welds, and pipe penetrations and reinforcing saddles. Branch, ff. Tr. 9051, at 11. Of the 3725 welds produced by Hunter that were reinspected (27% AWS welds, 73% ASME welds), 109 discrepant welds were observed. One hundred percent of these 109 discrepant welds were evaluated by Sargent & Lundy. As noted above, this included sixty AWS welds and forty-nine ASME welds. McLaughlin, ff. Tr. 9047, at 5, 14; Branch, ff. Tr. 9051, at 6, 10-11.

174. The sixty discrepant Hunter AWS welds were evaluated by the same procedure as described for the Hatfield discrepancies. Nineteen of the welds fell into the no-structural-impact category encompassing arc strikes, weld spatter and convexity, which do not reduce the load-carrying capacity of the weld. Eighteen of the welds had a capacity reduction

of less than 10%. The remaining twenty-three welds had a capacity reduction of 10% or more. McLaughlin, ff. Tr. 9047, at 14-15.

175. The detailed engineering evaluation of the sixty discrepant Hunter AWS welds indicated that none of the discrepancies exceeded design margin and, accordingly, none had design or safety significance. Accordingly, the quality of this reinspected work is adequate. McLaughlin, ff. Tr. 9047, at 15.

176. The forty-nine discrepant Hunter ASME welds were evaluated to ASME § III Code design criteria using three methods to determine whether the Code was met and whether the discrepant welds had design significance. The initial method involved comparing the weld discrepancy with the current design parameters and tolerances and with the ASME Code to determine if it was acceptable on that basis. For example, in some cases, such as with surface porosity, the visual welding reinspection criteria were overly stringent and exceeded Code acceptance criteria. These reported discrepancies were determined to meet the Code design criteria and were, therefore, judged to be acceptable. If it was not possible to disposition a discrepancy using the first approach, the second method involved evaluation by engineering judgment based on a comparison of the effect of a weld discrepancy to design margins or the component design function. The final method of resolution of the weld discrepancy was an evaluation by detailed engineering calculation. Branch, ff. Tr. 9051, at 11-12.

177. Three discrepancies were reported involving large-bore piping butt welds. Two were within current design parameters and tolerances. The third was compared to design margins and determined to be acceptable by engineering judgment. *Id.* at 12.

178. A total of thirty discrepancies involving socket and fillet welds was reported. Three were within current design parameters and tolerances; four were compared to design margins and determined to be acceptable by engineering judgment; and twenty-three were evaluated by engineering calculation and met ASME Code design criteria. The majority of the calculations involved a simple arithmetic computation of the Code-required fillet weld size. *Id.* at 13.

179. A total of fourteen discrepancies involving NF support welds was reported. One was within current design parameters and tolerances and thirteen were reviewed by calculation and met ASME Code design criteria. The majority of the calculations involved recalculating the designed weld with consideration of the discrepancy accounted for. All welds were found to meet ASME Code design criteria. *Id.* at 13.

180. A total of two discrepancies involving welds with pipe penetration and reinforcing saddles was reported. Both were reviewed by engi-

neering calculation and found to meet ASME Code design criteria. Both welds were compared to actual design requirements and neither of the discrepancies was determined to have design significance. *Id.* at 13-14.

181. All forty-nine ASME-discrepant welds met ASME Code design criteria. The Sargent & Lundy evaluations of the Hunter ASME weld discrepancies demonstrate that, as was true with respect to the Hunter AWS weld discrepancies, as well as the Hatfield weld discrepancies, none of the discrepancies had design significance and, hence, they had no safety significance. Accordingly, the quality of this reinspected work is adequate. *Id.* at 14.

182. The Board finds that, based upon the Sargent & Lundy evaluations of the Hatfield AWS-discrepant welds and the Hunter AWS- and ASME-discrepant welds, none of the discrepancies had design significance and, accordingly, they had no safety significance. Intervenors agree. Proposed Finding 150.

e. Matters Raised by Intervenors' Witness, Mr. Stokes

183. Intervenors' engineering expert, Mr. Stokes, raised several concerns about Sargent & Lundy's evaluation methodologies and practices. These concerns were thoroughly addressed by Applicant's rebuttal witnesses to the satisfaction of the Board and, for the most part, Intervenors. As has been their practice throughout the remanded hearing, Intervenors have not pursued matters not in genuine dispute and have agreed with Applicant's proposed findings on many of the issues raised by Mr. Stokes, as has the Staff. *See* Intervenors' Proposed Findings 139, 145-148, 151-153, 156.

184. However, Intervenors remain concerned about the discrepancy evaluations performed by Sargent & Lundy of thirty flare-bevel AWS welds produced by Hatfield and captured by the reinspection program.

185. Mr. Stokes also expressed concern because the flare-bevel groove welding was included under a prequalified AWS welding procedure designated as 13AA. Stokes, Tr. 10,800-01. Such welding should be produced against a qualified welding procedure, i.e., one that is validated by establishing through a field demonstration that the procedure produces an adequate weld. However, the Hatfield AWS flare-bevel welds captured in the Byron reinspection program were produced during the period May 1978 through September 1982. During that period, flare-bevel groove welds were, in fact, produced under qualified procedures 13Q and 13AB. Procedure 13AA, a prequalified welding procedure, was not approved until December 30, 1983, and flare-bevel groove welding was erroneously included in that procedure. This error is being rectified

and the procedure for flare-bevel groove welding is being issued as a qualified procedure. Erler, ff. Tr. 11,158, at 7.

186. In any event, the thirty flare-bevel welds produced by Hatfield and captured by the reinspection program were inspected for a determination of the actual radius. The inspection yielded a radius measurement of at least 2 times the tube wall thickness (2 *T*) for all tubes except one, which had a radius equal to 1.75 *T*. The stress of each weld was conservatively evaluated using the AWS formula for effective throat of 5/16 radius with the smallest radius measurement of 1.75 *T*. This demonstrated that the AWS-allowable stresses were met. *Id.* at 6-7. The Board concludes that no legitimate concerns have been raised with respect to flare-bevel welding at the Byron plant.

187. Applicant's witnesses were questioned about the fact that some of the Hunter visual weld discrepancies and discrepancies in Hatfield and Hunter objective attributes were repaired prior to evaluation by Sargent & Lundy. The repair of a discrepancy in no way interfered with Sargent & Lundy's engineering evaluation inasmuch as all the information necessary to perform the evaluation was contained in the discrepancy reports. McLaughlin, French, Branch, Tr. 9278-80, 9293-96.

188. All discrepancies subject to ASME Code examination acceptance criteria were repaired, even though they were determined by evaluation not to have design significance. All other discrepancies were either repaired or dispositioned as acceptable "as is" based on the engineering evaluation results. Del George, ff. Tr. 8406, at 36.

189. The Board was initially suspicious of the absence of any design-significant discrepancies from all of those analyzed. Sargent & Lundy attributes this absence to the extensive margin incorporated in the Byron design and, as explained by the Sargent & Lundy panel, is an inherent consequence of the design process. Engineers design a structure so that it is sufficiently strong to withstand the expected forces and stresses with spare or extra strength to account for uncertainties and contingencies. This extra strength is called margin. Design margin is that margin imposed by engineers during the design process. For example, connections are designed in groups rather than individually. As a consequence, the strength or load-bearing capability of each connection is established on the basis of the most highly stressed connection of the group. Therefore, the actual stresses for most connections will be less than those established in the design process. The difference between the two is an example of design margin. Sargent & Lundy contends that the existence of this design margin in the work they evaluated is the primary reason that none of the weld discrepancies was found to be design significant.

McLaughlin, ff. Tr. 9047, at 8-9, 11-12; French, Branch, McLaughlin, Tr. 9254-61.[10]

190. There is a second margin in the structural design of connections. This is the margin that the code writers put into the design process in the form of allowable stresses. The code writers typically attempt to include a margin of approximately 2 when they write the code. This means that a structure designed to a code could carry approximately twice the design load and not fail. McLaughlin, ff. Tr. 9047, at 9.

191. In Sargent & Lundy's detailed engineering evaluation, the code-allowable for stress was not exceeded for any discrepancy. *Id.*; Erler, ff. Tr. 11,158, at 4-5; McLaughlin, Tr. 9271-72. Although Mr. Stokes initially stated that some of Sargent & Lundy's calculations "appeared" to exceed the code-allowable for stress (Stokes, ff. Tr. 10,770, at 7, 8), following cross-examination Intervenors and Applicant stipulated that after reviewing the calculations and discussing them with Sargent & Lundy personnel, Mr. Stokes found no calculations for work performed by Hatfield or Hunter where the actual stress exceeded the code-allowable based on design criteria used by Sargent & Lundy. Tr. 10,936.

192. There were some additional examples of possible justification of the engineering practice whereby items called discrepant were later proven acceptable. In many instances an item of construction is specified by, say, a practical dimension with no statement of any acceptable tolerances or bounds on that dimension. If then an inspector observes a dimension different from that specified by more than the sensitivity of his measuring device he will call a discrepancy. In truth, however, the dimension will not be discrepant provided the observed value is within the dimensional bounds established by the designer but not appearing in the specification. Branch, Tr. 9250. A slightly different example is the original 6-inch-radius tolerance on the location of a conduit hanger on a Byron ceiling or beam. To catch marginal installations, the 6-inch latitude was reduced in the reinspection program to 3 inches. With due consideration, a support called discrepant when observed by the inspector to

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[10] Intervenors assert that because design is not an issue in this proceeding, the Licensing Board can make no findings with respect to conservative loadings, assumptions or margin used in the Byron design. Although the adequacy of the general design of the Byron plant was not an issue, the Sargent & Lundy discrepancy evaluations clearly do fall under the ambit of the remanded proceeding. Sargent & Lundy's evaluation necessarily considered loadings, assumptions and margins used in the design. And, as noted by the Licensing Board, the issue of design criteria is relevant to the extent that the criteria are used in the evaluation of the discrepancies noted in the BRP. Tr. 10,668-87. Thus, to the extent that these factors were used in the Sargent & Lundy evaluations, information on loadings, assumptions and margins was properly received into evidence, and findings based upon that evidence may be made. Accordingly, the Board may properly find that the unrebutted evidence on loadings, assumptions and design presented by Mr. McLaughlin and Mr. R.V. Laney lend support to their conclusion on the adequacy of the Hatfield and Hunter work.

be "off" by 4 inches may well be quite acceptable. French, Tr. 9251. In the layout of conduits a standard 9-foot span between supports has been adopted and incorporated in the design. That span suffices for a ¾-inch-diameter conduit. Obviously a 3-inch conduit can tolerate a larger span — perhaps twice or three times as great — allowing judgmental latitude. French, Tr. 9256. In the area of welds, a cable tray may, by design, be supported by several welds. In the inspection, one is observed to be substandard, even cracked. In an analysis the acceptance of remaining welds is established. Then the total support is reanalyzed with no credit taken for the cracked weld, or partial credit for other degrees of nonconformance. The result of that reanalysis may show no need for the discrepant item. McLaughlin, Tr. 9154-56; Branch, ff. Tr. 9051, at 13. The required capacity of individual support items, like bolts and hangers, will be shown by design to have a wide range. It is impractical and uneconomic, for a number of reasons, to procure an inventory of such support items having capacities fitting a ramp function. Therefore, in practice, the bolt supply follows a step function and a larger-than-design size is installed. French, Tr. 9255.

193. There were a few instances where a 10% overstress factor was used by Sargent & Lundy at an intermediate point in the calculative process. The 10% overstress factor refers to a 10% limit where Sargent & Lundy engineers are allowed to use their knowledge of the margin in the structural analysis to decide, when the calculated stress is less than or equal to 10% greater than allowable, that the calculated stresses have sufficient conservatism or margin to meet the American Institute of Steel Construction (AISC) Code stress-allowable. Erler, ff. Tr. 11,158, at 4. However, as Intervenors and Applicant stipulated, in each of these instances, the overstress factor was not relied upon for the ultimate conclusion in the calculation that the actual stress did not exceed the Code-allowable stresses. Tr. 10,936; Erler, ff. Tr. 11,158, at 4-5; Erler, Tr. 11,159-60.

194. Mr. Stokes charged that the judgments and assumptions used by Sargent & Lundy in its evaluation of the BRP discrepancies lacked "objectivity and impartiality" and, hence, an independent review was required. Stokes, ff. Tr. 10,770, at 7. However, outside of pointing to an alleged inconsistency between Sargent & Lundy's structural engineering group and the mechanical engineering group in the treatment accorded fatigue loading (Stokes, Tr. 10,893), Mr. Stokes could point to no specific instance, including no specific calculations, where Sargent & Lundy demonstrated a lack of "objectivity and impartiality." Stokes, Tr. 10,885-10,904. As Mr. Stokes himself stated, "I'm just saying they [Sargent & Lundy] ignored certain things, but I can't cite one." Tr.

10,894. He also testified that his statement was based in part upon testimony we had declined to receive. Tr. 10,895.

195. With respect to the alleged inconsistency between the mechanical group and the structural group in their treatment of fatigue loading, Mr. Stokes asserted that if mechanical designs account for fatigue in the piping system, then the structural group should take that into account when designing those respective pipe supports. Stokes, ff. Tr. 10,770, at 18. Contrary to Mr. Stokes' assertion, there is no inconsistency in Sargent & Lundy's treatment of fatigue loading for piping and for pipe supports. Due to the nature of loading on a piping system, the requirements may vary depending on the class of the system. For example, the ASME Code requires an explicit calculation of fatigue loading for a Class 1 piping system while Class 2 and 3 piping systems are affected by cyclic loading only if the number of cycles exceeds 7000 (ASME § III, NC 3611.2). For pipe supports with respect to Class 1, 2 and 3 piping, both ASME and AISC are consistent in not requiring any reduction in allowable stress for less than 20,000 cycles. Erler, ff. Tr. 11,158, at 8. At Byron, for Class 1 piping systems, the analysis has accounted for the number of cycles as required by the Code. Fatigue loadings were properly neglected for Class 2 and 3 piping systems and for pipe supports because the number of cycles experienced is less than the thresholds established in the Codes for requiring a reduction in the allowable stress limits. *Id.* Mr. Stokes apparently considered water hammer to occur each time some change in the system occurs. This is not the case. Water hammer does not occur at such a frequency that it would be a factor in fatigue loading design. There is no inconsistency in the manner in which fatigue loading was factored into the Byron design.

196. The Board finds that the Sargent & Lundy evaluations were performed in accordance with proper engineering standards and that the assumptions used in performing these evaluations were sufficiently conservative. In the words of Mr. Muffett, Sargent & Lundy's program for evaluating the discrepancies was "more than adequate." Muffett, Tr. 9813. Accordingly, the Board finds no evidence in this record to support the need for an independent review based upon any alleged lack of objectivity or impartiality on the part of Sargent & Lundy. Intervenors agree. In addition, in response to the issue added by the Board concerning Applicant's repair of defects, the Board finds that all discrepancies were either repaired or dispositioned as acceptable "as is" based on engineering evaluation results, thereby resolving this issue. Finally, the Board finds the complete absence of any design-significant discrepancies in the entire reinspection program to be a strong indication that the pre-

September 1982 inspectors had not overlooked any significant safety-related deficiencies.

X. QUALITY OF THE WORK

a. Introduction

197. The disposition of a few thousand discrepancies observed among some 160,000 individual items of Hatfield and Hunter work examined in the reinspection program has been adequately discussed in the preceding section (§ IX). There it was recounted that all of the discrepancies were shown to be of no design significance. This conclusion was largely a consequence of engineering judgments and design recalculations on a case-by-case basis by the Byron architect-engineer leading to the striking result that not a single discrepancy in construction, observed by qualified inspectors assigned to the reinspection program, survived the engineering analyses as a fault. *See, e.g.*, McLaughlin, ff. Tr. 9047, at 10-12.

b. Evaluation Results and Scope of Work

198. A panel of engineers-executives from the Byron architect-engineer discoursed at some length on the concepts and procedures of practicing engineers when making assessments such as those of the discrepancies in this instance. Emphasis was on the accumulation of favorable safety margins occurring in a normal design process which, when summed, can provide a sizeable leeway, in a particular instance, between the nominal design capability of an item or of a structure and the capability it can provide in its service, as we discuss in the § IX, above. *See also* Tr. 9249-67.

199. With those engineering evaluations as bases, the members of the panel, comprised of J.M. McLaughlin and A.K. Singh (structural), R.X. French (electrical) and Ernest Branch (mechanical), concluded that all Hatfield and Hunter items caught in the reinspection program are of adequate quality to fulfill their design intent. McLaughlin, ff. Tr. 9047, at 16; French, ff. Tr. 9044, at 12; Branch, ff. Tr. 9051, at 14; Singh, ff. Tr. 9055, at 4.

200. These results, coupled with the adequacy of the sample, can be extrapolated to the conclusion that all Hatfield and Hunter work at the Byron Station is adequate for the purposes of the design.

201. Additionally, R.V. Laney, an individual with long technical and administrative experience in nuclear power and presented by the Appli-

cant, explained that the engineering analysis of discrepancies demonstrated that inherent design conservatism rendered virtually all the discrepancies inconsequential. This conservatism, combined with an extremely rigorous code definition of weld discrepancies, resulted in the generation of reports of many discrepancies that were later found to be acceptable. Mr. Laney concluded that the absence of any identified design-significant discrepancies provides additional assurance that the work of Hatfield and Hunter is adequate. Laney, ff. Tr. 9339, at 10, 19-23.

202. The Intervenors fault several of the Applicant's conclusions, particularly those of Mr. Laney, in their claim that the Applicant was unable to supply unequivocally correct data in response to their interrogatories and did, in fact, make changes up to the time of this remand hearing. Intervenors view these successive changes as evidence of an unstable system of data acquisition and recording which undercuts the confidence to be expected in the Applicant's testimony and in the conclusions drawn therefrom. Intervenors' Finding 184A. The Applicant concedes to corrections having been made from time to time in its answers and downplays the consequences of the single incident named by the Intervenors. Applicant's Reply Finding 184A.

203. Mr. Del George and Mr. Behnke similarly concluded that Sargent & Lundy's finding of no design-significant discrepancies contributes to a demonstration of the adequacy of the Hatfield and Hunter work. Del George, ff. Tr. 8406, at 49; Behnke, ff. Tr. 9336, at 14. The Board accepts the results of the Sargent & Lundy analyses as supportive of the acceptable quality of work at the Byron site.

204. Mr. Laney also explained how the scope of the reinspection program supported his conclusion that the quality of the Hatfield and Hunter work was adequate. He stated that he assessed the adequacy of the Hatfield and Hunter data in relation to all work performed by Hatfield and Hunter. Laney, ff. Tr. 9339, at 11. Specifically, Mr. Laney performed a comparison of the attributes that were inspected with the total of each contractor's attributes. The BRP involved 160,000 reinspections of Hunter and Hatfield work. Of the approximately 4800 discrepancies found, about 90% were eliminated by comparison with current design parameters and tolerances or by engineering judgment based on a comparison of the discrepancy with design margins. Fewer than 500 discrepancies were of such a nature as to require engineering calculations to determine their significance. None had design significance and none reduced design margins below the level required by conservative design practice. Most of the work attributes and elements that were accessible and not nonre-creatable were sampled in the BRP. The attributes not

included in the Hatfield sampling were, according to Mr. Laney, less significant in size and importance, and, in addition, were installed using the same procedures as attributes that were reinspected. Of the fourteen Hunter work elements which could not be included because of inaccessibility or nonre-creatability, seven were welding-in-process inspection points such as preheat or welding interpass temperature. The BRP found Hunter's agreement rate between welding inspectors to be good, with less than a 3% discrepancy rate on 3725 welds and no design-significant discrepancies. The reinspection effort redid 11% and 6%, respectively, of Hatfield's and Hunter's total inspector work-months or some 5 to 10% of the total work of these two contractors. *Id.* at 12-17.

205. We find that a broad range of attributes was examined and no inspection attributes or elements were excluded from the BRP for any reasons other than inaccessibility, nonre-creatability or luck of the draw (i.e., none of the inspectors included in the BRP had conducted inspections of those attributes). There appeared to be no effort or action to exclude or minimize inclusion of any areas of inspection activity in the BRP.

206. Mr. Laney concluded that, in addition to the qualification of inspectors, the absence of any discrepancies with design significance considered with the inherent design conservatisms and CECo's QA program, the scope of the reinspected work demonstrates that the quality of the Hatfield and Hunter work at the Byron plant is adequate. Laney, ff. Tr. 9339, at 26, 27.

207. However, Mr. Laney's overall conclusions on the quality of work were not based solely on the reinspection report and the supplemental report. Laney, ff. Tr. 9339, at 7-11. He stated that, if he had not made additional inquiries himself and if he had no other knowledge than the two reports, he did not know whether the two reports alone would have been sufficient to enable him to reach a professional judgment that the quality of the work by Hunter and Hatfield was adequate. Laney, Tr. 9379. In fact the February 1984 reinspection report alone did not satisfy Mr. Laney as being sufficient to verify construction quality. Laney, ff. Tr. 9339, at 8.

208. Mr. Del George similarly concluded that the large number of Hatfield and Hunter items reinspected, the relatively small number of discrepancies, and the absence of any design-significant discrepancies provide a basis for his conclusion that the quality of work is adequate. Del George, ff. Tr. 8406, at 49. Specifically, Mr. Del George pointed to (1) the inspection of approximately 130,000 Hatfield and Hunter objective attributes and 30,000 Hatfield and Hunter subjective attributes and (2) the diverse data base developed for Hatfield and Hunter, including

related indicia of acceptability for inaccessible and nonre-creatable attributes. Del George, ff. Tr. 8406, at 50-51, Attachment E.[11]

209. All these judgments on work quality were made on the basis of engineering judgment rather than on the basis of the application of mathematical statistical theory. Del George, Tr. 8518. The Staff also stated that the sampling methodology in the BRP was based on engineering judgment and "was not statistically conceived." Little, ff. Tr. 9510, at 4. Nevertheless, the Applicant also offered the testimony of Dr. Anand Singh, Assistant Head of the Structural Analytical Division of Sargent & Lundy. Dr. Singh applied principles of statistics to the results of the engineering evaluations discussed in the testimony of Messrs. McLaughlin, Branch, and French and in § IX, *supra*. Singh, ff. Tr. 9055, at 3-4. Based on his statistical analysis, Dr. Singh concludes with 95% confidence that in general more than 99% of Hatfield and Hunter work in the plant meets the design requirements. *Id.* at 4-8. The conclusions of the Applicant's witnesses based on engineering judgment, however, stand independently of Dr. Singh's statistical analysis. McLaughlin, ff. Tr. 9047, at 16-17; McLaughlin, Tr. 9272-74.

210. Intervenors presented the testimony of Dr. Ericksen in an effort to demonstrate that, applying mathematical statistical theory, inferences could not be made regarding the entire scope of Hatfield and Hunter work based upon the sample of work reinspected in the BRP. In assessing the significance of the testimony of Intervenors' statistical expert, Dr. Ericksen, we recognize that he does not purport to be an expert in the design, construction or evaluation of nuclear power plants and that he has no experience as a quality control inspector at a nuclear power plant. Tr. 11,026-45. He is an expert statistician. However, he recognizes that the conclusions expressed by knowledgeable professional engineers in this proceeding may in fact not be statistical statements at all, but rather the results of an engineering analysis. Ericksen, Tr. 11,077-78.

211. As we discussed in the context of inferences of inspector competency in § IV, *supra*, the limited role of a statistician in these circumstances was also recognized by Dr. Frankel, the statistical expert testifying on rebuttal for Applicant. He explained that a sampling statistician is

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[11] In response to a Board concern, Mr. Del George's testimony explained that the results for all attributes were evaluated on a contractor-by-contractor basis to determine whether any trends existed in the observed discrepancies that might warrant further review. Only two such trends were found, one involving reproduction of original visual weld inspection reports by PTL, the other involving a relatively large number of Hatfield visual weld discrepancies associated with sheet steel welds. Both of these trends involved discrepancies that were not design-significant and were caused by factors that have since been remedied. Del George, ff. Tr. 8406, at 38-41.

not qualified to draw inferences where a nonprobability sample is used, but can only assist the subject-matter expert in drawing inferences from that sample and has no role to play when a subject-matter expert does not purport to apply mathematical statistical theory at all. Frankel, ff. Tr. 11,120, at 8-9. None of the witnesses presented by Applicant or Staff, except Dr. Singh, purported to rest their conclusions on an application of mathematical statistical theory and Mr. McLaughlin specifically stated that the results of a statistical analysis were immaterial to his conclusions. McLaughlin, Tr. 9272-73. Thus, recognizing that mathematical statistical theory plays an extremely minor role in the evaluation of the quality of Hatfield's and Hunter's work, we turn to a consideration of Dr. Ericksen's testimony.

212. Dr. Ericksen's criticism of Applicant's use of statistics focused principally on the formula used by Dr. Singh to calculate the reliability and confidence interval of statements expressing the absence of design-significant discrepancies in the work attributes of Hunter and Hatfield. Since the only statistical inferences made by Applicant were Dr. Singh's, we will discuss here only Dr. Singh's use of statistics.

213. According to Dr. Ericksen, the equation used by Dr. Singh to estimate the reliability that inspection attributes met design standards is valid only if the inspectors in the sample were "homogeneous" (claiming that different inspectors had different probabilities of success) and if the effect of "clustering" the sample were taken into account. He also criticized the aggregation of inspection elements into larger groups claiming that in some cases the sample sizes of individual inspection elements were too small to be meaningful for extrapolation of the results to the remaining population. Ericksen, ff. Tr. 11,045, at 10-13; Ericksen, Tr. 11,047-49. Dr. Ericksen purported to demonstrate the lack of inspection homogeneity by calculating "intraclass correlation," a standard technique for measuring homogeneity. Ericksen, ff. Tr. 11,045. In the calculation of intraclass correlation, Dr. Ericksen used observed discrepancies, not design-significant discrepancies. The results expressed by Dr. Singh refer to design-significant discrepancies. We agree with Applicant that it is appropriate to use only design-significant discrepancies. Dr. Ericksen agreed that the use of design-significant discrepancy values would lead to intraclass correlation values of zero and would demonstrate inspector homogeneity. Tr. 11,058.

214. Similarly, to assess the effect of clustering, the statistician must first calculate the "design effect." Ericksen, ff. Tr. 11,045, at 15. If one uses design-significant discrepancies and if the inspectors are homogeneous (as discussed above) the "design effect" of using a clustered sample is unity, and clustering has no effect. Frankel, Tr. 11,124. As regards

aggregation of inspection elements, the BRP essentially aggregated inspections into two major categories — subjective and objective. Hunter identified only two objective inspection attributes — documentation and hardware. Dr. Ericksen indicated two ways by which inspection elements could be properly aggregated. In the first, an expert in the subject matter could have made that judgment (and the rationale for the judgment should be included as part of the report for evaluation) and in the second, with hindsight, one could look at the data and make the judgment based on inspection of the data. Ericksen, Tr. 11,048-49.

215. Applicant provided two witnesses to demonstrate the similarity of inspector background, training and certification and similarity of inspection technique as they relate to differing components. Mr. Malcolm Somsag established the similarity of all the Hunter hardware inspections and specifically demonstrated that the same inspection parameters — type, size, location and condition — applied to a wide range of inspection elements, some of which had been identified by Dr. Ericksen as lacking adequate sample size. Somsag, ff. Tr. 11,172, at 2-9; Ericksen, ff. Tr. 11,045, at 7; Ericksen, Tr. 11,046-47. Mr. Buchanan provided similar information as to Hatfield inspections and inspection program. Buchanan, ff. Tr. 11,174.

216. In view of the testimony addressing each of Dr. Ericksen's criticisms of Dr. Singh's use of a reliability equation, it appears to the Board that Dr. Singh's application of statistics is not unreasonable and the results provided by his calculations are acceptable estimates of the reliability of statements concerning Hunter and Hatfield work quality. *See also* Frankel, Tr. 11,124-25.

c. NRC Staff Conclusions on Work Quality

217. The Staff says that from the August 1983 hearings on, it has always maintained that the quality of work at Byron was good, perhaps even exemplary. In the words of the Senior Resident Inspector at Byron, William Forney,

> [I]t has been Region III's position all along, and . . . mine, that the construction at the Byron plant was good, because we had not discovered obvious hardware problems like we have at other sites. . . .
>
> I feel at this time that the information provided by the reinspection program did, in fact, provide a very large data base to confirm Region III's position that the quality of the Byron site is acceptable and that it is generally good. . . .
>
> And when you couple this with the work . . . that the workers do, which I believe to be generally of good quality, the inspection programs that not only does the NRC undertake, but Licensee has inspection programs, they've had reinspection programs, they've had overinspection programs, you have that coupled with the

> construction testing before it's turned over to preoperational testing, and when you put those all together and you have the overlap, . . . it's my belief and my professional opinion that those together have provided that degree of assurance required by 10 C.F.R. 50, Appendices A and B, as to the requisite safety and health of the public.

Tr. 10,044-45.

218. When polled by the Board during the most recent hearings, the members of the Region III Staff panel expressed opinions very similar to Mr. Forney's. Mr. Ward said that with all the reinspection the Byron plant had gone through, in relation to welding it was "probably the safest plant there is." Tr. 9872. Mr. Muffett agreed, and added that the results of the reinspection program reinforced the Staff's already positive conclusions about Byron. *Id.* Mr. Little said that those conclusions were based on Region III's inspection activities throughout the construction of the plant. Tr. 9872-73. *See also* Connaughton, Tr. 9877. James Keppler, Region III Administrator, was emphatic about the continuity of the Staff's position since before the August 1983 hearings:

> I want to take this opportunity to emphasize to the Board that, despite the identification of certain quality assurance problems at the Byron site, my staff and I had, and continue to have, confidence in the quality of completed construction at Byron. This confidence is based on our overall inspection effort and was reinforced by the special team inspection conducted in early 1982. The applicant's reinspection program further reinforced our confidence. Unfortunately, I believe that in the August 1983 hearing we may have failed to convey to this Board our degree of confidence.

Ff. Tr. 10,135, at 2.

219. One of the obstacles the Staff faced in August 1983 in trying to convey to us the confidence it had in the quality of Byron construction was the difficulty we had in reconciling the Staff's expression of confidence and the magnitude of the reinspection program — magnitude in time, in money, in scope, in the number of persons involved, and in the number of issues whose resolutions depended on the results of the program. Region III was not going to recommend that a Byron operating license be issued until the Region had concluded that the results of the reinspection program were acceptable. *See* I.D., 19 NRC at 206-09, ¶¶ D-405 to D-416. In August 1983, with such a large program under way, and its design still not agreed upon by the Applicant and the Staff, the Staff was nonetheless confident enough in the quality of Byron to urge us to delegate to it the resolution of the remaining QA issues. In the Initial Decision we inferred from the Staff's position a view of delegation which we observed was not consistent with Commission case law. *See id.* at 209-12, ¶¶ D-418 to D-428. Apparently, however, the Staff

would rather have had us attribute less importance to the reinspection program — view it as reinforcing a conclusion the Staff had already drawn on other grounds (Keppler, ff. Tr. 10,135, at 2) — as providing "additional assurance that the plant is safe to operate." Connaughton, Tr. 9873; *see also* Muffett, Tr. 9872

220. Even now, we have some difficulty in reconciling the Staff's present assertion that it has always been confident of the quality of work at Byron with its position as reported by the Appeal Board in remanding the record to us — that the record at the time of appeal was not sufficient to permit the authorization of operating license issuance. *See* ALAB-770, *supra*, 19 NRC at 1168. Also, however continuous the Staff's confidence may have been, it did not always extend to all the contractors: For reasons outlined below in § XI of this Decision, the Staff took the position some time around the middle of this year that the Applicant had to demonstrate that all equipment supplied by Systems Control Corporation was able as built to withstand as-built loads in conformance with applicable codes. *See* Hayes, Connaughton, Muffett, ff. Tr. 10,478, at 8.

221. Whatever the history of the Staff's opinion of the quality of work at Byron may be, the Staff expresses no reservations now about that quality. Indeed, the Staff even appears willing to rest its confidence on the results of the reinspection program alone. Speaking in his capacity as supervisor of Region III's review of the program, William Little said,

> Region III believes that the reinspection of a total of 179,407 safety related elements for Hatfield, Hunter and PTL, the results of those inspections, and the analysis and disposition of the reinspection findings give us reasonable assurance that the overall quality of the work of those contractors is good. This conclusion is considered valid for both accessible and inaccessible work.

Ff. Tr. 9510, at 6. Mr. Muffett emphasized that the Staff reviewed the reinspection engineering evaluations of discrepancies "with a more critical eye than usual." Tr. 9872.

222. In § VIII of this Decision, we discussed the difference of opinion which exists between Mr. Forney and the Staff panel over whether from the findings of the reinspection program one may conclude not only that the QA inspectors did not overlook safety-significant deficiencies, but also that they were competent. We note here only that this difference of opinion, being about the competence of the inspectors and not about the quality of the construction, in no way detracts from the present unanimity among the Staff on whether the construction is good. The long quotation from Mr. Forney in the first paragraph of this section attests to this unanimity. Besides, as we noted in our earlier discussion of the difference of opinion about contractor QA inspector competence,

Mr. Forney has characterized that difference as "miniscule," and we agree. *See* Forney, Tr. 10,064.

d. Board Conclusions on Work Quality

223. Before stating the Board's conclusion on the quality of the work at Byron, as inferred from the reinspection program, it is useful to place again the work quality subissue into a perspective appropriate for this remanded proceeding.

224. Returning to the quality assurance contention, it charges generally that CECo does not have the ability or willingness to maintain a quality assurance program and to observe quality assurance criteria and plans. The contention also challenged the independence of the Applicant's quality assurance program. The contention, as accepted and litigated, looked at Applicant institutionally. The quality of the work at Bryon was never regarded as a matter directly in issue. Our Initial Decision recognized the scope of the contention. We found that Applicant was institutionally capable of maintaining an adequate quality assurance program. We also found that there was no evidence of widespread hardware or construction defects. Our decision turned more than anything else around the problem against which the reinspection program was designed — a failure to demonstrate that the quality control inspectors at Bryon were properly trained, tested and certified.

225. The Appeal Board recognized the bounds of the issue in ALAB-770 where it instructed:

> In the totality of circumstances, the appropriate course is a further hearing to permit a full exploration of the significance of the program in terms of whether there is currently reasonable assurance that the Bryon facility has been properly constructed. Stated otherwise, the focus of the inquiry should be upon whether, as formulated and executed, the reinspection program has now provided the requisite degree of confidence that the Hatfield and Hunter quality assurance inspectors were competent and, thus, can be presumed to have uncovered any construction defects of possible safety consequence. [Footnotes omitted.]

19 NRC at 1178.

226. Applicant argues, with considerable merit, that the language quoted above is an observation that, for the purposes of this proceeding, a presumption of work quality follows a showing of worker competence. The argument continues that the reinspection program removed doubt about the qualifications of the inspectors, *ergo*, we have an unrebutted presumption of the adequacy of the Hatfield and Hunter work. Proposed Finding 166.

227. Applicant then implies that the extensive testimony of its seven witnesses who draw direct inferences of work quality from the reinspection program data, rather than through the inspector competence inference, is an unneeded extra body of proof. Proposed Finding 167.

228. We agree that the decisional predicates in this proceeding could have provided a justification for ending the inquiry at the inference of inspector qualifications. We need not, however, decide that point. As we noted, the reinspection program provided data from some 160,000 Hatfield and Hunter reinspections. The data covered a very broad range of the Hatfield and Hunter work, cutting across their inspectors, the various types of inspections and work, and covered most of the time the plant was in construction. The data necessarily held useful information about the quality of work.

229. If Applicant had stopped at the point of evaluating the data against the program criteria, and if it had rested on its inspector qualification inference, we would have had very pointed questions about why the data were not looked at for any other implications respecting the safety of the Byron facility. To have wasted the information after its initial use would have, in our view, demonstrated a careless disregard for quality assurance opportunities. We know now, of course, that the Sargent & Lundy engineers could not resist using the results for their purposes. Their testimony and the testimony of Messrs. Laney and Del George about quality inferences were not only appropriate, but under the circumstances, very desirable for a complete record.

230. Since the large mass of reinspection data was almost entirely a byproduct of the inspector qualification reinspection program, and was not statistically conceived, its use for a work-quality inference was somewhat handicapped, and its use for statistical inferences was even more so. Nevertheless, the broadly based numbers produced are very strong. Not a single design-significant discrepancy was found.

231. The Board tolerated, rather than encouraged, the statistical debate between Dr. Singh and Dr. Ericksen. Overlooked in the debate was the fact that there was no passing score for work-quality conclusions. Byron work quality does not depend upon the reinspection program. Dr. Singh's calculated reliabilities of 99% plus (except for two small samples) with a 95% confidence level is reassuring. But given the purposes for which the data were generated, we find two other factors to be also very important. One is that the data were looked at in a careful and technically sound manner, thus we have no unexplored questions. The other factor is that the data do not reflect unfavorably on the quality of the Hatfield and Hunter work.

232. As to work quality, we find that the numerous bases presented by Applicant taken together demonstrate that the quality of the Hatfield and Hunter work is adequate.

Other Issues

XI. ADEQUACY OF THE EQUIPMENT SUPPLIED BY SYSTEMS CONTROL CORPORATION

233. In our January 13, 1984 Initial Decision, under the impression, eventually shown false, that every accessible piece of equipment supplied by Systems Control Corporation (SCC) either had been, or would be, reinspected by PTL, we concluded that there was nothing left to litigate about SCC. *See* I.D., 19 NRC at 216, ¶ D-442. The reinspection program for SCC equipment, unlike the one for Hunter and Hatfield, was aimed at quality of work, not the qualifications of inspectors, and did not appear to involve sampling. The SCC program therefore appeared routine and not at all controversial, and thus delegable to the NRC Staff. *Id.* However, in the months after the Initial Decision, enough nonroutine questions came to light about SCC's equipment and PTL's inspections to put the issue of the safety of SCC-supplied equipment squarely before us in the remand proceeding. We now are able to be more conclusive than we were in January and to speak more directly to quality of work than we can in our findings on Hunter and Hatfield: All the parties agree, and we find, that the extensive program of inspection and evaluation of SCC-supplied equipment that has been carried out since the Initial Decision demonstrates the adequacy of all but one of the kinds of that equipment. The parties also agree, and we also find, that, much as in January, the Staff may properly be delegated the function of overseeing the further inspection and evaluation of that one kind of equipment. Given this agreement among the parties we need do no more here than briefly report how the question of the adequacy of SCC's equipment came before us again, briefly describe the case the Applicant presented on remand, and describe the issue which remains to be resolved by the Staff.

234. At the outset, we emphasize that although the findings on the adequacy of SCC's equipment are fuller than they were in January, the two essential points of our treatment of SCC in the January Initial Decision still stand. First, overseeing the remaining inspection and evaluation properly belongs to the Staff, and second, "Applicant defaulted in its responsibility to be assured of the adequacy of Systems Control's quality assurance program as required by Criterion I of Appendix B to Part 50."

I.D., 19 NRC at 135, ¶ D-109. Nothing we heard in the remand proceeding weakens the latter point. Indeed, some things we heard on remand, and which we mention below, strengthen that point. Of course, since, as we observe throughout this Supplemental Initial Decision, the various reinspection programs provide additional reasonable assurance of the safety of the Byron plant, the Applicant's failure with SCC no longer supports denial of the operating license but instead only belongs to what we hope is an instructive history.

235. SCC supplied Byron with main control panels, cable trays, and other items which house or support safety-related electrical equipment. As reported more fully in our January Decision, since 1977 various efforts by the Applicant and the Staff uncovered an unreliable, indeed fraudulent, quality assurance program at SCC: among other deficiencies, nonconforming welds, unperformed inspections, falsified SCC internal audit reports, possibly unqualified welders and inspectors, and a clearly unqualified QA/QC manager, who was also involved in the falsified reports, and who on one safety-related job performed the conflicting roles of QA manager and project engineer. *See id.*, 19 NRC at 131-34, ¶¶ D-94 to D-108.

236. In its proposed findings for the Initial Decision, the Applicant had urged us to find that it had dealt very responsibly with the deficiencies in SCC's QA program; the Staff had agreed. *Id.*, 19 NRC at 134, ¶ D-106. The Applicant had been, after all, the first to reveal problems in SCC's QA program and had duly reported them (*id.* at 132, ¶ D-95), had issued stop-work orders on two occasions (*id.*, ¶ D-96), and finally had, or so it appeared, discontinued new purchases from SCC (*id.* at 133, ¶ D-105).

237. Nevertheless, in the Initial Decision we concluded that the Applicant had defaulted in its responsibility to oversee SCC's QA program. That program was very bad, we said, and the Applicant did not explain how it had gotten so. *Id.* at 134, ¶ D-108. Moreover, other problems with SCC's QA program, most especially the fraud, came to light through no effort of the Applicant. *Id.* Finally, on one occasion, almost 3 years after problems first appeared, the Applicant waived some crucial inspections of some SCC equipment. *Id.* at 133, ¶ D-102. Now, since the Initial Decision, our finding of default has been strengthened by the Staff's discovery that, although the Applicant did indeed submit no new purchase orders to SCC after January 1978, it nonetheless continued purchasing from SCC after that date, simply by revising upward the quantities in the existing purchase orders. Connaughton, ff. Tr. 10,478, at 8. With this conclusion on the Applicant's default, and with what we

took to be complete reinspection under way, we thought that the litigation on SCC was over.

238. How wrong we turned out to be about the reinspection of SCC work clearly illustrates what in the Initial Decision we called the "randomness in this quality assurance litigation," namely, that how the Applicant fared in the litigation depended not on a complete and systematic review of the Applicant's QA program, but rather on the somewhat random collection of facts which came before us and on whether issues concerning those facts were delegable to the Staff. *See id.* at 213-14, ¶¶ D-431 to D-433. We had, after all, learned about the nondelegable reinspection programs for Hunter and Hatfield almost accidentally. *Id.* at 208, ¶¶ D-411 to D-413.

239. At the time of the Initial Decision we did not know how limited the scope of the reinspection of SCC's work was. We were given to understand then that:

> In February 1980, Applicant assigned personnel of the Pittsburgh Testing Laboratory . . . to the SCC plant . . . . All items were required to pass inspection by PTL before being shipped either to Byron or Braidwood. Tr. 2579 (Shewski). Panels already shipped and received at Byron were reinspected and repaired. Tr. 2509, 2579 (Shewski); Tr. 3898-99 (Hayes, Williams).

Id. at 133, ¶ D-104. We stretched this description too far and concluded that there would be reinspection "of all of Systems Control's work, which by its nature is accessible for reinspection." *Id.* at 216, ¶ D-442. The Appeal Board later pointed out that our conclusion was "possibly erroneous." *See* ALAB-770, 19 NRC at 1179. The Appeal Board had been alerted to the possibility of our having erred by reports first from the Applicant and then from the Staff that welding deficiencies had been found on some SCC-supplied cable pan hangers already at the Byron site. The Appeal Board reasoned that PTL might have either not performed a 100% reinspection of SCC work or not performed it carefully. *Id.* at 1179-80. Thus, the issue of the quality of SCC's work was no longer simply delegable to the Staff, and it became ours again on remand. *Id.* at 1180.

240. Eventually it came out that even the description we had stretched was inaccurate. The Applicant had committed to the described reinspection in a January 26, 1981 letter to the Staff, but the Staff later learned — we are not told exactly when, though we would assume it was after the record was remanded to us — that for the first 11 months of the program, from February 1980 up to the time of the letter, some shipments from SCC were not source-inspected by PTL at all, and some others were inspected only by sampling. Hayes and Connaughton, ff. Tr.

10,478, at 6; Marcus, ff. Tr. 10,319, at 6-7 and Attachment A. Mr. George F. Marcus, the Applicant's Director of Quality Assurance for Engineering and Construction, was helpful in trying to explain how administrative confusion could have been the cause of the January 26, 1981 letter's being inaccurate (Marcus, ff. Tr. 10,319, at 8-10), but he volunteered an admission that the cause was not completely clear. *Id.* at 11.

241. Moreover, after the January 26, 1981 letter, although PTL source-inspected each SCC shipment, the inspection did not necessarily go beyond sampling. Hayes and Connaughton, ff. Tr. 10,475, at 6. Mr. Marcus testified that although the January 26, 1981 letter spoke variously of inspection of "all equipment shipped" and of inspection of "all shipments," the latter phrase more accurately conveyed the Applicant's intent, and that it was common practice in the industry to rely on sampling when inspecting a shipment containing a large number of items. Marcus, ff. Tr. 10,478, at 4-5.

242. On the basis of nonconformance reports issued by the Applicant in late 1983 and early 1984 on welding discrepancies in SCC-supplied equipment, the Staff eventually concluded that the limited scope of PTL's source inspection program for SCC-supplied equipment was not adequate, and that the Applicant would have to demonstrate that all SCC equipment as built was able to withstand as-built loads in conformance with applicable codes. Hayes and Connaughton, ff. Tr. 10,478, at 8. We are not told exactly when the Staff came to this conclusion, but we would assume that it was after the Appeal Board remanded the matter to us.

243. The case presented to us in the remanded hearing was therefore rather large. It consisted of the demonstration the Applicant had made to the Staff of the adequacy of all of SCC's work, the Staff's evaluation of that demonstration, and the results of a third-party review of the demonstration performed at the Applicant's request by Torrey Pines Technology.

244. Testifying for the Applicant were Mr. Bradley F. Maurer, Mr. Kenneth T. Kostal, and Dr. Anand K. Singh. Mr. Maurer is a Senior Engineer with the Equipment Qualification Analysis Department of the Water Reactor Division of Westinghouse Electric Corporation. The Applicant retained Westinghouse in 1982 to evaluate the structural adequacy of the main control panels supplied by SCC. Westinghouse had done similar evaluations on some main control panels it had supplied Byron. Maurer, ff. Tr. 10,158, at 5-6. Mr. Kostal is a Partner and Assistant Manager of the Structural Department of Sargent & Lundy, which evaluated the adequacy of SCC DC fuse panels, cable trays, cable tray hangers, and local instrument panels. Dr. Singh, a structural engineer

and Assistant Head for Sargent & Lundy's Structural Analytical Division, did a statistical analysis of Sargent & Lundy's evaluations of components inspected by sampling. We allude to other testimony by Dr. Singh in § X, above.

245. Testifying for NRC Staff were Messrs. K.A. Connaughton, D.W. Hayes, and James Muffett, all of whom have been identified earlier in connection with their testimony on the reinspection program. Testifying for Torrey Pines Technology (TPT) was Mr. Louis D. Johnson, a mechanical engineer and Manager of Projects for TPT. TPT reviewers were either qualified inspectors or engineers experienced in the field of structural analysis, QA, statistics, mechanical systems, and project management. TPT reviewed all of SCC's work; for each kind of SCC equipment, TPT collected and evaluated pertinent records, did an engineering evaluation of the technical bases used to substantiate the acceptability of SCC work, reinspected samples of SCC work, and documented discrepancies found during such reinspection. Johnson, ff. Tr. 10,294, at 9-12. The Intervenors relied mainly on cross-examination, but their witness, Mr. Stokes, identified in § X of this Decision in connection with his testimony on Sargent & Lundy's evaluations, raised some concerns about SCC, matters which the Intervenors agree were adequately dealt with by the Applicant, in part by explanation, and in part by a modest amount of reinspection and three new welds. *See* Applicant's Proposed Findings at 120-22, ¶¶ 221-225, adopted by the Intervenors.

246. Despite the disconcertingly large number of discrepancies in SCC's work, the parties agree that the Applicant has demonstrated that, except for one discrete area still under review and delegable to the Staff for resolution, the SCC work at Byron is adequate to accept design loads without exceeding code-allowable stresses. Except for a very few typographical errors and incorrect references, those of the Applicant's findings which outline its demonstration of the adequacy of SCC's work, ¶¶ 216-262, have been adopted by both the Staff and the Intervenors. Since we have only a few additions to make to those findings, we now by reference incorporate them as corrected by the Staff in its September 24, 1984 Proposed Supplemental Initial Decision. We make our additions in our discussion of the one discrete area which is still under review by the Staff, and which we are delegating to the Staff for resolution.

247. That one discrete area involves cable tray hangers. These support the trays which support and protect electrical cables. As we noted earlier in this section, it was the discovery of welding discrepancies in these hangers that led the Appeal Board to remand to us the issue of the quality of SCC work. As we show below, the Applicant has been particularly thorough in reviewing these hangers. We have no difficulty in

delegating to the Staff the oversight of the last remaining stages of that review. The Intervenors have raised no objection to this delegation.

248. Of the several engineering evaluations which have been performed on the cable tray hanger system, the most significant was conducted in early 1984, after the Applicant's nonconformance reports which led to the remand of SCC issues. *See* Kostal, ff. Tr. 10,159, at 12; *see also* Applicant's March 14, 1984 letter to the Appeal Board, cited in ALAB-770, *supra,* 19 NRC at 1179. During this most significant of the evaluations, Sargent & Lundy reinspected 358 SCC shop-welded connections of 80 cable tray hangers randomly chosen from the 5717 cable tray hangers at Byron. Kostal, ff. Tr. 10,159, at 12-13. Of the 358 connections, 106 were found to have some kind of discrepancy, and 2 of the 106 were missing portions of welds. *Id.* In evaluating each discrepant weld, Sargent & Lundy calculated the capacity of only the nondiscrepant portion of the weld. *Id.* at 13. The calculations showed that none of the discrepancies had design significance. *Id.*

249. It is certainly arguable that at this point the evaluation of the discrepancies had gone far enough. Indeed, Dr. Singh, using generally accepted statistical methods, determined that there was a 95% chance that more than 99% of the connections on the cable tray hangers met design requirements. Singh, ff. Tr. 10,160, at 4-5. Moreover, TPT's third-party review of the hangers, which included new inspections and calculations by TPT, confirmed Sargent & Lundy's results. Johnson, ff. Tr. 10,294, at 31-35. (The Applicant's proposed findings mention neither Dr. Singh's nor TPT's analyses, perhaps for reasons which will become clear below.)

250. Nevertheless, the Applicant mounted three further stages of evaluation. It is the review of the last of these which we are delegating to the Staff.

251. The first of the three further stages looked more closely at the worst of what was found during Sargent & Lundy's inspection of the eighty hangers. Three of the eighty contained the three welds which, among those inspected, had the greatest reductions in load capacity. Computer models of the as-built condition of these three hangers showed that all three hangers could bear at least three times design load without exceeding code-allowable stresses. Kostal, ff. Tr. 1059, at 14-15; Kostal, Tr. 10,241.

252. The other two further stages involved expanded inspections so extensive that Dr. Singh's and TPT's review, which dealt with the inferences that could be drawn from the inspection of only a small population of welds, become unnecessary to confirm Sargent & Lundy's initial finding that none of the discrepancies on the eighty randomly chosen hangers had design significance.

253. Among the 358 connections which Sargent & Lundy inspected, the greatest reduction in load capacity was found to be 53%, this on one of the connections which was missing a portion of weld. Kostal, Tr. 10,261-62. To assure that there were no missing portions which compromised the adequacy of welds on any of the 5637 hangers not among the 80 Sargent & Lundy had inspected, the Applicant established a program of inspection of about 3000 SCC hanger connections which cannot accommodate a 53% reduction in load capacity. Kostal, ff. Tr. 10,159, at 23; Kostal, Tr. 10,243-48, 10,255-56, Muffett, Tr. 10,506. The program also called for any necessary repair. Kostal, ff. Tr. 10,159, at 23.

254. The discovery that one among these 3000 connections had suffered a capacity reduction of more than 53% triggered the last and most extensive, but also delegable, stage of evaluation. This last stage calls for inspection of *all* accessible SCC connections on cable tray hangers, and inspection of even the nominally inaccessible SCC connections of types DV-8 and DV-8(a), since it was among connections of these types that the missing portions and the most discrepancies were found in Sargent & Lundy's original inspection. Muffett, ff. Tr. 10,478, at 17-18; Muffett, Tr. 10,484, 10,488-89. There are about 10,000 DV-8 and DV-8(a) connections, some of which are inaccessible, and there are about 20,000 connections of all other types, 80 to 90% of which are accessible. Muffett, Tr. 10,488. At the time of the August 1984 hearings, the Applicant was proposing that if during this expanded inspection, any connection were found to have a capacity reduction of more than 53%, all inaccessible connections would be inspected, unless the circumstances of the connections with capacity reduction of more than 53% suggested otherwise. Muffett, Tr. 10,483-84, 10,512-13. Since those hearings, the Applicant has reported to the Staff all accessible SCC connections and all nominally inaccessible SCC connections of types DV-8 and DV-8(a) have been inspected and that one DV-1 connection, two DV-3, one DV-7, and four DV-162 connections have been found to have capacity reductions of more than 53%. *See* Applicant's September 26, 1984 Letter to Region III. The Applicant now proposes reinspecting all the presently inaccessible connections of the last four types just named. *Id.*

255. The procedure for the conduct of this third stage of further evaluation has been reviewed and accepted by the Region III Staff. Muffett, ff. Tr. 10,478, at 17-18; Muffett, Tr. 10,480-81, 10,500; NRC Staff Exh. R-1, "Instruction for Walkdown of Cable Tray Hanger Connection Welds, Byron Station." Thus, we are in a position in relation to SCC

work much like the position we thought we were in last January. There is afoot a 100% reinspection of all accessible work, under procedures accepted by the Staff. The differences between our position now and what we thought our position was then strongly suggest that delegation to the Staff is even more justified now than we thought it was then. The new inspection program includes some inaccessible work, and may eventually include all. Moreover, the questions which we thought remained in January concerned all SCC equipment, but the question which remains now concerns only cable-tray hangers.

256. We therefore conclude that, except for the work still under review in the Applicant's expanded inspection of cable tray hangers, the quality of the SCC work is acceptable. We delegate to the Staff the determination of whether the hangers are adequate. Once again we have a vivid proof of the prudence of conservative design.

XII. CABLE OVERTENSIONING

257. In the installation of safety-related electrical conductors in conduit, the cables are subjected to tensile forces while being pulled. Additionally when the cable bundle snugly fits within the conduit, as it might at bends of short radius, side wall forces develop between the conduit and the cable. In both these situations, the insulation and the conductors are subjected to unusual, undesirable and potentially damaging forces. Such occurrences concerning Hatfield's work were found during inspections and were addressed in the Initial Decision. 19 NRC at 184.

258. This subject of overstressing was brought again to the Board's attention by the Staff in early 1984 by NRC Inspection Reports 50-454/84-02 and 50-454/84-09. Binder, ff. Tr. 9406, Attachment F at F-14, Attachment G at G-3. The former of these citations documents historically the evolution of the requirements for determining and documenting the tensions in pulled cables; it states that the item remains open. Binder, ff. Tr. 9406, Attachment F at F-14 through F-17 (pp. 12-15 of the Report, ¶ v). Further, the topic was suggested by the Intervenors as an item for the remand hearing.

259. The Board ordered a full evidentiary presentation of the alleged overstressing at the remand hearing. Board Memorandum and Order, June 8, 1984, at 9. The issue was addressed by Applicant's witnesses James G. Binder, a Project Electrical Supervisor of Commonwealth Edison, and Bobby G. Treece, a Senior Electrical Project Engineer at Sargent & Lundy, and by Staff witness Ray Love. The Intervenors presented no testimony.

260. In the context and terminology of the reinspection program, this attribute of the electrical installation was considered to be not recreatable, that is, the subject items are in place and the measurements cannot be repeated. Applicant Exh. 3-4, Exh. II-1 at 2. In any reevaluation, therefore, recourse must be made to documentation or to other indirect observations. Cable pulling was, strictly speaking, not a part of the formal reinspection program. Love, Tr. 9718.

261. Throughout the construction period the procedures for cable pulling by Hatfield have been changed. Now for example, a quantitative determination of the pulling force and the stress contribution of compression at bends is required for both hand and machine cable-pulling operations. Prior to December 1982 inspectors were not required to monitor and record tensile stresses. Binder, ff. Tr. 9406, Attachment F at F-14 through F-16.

262. As a consequence, the detail of the history of a particular cable depends upon when its installation occurred.

263. A conservative average "general" permissible force applicable to an individual cable for the purpose of its installation in a conduit is specified by the manufacturer. When that cable is one of several located in a single conduit, the distribution of the total pull among the components of the bundle cannot be precisely established, so the total pulling force is less than the sum of the individual ones by some factor determined by the installing contractor based on the characteristics of the bundle. The manufacturer, however, can violate his "general" criterion, on a case-by-case basis, to establish greater permissibility. Treece, ff. Tr. 9408, at 6, 7; Treece, Tr. 9422-27.

264. Evidence on the acceptability of cables for their intended use was prepared by several methods depending upon the input data available. In some instances of safety-related cables installed before December 1982, cable-pull reports were sufficiently complete to allow an analysis based on general specifications supplied by manufacturers. In instances where local analyses indicated an overstress, review of the installations by the cable manufacturers found them within the tolerances placed on the general limiting tensile force. The result could be a certification of acceptability by the cable manufacturer.

265. Still another investigative method entailed calculations of the maximum pull expected to have been required based on the length of the conduit between pull boxes, the number, location and dimensions of bends, the configuration and dimensions of the bundle, the dimensions of the conduit and the value of the coefficient of friction. If a calculation entailing worst possible conditions showed a too-large pull, more realistic input characteristics were applied. Finally, the properties of installed

cable could be measured *in situ*. This last method includes the electrical resistance of insulation to ground determined by an instrument known in the trade as a "megger" and, as a second test, the observation of the ability of insulation to withstand a relatively high direct current potential without sparking to ground. Treece, ff. Tr. 9408, at 5-9; Binder, Tr. 9428-29.

266. The result of the initial review, based on manufacturers' criteria, of reports on pulls of nearly 200 safety-related cables installed before implementation of the revised Hatfield inspection procedures in December 1982 was the identification of an excessive pulling force in 25 installations resulting in potential overstress by either tensile forces, radial forces, or both. Review on an individual basis of the details of these twenty-five instances by the cable manufacturers showed each of them to be acceptable for the designed purpose. Treece, ff. Tr. 9408, at 7, and Attachment A.

267. In a more inclusive study, all of the approximately 2600 identifiable conduits into which safety-related cable had been pulled prior to 1983, including those documented, were investigated by one or more of the analytical methods. All but three cable/conduit runs were deemed acceptable. These three, conduits COA-6158, COA-6193, and COA-6192, having no cable-pull reports, were referred to the manufacturer who, on the basis of a reanalysis, judged installation to be acceptable provided, in the case of COA-6193 and COA-6192, pull through the conduit was in a direction specified as towards junction box 1JB261A. If the pull were made in the opposite direction, the manufacturer recommended replacement. The oral and written testimony is silent on the direction of installation except for statements in the information supplied to the manufacturer (Treece, ff. Tr. 9408, Attachment C at C-4) where the direction of pull is noted as "Starts At 1JB261A" and as "Cable Pulled From 1JB261A to 1JB262A . . . [and] . . . From 1JB261A to Gear . . . ." (Here the testimony is illegible.) The forces calculated for the 1JB261A to 1JB262A section, if the overall pull beginning at 1JB261A were truly in two parts, are given by the manufacturer's analysis as 2803 lb and 740 lb/ft, both apparently acceptable. The second part of the pull, 1JB262A to the use point, if analyzed, is not reported. It is not clear why the manufacturers calculated the forces for a single pull, from 1JB261A to use point, and arrived at unacceptable values. Treece, ff. Tr. 9408, Attachment B at B-6 through B-8. The Staff is requested by the Board to examine this paradox.

268. Although certain NRC Inspection Reports now a part of this record cite many instances of overstressed cables (*see*, particularly, Binder, ff. Tr. 9406, Attachment G at G-6 through G-12), we are in-

formed that all cables earlier shown by one or more of the several analyses and tests not to be acceptable have been replaced. Binder, ff. Tr. 9406, at 11, 12.

269. In one instance one cable of a bundle of thirteen was necessarily removed requiring a force greater than the permissible tensile stress of others in the bundle. Since the distribution of this force among the remaining twelve cables could not be ascertained, all thirteen were replaced at the behest of an NRC Inspector. *Id.* at 12-14.

270. The question of cable tension was addressed briefly by the Staff through the testimony of Ray Love, a Region III Reactor Inspector. Ff. Tr. 9510, at 25-27. In NRC Inspection Report 50-454/84-27 and 50-454/84-19 (Binder, ff. Tr. 9406, Attachment E at E-10 to E-11; Treece, ff. Tr. 9408, Attachment D) appears a review of Applicant's actions on the overtension in cables encased in conduit which have been detailed in the preceding paragraphs. The Staff concurs in the method and results of the various tests and analyses and concludes that safety-related cables will serve their intended purpose. This hitherto unresolved item, opened in a 1981 NRC Inspection Report 50-454/81-16, is now closed.

271. With the exception of the above assignment to the Staff to inquire into an apparent inconsistency in the testimony, the Board concludes the inquiry in a manner favorable to the Applicant.

XIII. TABLING ALLEGATION

272. In the earlier hearing, an Intervenor witness, Michael Smith, a one-time inspector at Byron for the Hunter Corporation, alleged observing, in a pre-1980 interval, the absence of a number of pipe supports although documentation attesting to their proper installation existed. Upon reporting these conditions to his supervisor, he was instructed not to document the missing items, for their absence would be detected later. This delayed action was called "tabling." Ff. Tr. 3243, at 23. In the previous Initial Decision, this Board found that Hunter had been delinquent in identifying and documenting such discrepancies. 19 NRC at 141-43, ¶¶ D-137 to D-145. Accordingly those allegations became candidates for consideration in the remand hearing.

273. In this remand hearing the issue was addressed by Applicant's witness Malcolm Somsag and Staff's witnesses Kevin Connaughton and Kavin Ward.

274. Mr. Somsag, Quality Assurance Supervisor for Hunter, explained that the genesis of the tabling allegations was probably an assignment to Mr. Smith whereby he was to collect data on hangers as a consequence of reports that a number of such hangers had been installed with-

out complete inspection and concomitant documentation and instances of documentation of nonexistent hardware. In Mr. Smith's collection appeared both safety-related and nonsafety-related items. Since the collection was to have been limited to safety-related equipment, other items were deleted by Mr. Somsag, who opined that those nonsafety-related hangers, so removed from his list, are the "tabled" items put forward by Mr. Smith. Somsag, ff. Tr. 9452, at 6 and 7.

275. The absence of even nonsafety-related items as well as those classed as safety-related would have been detected through the final walkdown and during the three or four types of inspection effected for safety-related supports in the completion-of-work process. *Id.* at 2-3, 7-8; Somsag, Tr. 9453-54, 9476-78. The employment of Mr. Smith by Hunter terminated in early 1980; subsequently Hunter conducted a 100% inspection of pipe supports installed prior to March 1, 1980, which would, in principle, have detected discrepancies occurring during Mr. Smith's tenure. *Id.*

276. The Staff addressed the tabling allegation in its direct testimony. The Staff has no evidence that the tabling practice was in any way followed during the reinspection, an observation consistent with the tenure of Mr. Smith's employment. As to practices and occurrences during the Smith era (pre-early 1980), Hunter did document and control identified discrepancies by procedures not in agreement with its QA program, actions subsequently remedied. The Staff concludes that "tabling," as alleged to have occurred, has been adequately addressed and that the quality of Hunter's work has not been compromised. Connaughton and Ward, ff. Tr. 9510, at 19-21.

277. Mr. Somsag's concept of how Mr. Smith's allegation arose is believed by the Board not to be unreasonable. Further, any gross omission of structural items has a high probability of discovery during the Type 3 (or Type 4) inspection made by the contractor immediately preceding transfer of that phase of construction to the control of the Applicant. Additionally there are the usual, though not necessarily as thorough, inspections by the Staff. Accordingly the Board concludes that the tabling practice alluded to by Mr. Smith could have been, and likely was, negated by the Hunter QA program described by Mr. Somsag.

XIV. APPLICANT'S QA PROGRAM – PARTICULARLY SINCE AUGUST 1983

278. The attitude, capability and interest in the quality of the construction of the Byron Station of the highest management of the Applicant was not an issue in this remanded proceeding. In fact the Applicant

prevailed on that matter in the Initial Decision. 19 NRC at 218, ¶ D-449. Nonetheless the Applicant presented as a witness Wallace Behnke, Vice Chairman of the utility, who held upper management responsibility for quality during the reinspection program. He addressed items ruled on favorably earlier and reiterated the corporate policy of delegating initial responsibility for quality control and quality assurance to the contractors actually performing the work, a practice based on CECo's belief that the organization doing the work will produce a higher quality product if it inspects and audits itself. This is also consistent with CECo's policy to insist on obtaining documented quality performance from each of the contractors and vendors with whom it does business. He cited PTL as an "arm of our quality assurance department" which shares with CECo the responsibility of complementing the contractors' audit functions. Behnke, ff. Tr. 9336, at 5, 6. The function of PTL in the reinspection and other activities has been discussed earlier in this decision.

279. Mr. Behnke has experience with CECo quality assurance dating back to 1965. In 1973, he established a separate quality assurance department which reported directly to him as Executive Vice President. Behnke, ff. Tr. 9336, at 4. In 1982 Unit Concept Inspections by PTL at Byron were inaugurated. For a Unit Concept Inspection a section of a generating station is selected for an overall comprehensive inspection within many disciplines. In the Byron instance the inspections were done by a selected team of PTL, an organization which did no construction and, hence, no initial evaluation of the quality of the work. A special and more comprehensive CECo management audit was conducted at Byron in 1983. Although the testimony does not define a "management audit," in our Initial Decision we noted it to be a formal investigation by a team of experts reporting to the upper echelon of CECo, i.e., not those employed on site whose duties are day-to-day examinations of construction. Behnke, ff. Tr. 9336, at 6, 7; I.D., 19 NRC at 128, 129.

280. In late 1982 a group of twenty senior management personnel with multi-discipline backgrounds evaluated Byron against the performance-objectives criteria put forth by the Institute of Nuclear Power Operations. Byron "measured up well" against those criteria. Behnke, ff. Tr. 9336, at 9.

281. Mr. Behnke testified that on three occasions Hatfield's activities resulted in senior management attention. In 1980, an NRC inspection of Hatfield's activities at Byron led to multiple items of noncompliance and issuance of a stop-work order by the CECo quality assurance organization. In 1982, extensive reinspection of cable pan hangers installed by

Hatfield was performed at CECo's request because of incomplete documentation of inspections by Hatfield and led to a meeting of the presidents of the two companies where CECo's concerns about the quality of Hatfield work were forcefully expressed. Hunter's activities have not necessitated similar intervention. Behnke, ff. Tr. 9336, at 10.

282. The tables which comprise Attachment A to Mr. Behnke's testimony show the extent of CECo's quality assurance program for Hatfield and Hunter. When asked to compare the inspection effort performed by CECo's own QA department with that of PTL, Mr. Behnke testified that the bulk or mainline of the effort was by CECo's own QA department. Behnke, Tr. 9346-48.

283. A comparison of the column totals of the tables might lead to a hasty comparison of the relative contributions of the three organizations (Hatfield, CECo and PTL, for instance) to the overall inspection effort with the inference that PTL carried the brunt in the Hatfield case. *See* Intervenors' Proposed Findings 166c, 190. It is to be noted, however, that the successive groups of columns report different things — for example, *audits* by Hatfield and CECo and *inspections* by PTL. If PTL did make a significant contribution, it is as it should be. That is what PTL was hired to do.

284. Mr. Behnke concluded that the Applicant's QA program adequately controls the activities of Hatfield and Hunter and provides assurance that the work of these two contractors is adequate. Behnke, ff. Tr. 9336, at 12-14.

285. Mr. Del George also testified that his confidence in the Hatfield and Hunter work quality at Byron was based in part on the many independent layers of inspection and review of their work. Del George, ff. Tr. 8406, at 51. Similarly, Mr. Laney based his engineering judgment on the adequacy of Hatfield and Hunter work in part on the coverage and effectiveness of CECo's quality assurance program. Laney, ff. Tr. 9339, at 26-27.

286. Following completion of the reinspection program, two sets of Staff Inspection Reports were issued which relate to Hatfield QC activities. Report 84-27 identified two items of noncompliance. The first involved failure to incorporate a drawing on a cable pan cover installation into an inspection procedure. However, the affected contractor personnel had been trained on the requirements of the drawing and are believed to have properly implemented them. Del George, ff. Tr. 8406, at 43-45.

287. The second item of noncompliance identified a number of discrepant cable pan hangers caused by deficient inspections. The majority of the observed discrepancies was in welds with fit-up gaps, items only

recently designated as candidates for inspection and not compromise the integrity of previously performed inspections. The valid discrepancies were shown not to be significant. *Id.*

288. Report 84-09 identified one apparent item of noncompliance involving a single Hatfield discrepancy report (DR-3382) which dealt with the removal of a cable from a conduit. The discrepancy report inaccurately described the pulling force applied in the removal of that cable, resulting in a deficient engineering evaluation. This event was determined to be an isolated occurrence. *Id.* It is described in § XII.

289. Taken together, these three items of noncompliance do identify an apparent weakness in translating design requirements into inspection procedures. However, these procedural discrepancies have not demanded major rework on the affected safety-related components and do not contribute to our evaluation of the QA program. Del George, ff. Tr. 8406, at 47.

290. In the course of the remand hearing, at the Board's request, Applicant witness W.J. Shewski, the corporate manager of quality assurance, testified on the oversight by his department of Hatfield, Hunter, and PTL between August 1983 and July 1984.

291. Mr. Shewski reported that Hatfield had been subjected to 14 audits and at least 222 surveillances, covering a broad spectrum of its work, which identified 17 deficiencies (7 findings and 10 observations).[12] The findings included the absence of followup on audits and on objective errors, inadequate identifications on weld-traveler cards, a lack of inspection of combination hangers, improper disposition of discrepancy reports and the failure of some QC inspectors to perform required read/study activities. Shewski, ff. Tr. 8423, at 32, 33.

292. Hatfield's corrective actions have consisted of additional inspections, audits and training, together with reviews of personnel documentation and of discrepancy reports to ensure proper disposition of the discrepancies. All seven findings have been acceptably corrected or action on them is under way. The Hatfield quality assurance performance during this period has been acceptable. *id.*

293. Applicant's quality assurance organization has conducted 14 audits and at least 142 surveillances of Hunter between August 1983 and July 1984 covering the key aspects of Hunter's work and quality requirements, resulting in the identification of 16 deficiencies (6 findings and 10 observations). None was found to be significant and each required only minor corrective action. All of these deficiencies were

[12] Absent more formal definition, the Board likens "findings" and "observations," at least in relative degree of severity, to Staff's "noncompliance" and "open items," respectively.

closed out during subsequent surveillances. Shewski, ff. Tr. 8423, at 30, 31.

294. Eight audits and at least fifty-one surveillances of PTL have been performed since August 1983 covering such items as instrument calibration, personnel qualifications, visual and other nondestructive inspections, and document and material controls. The audits identified ten deficiencies (four findings and six observations) including improper acceptance of seven welds, improper certification of a receiving inspector, and obliteration and incomplete recording of data. The cause of these deficiencies was correctable through retraining. Adequate corrective measures were easily achieved. Shewski, ff. Tr. 8423, at 31-32.

295. We reaffirm our early 1984 ruling that the Applicant is institutionally capable and willing to maintain and effect an adequate and acceptable quality assurance program at Byron. We continue to believe that during and prior to the initial sessions of this proceeding that strong managerial attitude had not permeated the day-to-day, onsite activities of the Applicant and its contractors. 19 NRC at 218. The reinspection program and time appear to have brought cohesion into the gross structure of the quality program.

XV. APPLICANT'S QA MEASURES TO PREVENT INACCURATE OR UNRELIABLE CONTRACTOR DOCUMENTATION PRACTICES

296. A concern of this Board at the close of the earlier proceeding challenged the reliability of Hatfield's documentation of its inspection procedures and results and the exercise of Applicant's oversight of it. In an endeavor to alleviate that concern Applicant reviewed its current efforts to assure itself that quality documentation is accurate and reliable. Mr. Shewski reported that Hatfield's documentation procedures have gone through several changes since Hatfield began work at Byron in 1976. Originally, about 5% of the welds were spot checked and the results were indicated directly on the drawings. Thereafter, Hatfield changed from inspections based on drawings to the use of weld-traveler cards which now constitute the primary record of weld quality and record the inspection results by quality control inspectors (*see* Applicant's Exh. R-1). In 1981, Hatfield changed from spot checks to 100% inspection of all welds. Mr. Shewski testified that, based on his experience, neither Hatfield's documentation practices nor its procedures over time differ markedly from those of electrical contractors at other nuclear sites. Shewski, Tr. 8763. This evolution in inspection practices and documentation is at least partially responsible for the apparent difficulty

which Hatfield has experienced from time to time in maintaining proper documentation. Hunter performs much of its construction work under the ASME Code which required a weld traveler system and documented inspections and, therefore, has not experienced documentation problems comparable to Hatfield's. Shewski, Tr. 8761.

297. Since mid-1982, special attention has been given by Applicant's site quality assurance organization to actions by site contractors which might lead to inaccurate or unreliable documentation. Training for detecting possible alterations to documents was provided for site QA personnel. Shewski, ff. Tr. 8423 at 25.

298. An audit by the Applicant of over 10,500 records was conducted in late 1982 to verify the authenticity of contractor QC documentation. CECo's audit of Hatfield's implementation of the reinspection program specifically included a review of the accuracy and reliability of Hatfield's records. Another related audit was performed for the reinspection program in early 1984 by Applicant's corporate quality assurance department which covered the records of Hunter and PTL as well as those of Hatfield. Included in these investigations were the contractors' methods of control and administration of QC qualification tests of inspectors and of measuring-instrument calibrations to ensure a complete and properly authorized record. Contractor-welder and QC-inspector qualifications were examined to establish acceptability and authenticity. Neither fradulent activities nor evidence of inaccurate or unreliable certifications of contractor inspection and reinspection personnel were observed. Shewski, ff. Tr. 8423, at 26; Hansel, Tr. 9013.

299. On the basis of the evidence presented, the Board concludes that the exercises stimulated by the reinspection program in general have sharpened the awareness, by those directly responsible for the quality of the Byron Station, of both careful observations, *per se*, and of complete and intelligible records of those observations. In effect we sense improvements in these inspection practices since our opinions in the first Initial Decision were noted. 19 NRC at 214-15, ¶ D-438. We encourage the Applicant to maintain close surveillance, throughout the life of Byron, over the quality of those equipment alterations and procedural changes that will inevitably occur in the future. Concomitantly, we suggest continuing oversight by the Staff as those improvements are effected.

300. The Board did not explore again the specific instances which caused us to conclude in the Initial Decision that Hatfield seems to be incapable of maintaining reliable records of nonconforming and deviating conditions. We were mindful from the outset of the remanded proceeding that the Appeal Board determined that a finding, as a result of the

reinspection program, that the quality of work of Hatfield and Hunter is acceptable would indicate that any deficiencies in document control did not affect the final product. ALAB-770, *supra*, 19 NRC at 1178 n.65. Whatever deficiencies in Hatfield's and Hunter's document control practices might have been perceived by us and others outside their respective organizations, those deficiencies did not affect the ultimate quality of the work. The documentation must have been acceptably reliable for the contractors' own use. We cannot, however, conclude that we were initially mistaken in criticizing specific instances of ambiguous record keeping.

XVI. DISPOSITION OF ALLEGATIONS

301. In our Initial Decision, we expressed concern over several matters regarding Hatfield arising from worker allegations that were still pending with Region III and the Office of Investigations, and noted that the NRC Region III Staff intended to close out several allegations on the basis of the results of the reinspection program. I.D., 19 NRC at 206-07, 215, ¶¶ D-406, D-407, D-439. In our June 8, 1984 prehearing order, we clarified that our concern was limited to whether, in accordance with the NRC Staff's expectations, the BRP has been effective in resolving some of the worker allegations. We also asked whether the NRC Staff or Applicant had identified any allegations as having independent and important relevance to the reinspection program. Memorandum and Order (June 8, 1984), at 8-9.

302. NRC Staff witnesses testified that the BRP was relied upon to resolve two worker allegations regarding Hatfield welding, and supplemented the resolution of three others. The remainder of the twenty-three allegations assigned to Region III and as yet uninvestigated at the close of the August 1983 hearings have since been resolved independent of the BRP. Hayes, Connaughton, ff. Tr. 9964, at 3.

303. In response to our second request, the NRC Staff found, with one exception, no other allegations of independent and important relevance to the BRP. In the one exception, the NRC Staff found an allegation regarding the improper certification of one QC inspector to be substantiated. Appropriate corrective actions were taken with respect to this individual and found acceptable to the NRC Staff. Hayes, Connaughton, ff. Tr. 9964, at 5-6.

304. Because of the NRC Staff's testimony, our questions in this regard have been satisfied.

XVII. MODIFICATION OR WITHDRAWAL OF FINDINGS AND CONCLUSIONS IN INITIAL DECISION

305. In ALAB-770 the Appeal Board directed us to include in our Supplemental Initial Decision any modification or withdrawal of any ultimate findings and conclusions of our Initial Decision that might be required as a result of the additional evidence received in the remanded proceeding. 19 NRC at 1182.

306. In our January 13, 1984 Initial Decision we observed the changing nature of the quality assurance program at Byron. We noted that the reinspection program was still freshly in its implementation phase and that CECo was, during the hearing, just catching up on its quality assurance oversight responsibilities. For our part upon remand we saw no need to question in either direction the validity of the findings and conclusions of the January Initial Decision and we concentrated on later events. The parties also focused on the events occurring shortly before the close of the record in August 1983 and on the period following. As a consequence, this Supplemental Initial Decision, as its title implies, is the conclusion of the story rather than a substantial alteration of it.

307. Applicant has, however, requested a series of particular modifications which, for the most part, have been considered in the discussions of the respective issues. Applicant's Proposed Findings 318-333. For example, we have found that Michael Smith's tabling allegations against Hunter Corporation have a probably benign explanation as demonstrated by Mr. Somsag's testimony. We found that Hatfield's and Hunter's record-keeping abilities were necessarily sufficiently reliable for sound construction purposes, but for Hatfield, at least, we would not change our original finding that their records were ambiguous to persons outside their organization, namely us. There are, however, some very important ultimate conclusions which must be expressly superseded in this Supplemental Initial Decision in keeping with the ALAB-770 mandate.

308. Contrary to ¶ D-434 (19 NRC at 214), we have concluded now that, with respect to the record before us, the quality of Hatfield work at Byron is adequate as inferred from inspector competence and as directly inferred from evaluating the reinspection results. Also, contrary to that earlier finding, CECo has today met its oversight responsibilities respecting Hatfield.

309. Contrary to ¶¶ D-436 and D-437, the rationale of the reinspection program sampling has been thoroughly explained, and the reliable similarity between work reinspected with the work not reinspected has been demonstrated. 19 NRC at 214.

310. In connection with ¶ D-439, there has been a satisfactory explanation of the disposition of worker allegations pending at the close of the record. 19 NRC at 215.

311. Consistent with ¶ D-444 of the Initial Decision (19 NRC at 216), the reinspection program became an effective verification of Hunter's quality assurance program.

312. Finally, our finding in ¶ D-429 (19 NRC at 213) to the effect that Intervenors prevail on the quality assurance contention is superseded in the following section to the effect that Applicant has prevailed.

XVIII. CONCLUSIONS OF LAW

313. The Board concludes that the Applicant prevails on the quality assurance contention. Applicant has, in the language of the contention, demonstrated its "ability or willingness to comply with 10 C.F.R. Part 50, Appendix B, to maintain a quality assurance and quality control program, and to observe on a continuing and adequate basis the applicable quality control and quality assurance criteria and plans . . . ."

XIX. ORDER

The Appeal Board retained jurisdiction of the proceeding while we complete the hearing and issue the Supplemental Initial Decision. ALAB-770, *supra*, 19 NRC at 1168. Pointing to the local rules of the Court of Appeals for the District of Columbia, the Appeal Board noted that it retained jurisdiction for the purpose of facilitating the procedures on appeal. Since we were expressly instructed to modify or withdraw any ultimate finding in our Initial Decision of January 13, 1984, it is apparent that the Appeal Board returned full jurisdiction to this Board on the quality assurance issue in all substantive respects. Accordingly, it is our intention to resolve this matter as if it had been resolved in Applicant's favor in our Initial Decision.

IT IS THEREFORE THE ORDER OF THE BOARD, that the January 13, 1984 Order that the Director of Nuclear Reactor Regulation may not issue the operating license for Byron Nuclear Power Station, Units 1 and 2, is set aside. 19 NRC at 280. The Board's Order denying the Byron operating license is also set aside. *Id.*

The Director of Nuclear Reactor Regulation, upon making the findings on all applicable matters specified in 10 C.F.R. § 50.57(a), is authorized to issue full-power licenses for Byron Nuclear Power Station, Units 1 and 2, subject however to the provisions of 10 C.F.R. § 2.764(f). That

section, the so-called immediate effectiveness provision, limits the authorization to fuel loading and low-power (up to 5% of rated power) testing pending the Commission's review on its own motion of any decision authorizing an operating license.

XX. RESERVATION OF JURISDICTION, FINALITY AND EFFECTIVENESS

Intervenors' September 12, 1984 motion to reopen the record to include the Byron design as an issue in the proceeding is pending. By its Order of September 19, 1984 (unpublished), the Appeal Board authorized this Board to consider the motion in the first instance and we have done so. We intend to deny the motion. A memorandum and order to that effect will issue soon. We reserve jurisdiction for that purpose. The pendency of Intervenors' motion does not influence the effectiveness of this Supplemental Initial Decision.

Finality of this Supplemental Initial Decision will oe subject to Appeal Board rule. It shall not become effective until the Commission actions specified in 10 C.F.R. § 2.764(f)(2) have taken place. The parties may file brief comments with the Commission pointing out matters which, in their view, pertain to the immediate-effectiveness issue. To be considered, such comments must be received within 10 days of the Board's decision.

ATOMIC SAFETY AND
LICENSING BOARD

Dixon Callihan, Ph.D.
ADMINISTRATIVE JUDGE

Richard F. Cole, Ph.D.
ADMINISTRATIVE JUDGE

Ivan W. Smith, Chairman
ADMINISTRATIVE LAW JUDGE

Bethesda, Maryland
October 16, 1984

Cite as 20 NRC 1296 (1984) LBP-84-42

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

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

In the Matter of

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

KERR-MCGEE CHEMICAL CORPORATION
(West Chicago Rare Earths Facility)

October 19, 1984

In a proceeding commenced to consider Staff's proposal to license onsite storage of thorium mill tailings, the Licensing Board, in considering objections to contentions, rules that Staff must consider permanent disposal of the mill tailings now and that the Applicant may file contentions in the proceeding even though it did not request a hearing.

RULES OF PRACTICE: ADMISSIBILITY OF CONTENTIONS

An applicant for a license amendment may file contentions challenging Staff's proposed action in a proceeding commenced at the request of another party despite the fact that applicant did not request a hearing.

LICENSING BOARDS: DELEGATED AUTHORITY

Commission's delegation to Licensing Board of authority to act on petitions to intervene and conduct any necessary proceedings pursuant to

10 C.F.R. Part 2, Subpart G, includes authority to accept contentions filed by applicant even though applicant did not request a hearing.

NEPA: SEGMENTATION

Facts surrounding Staff's proposal to license onsite storage of mill tailings where applicant had applied for a license permitting onsite permanent disposal are strongly indicative of the conclusion that Staff's proposal amounts to segmentation prohibited by NEPA of an overall plan. Provisions of the CEQ's regulations (adopted by NRC) mandate that permanent disposal be considered now.

NEPA: SEGMENTATION

Where no concrete proposal exists to add material to the mill tailings which are the subject of the proceeding, there is no requirement that Staff consider the addition of such material in its environmental impact statement.

NEPA: CONSIDERATION OF ALTERNATIVES

Consideration of alternative sites under NEPA is meaningful only when all alternatives considered meet the requirements of the Commission's regulations promulgated under the Atomic Energy Act.

UMTRCA: COST OF LONG-TERM MAINTENANCE AND MONITORING OF TAILINGS DISPOSAL SITES

Nothing in § 203 of UMTRCA suggests that a licensee must post a bond to cover the cost of adverse health and socioeconomic effects resulting from disposal of mill tailings.

UMTRCA: EPA AND NRC REGULATIONS

EPA's regulations promulgated under UMTRCA provide a minimum level of protection which may not in all cases be deemed sufficient by NRC after the latter considers the level of risk posed by a specific tailings pile, economic costs, and other appropriate factors (§ 84(a), Atomic Energy Act).

UMTRCA: OWNERSHIP OF DISPOSAL SITES

Section 83(b)(1)(A)(ii) of the Atomic Energy Act provides that, if the State in which a permanent tailings disposal site is located elects not to become the owner of that site on license termination, the federal government must.

UMTRCA: COST OF LONG-TERM MAINTENANCE AND MONITORING OF TAILINGS DISPOSAL SITES

Criteria 9 and 10 of Appendix A to 10 C.F.R. Part 40 require that the financial cost of long-term maintenance and monitoring of disposal still be considered initially rather than deferred until shortly before license termination.

NEPA: COST-BENEFIT BALANCE

Part 51 of the Commission's regulations requires a cost-benefit balance which includes a consideration and balancing of qualitative as well as quantitative environmental impacts.

MEMORANDUM AND ORDER

(Ruling on Kerr-McGee's and Illinois' Contentions)

This proceeding concerns Kerr-McGee Chemical Corporation's (Kerr-McGee) application for a license amendment which would permit it to permanently dispose of certain mill tailings at its West Chicago Rare Earths Facility site. The mill tailings in question are the result of thorium milling which began when the Lindsay Light and Chemical Company established a mill at this site in 1931. In 1958, Lindsay transferred ownership of the mill to American Potash and Chemical which, in turn, transferred ownership to Kerr-McGee in 1967. Kerr-McGee closed the plant in 1973 and for some time has been in the process of demolishing the buildings and preparing the site for eventual return to unrestricted use. This work is being carried out pursuant to NRC authorization. (*See* FES at xi.)

Kerr-McGee wishes to dispose of the mill tailings on a so-called disposal site which is connected to the factory site by means of an intermediate site. (*See* FES at 1-1.) Kerr-McGee has requested a license amendment which would permit permanent disposal of these mill tailings on the disposal site in an engineered disposal cell.

Staff reviewed Kerr-McGee's request and prepared draft and final environmental impact statements (NUREG-0904, May 1982 and May 1983). Staff concluded that, while it would not approve Kerr-McGee's request for permanent disposal on the disposal site, it would approve storage for an indeterminant period on the disposal site in a cell very similar to that proposed by Kerr-McGee. Staff would thus defer a decision with regard to permanent disposal until after a period of monitoring for at least 5 years, and would hold open the possibility that the mill tailings might be moved to another site. At the time Staff reached this conclusion, the Environmental Protection Agency (EPA) had not yet adopted its regulations setting out standards for disposal of this type of waste.

On June 7, 1983, Staff published a notice in the *Federal Register* affording an opportunity for hearing on this matter. (*See* 48 Fed. Reg. 26,381.) That notice referred to the difference between Kerr-McGee's proposal and Staff's alternative of choice. The notice further provided that Kerr-McGee and any other person whose interest might be affected could request a hearing. Kerr-McGee did not request a hearing. However, the People of the State of Illinois and the West Chicago Chamber of Commerce did file such requests.[1]

Demolition of the factory site buildings had been authorized by the Commission following informal hearings. An issue arose whether resolution of the matters presented by the pending hearing requests should be similarly resolved or should be the subject of adjudication pursuant to 10 C.F.R. Part 2, Subpart G. In an unpublished Order of November 3, 1983, the Commission determined that the latter procedures should govern and authorized the appointment of this Board.

Following our appointment,[2] we issued a Memorandum and Order on November 17, 1983, which set a schedule for the filing or amending of contentions by the two petitioners and for responses by Kerr-McGee and Staff. Subsequently, we scheduled a prehearing conference for February 2, 1984. By letter of January 20, 1984, Kerr-McGee noted three contentions which it wishes to litigate. On January 31, Staff objected to the admission of these contentions. Kerr-McGee, Staff, and the

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[1] The People were admitted as a party after Kerr-McGee and Staff conceded their standing. *See* Prehearing Conference Memorandum and Order of February 24, 1984 (unpublished). The Attorney General of Illinois advised on February 29, 1984, that in addition to the People of the State, he also represents the Illinois Department of Nuclear Safety (IDNS). No party objected to the participation of IDNS, and it is also a party. The IDNS and the People are collectively referred to herein as the People. Pursuant to its request, the West Chicago Chamber of Commerce's petition to intervene was withdrawn in favor of a limited appearance statement. *See* Memorandum and Order of March 7, 1984 (unpublished).

[2] *See* 48 Fed. Reg. 52,370 (Nov. 17, 1983).

People have briefed the issue thus presented.[3] These parties have also briefed Contentions AG 1 and portions of AG 2 filed by the People.[4] Contention AG 1 attacks the adequacy of the FES, and the parties agreed that it presents legal issues which may be decided without an evidentiary hearing. The Board, in its February 24 Prehearing Conference Order, also directed the parties to address portions of AG 2 in their briefs. It is the purpose of this Memorandum and Order to rule on these matters.

Kerr-McGee's Proposed Contentions

The first of Kerr-McGee's three contentions takes issue with the Staff's position that permanent disposal of the mill tailings should not now be authorized. This contention raises the questions whether Kerr-McGee's proposed onsite Stabilization Plan meets the requirements of the Uranium Mill Tailings Radiation Control Act (UMTRCA)[5] and EPA's implementing regulations and whether, as a consequence, permanent disposal of the tailings on site should now be authorized. Thus it challenges Staff's rejection of Alternative I in favor of Alternative III as set forth in the FES. Kerr-McGee and the People are agreed that this question should be resolved now, although they are diametrically opposed on how it should be answered. While Staff opposes admission of this contention, it believes that compliance with UMTRCA and EPA's implementing regulations can be litigated under Alternative III of the FES. The positions of the parties are more fully discussed below. For purposes of this discussion, it is important to note that this contention and the People's Contention AG 1 raise the question whether the deci-

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[3] "Memorandum of Kerr-McGee Chemical Corporation in Support of the Admission of Its Contentions" of May 2, 1984; "People of the State of Illinois' Post-Prehearing Conference Brief" of May 2, 1984, at 2-7; "NRC Staff Memorandum in Opposition to Admission of Kerr-McGee Contentions" of June 6, 1984; "Reply of Kerr-McGee Chemical Corporation to the NRC Staff Memorandum in Opposition to the Kerr-McGee Contentions" of June 21, 1984; People's "Reply to Staff Memorandum Opposing Kerr-McGee Contentions" of June 22, 1984; "NRC Staff Answer to Board's Question" of September 6, 1984, and "Clarification of NRC Staff Answer to Board's Question" of September 20, 1984; "Response of Kerr-McGee Chemical Corporation to the Board's Question" of September 25, 1984; and "People's Response to NRC Staff Answer to Board Question" of September 24, 1984.

[4] "People of the State of Illinois' Post-Prehearing Conference Brief" of May 2, 1984; "Brief of Kerr-McGee Chemical Corporation Concerning Contentions of the Illinois Attorney General" of June 6, 1984; "NRC Staff Memorandum in Opposition to State of Illinois Contentions" of June 21, 1984; and "People of the State of Illinois' Reply Brief" of August 7, 1984. We note that in a few instances, citations to authority were not always complete, omitting later relevant decisions in the same case. In the future, we expect the parties to be thorough in their briefing and argument.

[5] UMTRCA made amendments to the Atomic Energy Act. When discussing specific provisions of UMTRCA, we cite the applicable Atomic Energy Act section.

sion with regard to permanent disposal should be made now rather than later as Staff would have it.

Kerr-McGee's Contentions KM 2 and KM 3 raise technical matters pertaining to the design of the disposal cell. Contention KM 2 challenges the Staff's determination that a uniform gravel layer, 1 foot in depth, should be installed beneath the cell, while KM 3 raises a question concerning Staff's determination with regard to the thickness of the top cover of the cell. In its discussion of KM 3, Kerr-McGee notes that Staff's apparent determination that a top cover thicker than that proposed may be no more than a typographical error in the FES.[6]

We heard argument from the parties with regard to Staff's position of the February 2, 1984, prehearing conference. Because we perceived that Staff's position might well have implications for licensees' and applicants' procedural rights to challenge Staff determinations in an adjudication, and because of the novelty in NRC practice of a licensee or applicant filing contentions,[7] we called for briefing of the issues by the parties.

THE POSITIONS OF THE PARTIES

In its January 31, 1984 response to Kerr-McGee's contentions as further elaborated in its June 6 Memorandum, Staff takes the position that:

> First, by failing to request a hearing in response to the June 1983 *Federal Register* notice, Kerr-McGee waived its right to raise contentions challenging Staff's conclusion stated in the FES. Staff concedes Kerr-McGee's status as a party and its right as such to respond to contentions advanced by others. However, Staff views Kerr-McGee's failure to request a hearing as limiting its participation as a party to this role.
>
> Second, because, in Staff's view, the contentions advanced by Kerr-McGee are outside the scope of the contentions advanced by the People or the Chamber, and because the Commission referred only the latter two petitions to the Board for action, Kerr-McGee's contentions raise matters which are outside the authority delegated to this Board.[8]

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[6] *See* January 20, 1984 Letter to the Board from Kerr-McGee's counsel at 7.

[7] We are aware of only one other proceeding in which a Staff-Applicant disagreement persisted to an evidentiary hearing. *See Tennessee Valley Authority* (Bellefonte Nuclear Plant, Units 1 and 2), LBP-74-66, 8 AEC 472, 475, 476 (1974).

[8] Staff relies on *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), LBP-81-60, 14 NRC 1724 (1981) and *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-316, 3 NRC 167 (1976) for the proposition that this Board may act pursuant to delegated authority only.

Staff also takes the position that, because others who might have petitioned to intervene were not on notice that Kerr-McGee would take issue with the Staff's conclusion, acceptance of the Kerr-McGee contentions would require that a new notice be published.[9]

Finally, Staff asserts that admission of Contention KM 1 would prejudice the People because they oppose onsite disposal of the mill tailings and Staff because it would, if successfully prosecuted by Kerr-McGee, prevent Staff from ordering removal of the tailings to another site if, after closure of the cell, it developed that its performance was substandard. Curiously, Staff goes on to argue that, even if Contention KM 1, is denied, Kerr-McGee can, within the scope of Alternative III, seek to demonstrate that its proposed disposal cell complies with UMTRCA and the implementing regulations. Staff states that any Board determination on this point would be *res judicata* as to it, Kerr-McGee, and the People. Thus Staff's view is that Kerr-McGee can litigate, under Alternative III and the contentions already admitted, all of the matters it seeks to litigate under Contention KM 1.

Kerr-McGee takes issue with the Staff's position that admission of its contentions would require that a new notice inviting petitions to intervene be issued. Kerr-McGee points out that its position has been a matter of public record identified not only in the FES but also in the notice inviting requests for hearing. Further, Kerr-McGee points out that, because it was invited to request a hearing by the same date as other interested persons, no one could have relied on Kerr-McGee's failure to request a hearing as a reason for inaction.

Kerr-McGee maintains that the public interest will be served by evaluating its disposal cell as a permanent repository now, and that, because it is impractical to change that cell once constructed, deferral of that evaluation is not feasible. Kerr-McGee believes Staff's statement that compliance of the cell with EPA's requirements may be litigated under Alternative III concedes this position. Kerr-McGee justifies delaying the filing of Contention KM 1 until January on the unavailability prior to October 7, 1983, of EPA's regulations, pointing out that the Staff's justification, stated at page 1-6 of the FES, for rejecting Alternative I was the lack of these regulations. It notes that Staff does not seriously contest the timeliness of its contentions.

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[9] *See* Staff's January 31 Response at 2 n.1.

Kerr-McGee characterizes Staff's position that, by failing to request a hearing, Kerr-McGee waived its right to have contentions adjudicated as attempting to apply standards applicable only to petitioners to intervene to Kerr-McGee, and points out that nothing in the regulatory scheme compels this result. Kerr-McGee suggests that in fact the regulations and the *Federal Register* notice imply the contrary.

Kerr-McGee asserts that Staff's position that this Board lacks jurisdiction to hear these contentions is not compelled by the Commission's delegation of authority (to "conduct any necessary proceedings"), and is in fact contrary to the authority contained in 10 C.F.R. § 2.714(a) to accept tardy contentions and in 10 C.F.R. § 51.52(b)[10] which permits *any* party to take a position on matters covered by NEPA. Kerr-McGee also argues that its contentions are within the scope of those sponsored by the People. Finally, Kerr-McGee takes issue with Staff's position that prejudice would result from the admission of Contention KM 1. In this connection, Kerr-McGee points out its undertaking, if Alternative I were approved, to monitor and maintain the site for a period of 25 years and to remedy any problems consistent with applicable performance criteria.

The People argue that the regulatory scheme here in question permits Kerr-McGee to litigate its contentions in this proceeding. The People

> question what possible public interest can be served by limiting this hearing as the Staff suggests. In terms of administrative and judicial economy, not to mention the welfare of West Chicago's citizens, resolution of the long-term problem posed by Kerr-McGee's application should be decided now.[11]

The People point out that, while they oppose Kerr-McGee as to what the ultimate outcome of that litigation should be, admission of the contention does not prejudice them. The People also express puzzlement as to how Staff might be prejudiced by the admission of this contention.

Because we were also puzzled by the Staff's position, at the August 22 Prehearing Conference we posed a question to Staff. We wished to know whether Staff perceived that, should Alternative I be approved, some regulatory constraint might exist which would prevent Staff from subsequently ordering relocation of the tailings if the cell did not meet applicable standards, an option which Staff clearly believes to be available under Alternative III. In its answer of September 6, Staff makes the following points:

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[10] This provision is now contained in 10 C.F.R. § 51.104.

[11] People's Post-Prehearing Conference Brief at 7.

First, if the Board approved Alternative I, Staff and the People would be bound by that decision.

Second, as a consequence, Staff would have to issue an enforcement order on which it would have the burden of proof in order to require that the tailings be moved. In Staff's view, if Alternative III were approved, Kerr-McGee would have the burden of showing that the cell had performed adequately and should be approved for permanent disposal.

Third, a reasonable period of monitoring is necessary to demonstrate the acceptability of this site for permanent disposal.

Fourth, that even though the compliance of the site with EPA's regulations governing permanent disposal of the tailings can be litigated under Alternative III, the acceptability of the site for this purpose would not be an issue under this Alternative.

Staff also took the position, relying on an exchange between counsel for Kerr-McGee and the People at the second prehearing conference, that Alternatives I and III are virtually identical and that therefore Contention KM 1 should be denied as redundant.

After receiving the Staff's answer, we called for responses from Kerr-McGee and the People.

In its Response of September 25, Kerr-McGee perceives that Staff may view Alternatives I and III as substantially different in that Alternative III might permit Staff to seek relocation of the tailings after their storage on the disposal site for reasons other than nonperformance of the disposal cell and site. Kerr-McGee thus renews its plea that Contention KM 1 be admitted. Kerr-McGee believes that under either Alternative I or III, the Staff would need to proceed by way of an enforcement order to require that applicable standards and license conditions be met. It does not address Staff's burden-of-proof argument.

The People take issue with the Staff's view that under Alternative I it would have to proceed by way of an enforcement order to require that the tailings be moved. The People point out that whether Alternative I or III is approved, that approval should be on the condition that Kerr-McGee must demonstrate prior to license termination that the cell and site are performing in accord with applicable standards. The People also take the position that *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-283, 2 NRC 11 (1975); *reconsideration denied,* ALAB-315, 3 NRC 101 (1976) would place the ultimate burden of proof in an enforcement proceeding on Kerr-McGee.

We find ourselves in substantial agreement with the People on this point. First, we envision that any storage or disposal plan approved in this proceeding would likely include a condition which would require

Kerr-McGee to demonstrate that applicable criteria were being met prior to license termination. Second, absent such a provision, we suspect that the rationale expressed in ALAB-283 and ALAB-315, *supra*, for placing the ultimate burden of proof on a licensee in a show cause proceeding may also be applicable in any enforcement proceeding brought prior to license termination to ensure compliance of a disposal cell and site with applicable criteria. A cursory review of Title II of UMTRCA certainly suggests this possibility.[12] Thus we do not perceive any regulatory constraint on Staff under Alternative I, and move to our consideration of whether Kerr-McGee may litigate contentions in this proceeding.

DISCUSSION

A. Kerr-McGee's Waiver and Its Consequences

At the outset, we must note our agreement with Staff that Kerr-McGee has waived its right to cause a hearing to be held in this proceeding. However, we must also note our disagreement with Staff on the consequences of that waiver.

There can be no doubt that a person may waive a right to a hearing,[13] and that an NRC licensee may waive its right to a hearing on Staff's action with respect to its request for a license amendment.[14] Kerr-McGee's failure to have requested a hearing within the time prescribed in the *Federal Register* notice must be viewed as constituting such a waiver. Absent good cause, Kerr-McGee now would be precluded from causing a hearing to be held with regard to its contentions.

However, we disagree with Staff that this conclusion also bars Kerr-McGee from advancing these contentions in a hearing held at the request of another party. We regard Staff's position as entirely too rigid. If followed, it would subject applicants and licensees to standards which are far more strict than those applicable to intervenors. We perceive no reason to follow such a course.

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[12] In a September 20 clarification of its September 6 response, Staff notes ALAB-283 and points out that that decision distinguished an earlier decision — *New York Shipbuilding Corp.*, 1 AEC 707 (1961) — which had placed the ultimate burden of proof on Staff in an enforcement action related to a materials license. The distinction was based on the fact that the materials license was not governed by the same statutory criteria as those governing construction permits. *See* ALAB-283, *supra*, 2 NRC at 18. We believe Title II of UMTRCA may be more similar to the statutory provisions interpreted in *Midland* than to those involved in *New York Shipbuilding*.

[13] *See, e.g., EEOC v. Bay Shipbuilding*, 668 F.2d 304 (7th Cir. 1981); *Reese Sales Co. v. Hardin*, 458 F.2d 183 (9th Cir. 1972); *Eastern Oil Transport Inc. v. United States*, 413 F. Supp. 121 (E.D.N.C. 1976).

[14] *See, e.g., Toledo Edison Co.* (Davis-Besse Nuclear Power Station), ALAB-300, 2 NRC 752 (1975); *Easton Utilities Commission v. AEC*, 424 F.2d 847 (D.C. Cir. 1970).

We agree with Kerr-McGee that there are no regulations which are applicable to this situation. We therefore begin with the proposition that Kerr-McGee is a party to this proceeding. No regulation specifically accords Kerr-McGee this status, although the long-standing practice of the NRC and its predecessor, the AEC, provides for it. As such, Kerr-McGee has, in general, the same rights and duties as the other parties.

We perceive no purpose to be served by prohibiting a party from filing contentions in a proceeding commenced at the instance of another party, and Staff has advanced none. Intervening parties are accorded the right under § 2.714 to file contentions without leave at any time until 15 days prior to the first prehearing conference, and to file new or amended contentions after that time upon a satisfactory showing under § 2.714(a). Staff's position would apply a different and much more rigid rule to applicants and licensees to deny them the same treatment. We see no reason for this. Indeed, it would be arbitrary to treat applicants differently from intervenors in this respect. Because both are parties, and because no specific rule governs the filing of contentions by applicants, applicants must be afforded substantially the same rights as intervenors to challenge Staff's actions by filing contentions.[15]

In this case, Kerr-McGee's three contentions were filed 13 days prior to the first prehearing conference and 21 days after the deadline imposed on the intervening parties to file new or amended contentions. The timing of the filing of these contentions thus approximates the schedule contemplated by the Rules of Practice for the filing of contentions. Kerr-McGee did not sleep on its rights, and we do not perceive that Staff's argument raises laches.

We conclude that although Kerr-McGee waived its right to cause a hearing to be held, it did not waive its right to raise contentions on a timely basis should a hearing be held at the instance of another. We also conclude that Kerr-McGee's contentions were timely filed.[16]

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[15] *Cf. Etelson v. Office of Personnel Management*, 684 F.2d 918, 926-27 (D.C. Cir. 1982); *Offshore Power Systems* (Floating Nuclear Power Plants), ALAB-489, 8 NRC 194, 221-22 (1978).

It is true that applicants and licensees who, like Kerr-McGee, are willing to abide by the Staff's action on their request unless a hearing is requested by another could protect their rights by routinely requesting a hearing. Interested States which desire to participate in any hearing which may be held on an application but do not themselves wish to cause a hearing to be held sometimes follow this practice. However, this practice adds an administrative burden without any perceptible benefit. Indeed, even if it were imposed, it would not require that an applicant's contentions be filed at the time the hearing request was made, there being no apparent reason why applicants should be treated differently from intervenors or interested States in this respect.

[16] We agree with Kerr-McGee that the acceptance of its contentions does not necessitate a new notice of hearing. Its differences with the Staff were publicized, and any hearing request filed by it would not necessarily have advised the public of the specific issues it wished to litigate.

B. Kerr-McGee's Contentions and the Scope of the Commission's Delegation to This Board

Staff takes the position that, in its November 3, 1983 Order, the Commission referred only the petitions for hearing filed by the People and the Chamber of Commerce. Therefore, in Staff's view, we lack jurisdiction to entertain Kerr-McGee's contentions because, Kerr-McGee having failed to request a hearing, no jurisdiction to consider its contentions was delegated to us. Staff relies on *Three Mile Island,* 14 NRC at 1727, and *Marble Hill, supra* note 8, for this position.

We agree with Staff that our jurisdiction is strictly limited by the Commission's delegation expressed in its November 3 Order. It is true that, Kerr-McGee having failed to request a hearing, no such request was referred to us by the Commission. Nonetheless, the Commission authorized us to "conduct any necessary proceedings under 10 C.F.R. Part 2, Subpart G."[17]

In Part A of this discussion we held that Kerr-McGee had not waived its right to file contentions pursuant to Part 2, Subpart G of the Commission's rules and that its contentions were timely. Thus, those contentions were properly filed pursuant to the Rules which the Commission has directed to be followed in this proceeding. It follows that we have been delegated jurisdiction by the Commission to consider them.[18]

The People's Proposed Contentions

Contention AG 1 filed by the People raises issues under the National Environmental Policy Act (NEPA). This contention is divided into eight subparts, but its overall thrust is to assert that Staff's proposed action (approval of Alternative III in the FES) constitutes an illegal segmentation of an overall plan to permanently dispose of the mill tailings in question at the disposal site in West Chicago. Staff characterized its proposal and comments on the People's position as follows:

> It is essential at the outset to understand what this case is about, for that understanding is the key to a proper disposition of contention AG 1. The NRC Staff can only reiterate that the licensing decision at issue is to permit KM to store waste at West Chicago in an engineered containment cell for a period of years. During this period of years there will be site monitoring to check on the performance of the containment cell. After sufficient monitoring there will be a further review of health,

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[17] November 3, 1983 Order at 2.

[18] Our ruling with respect to these contentions also requires that Contention AG 2(k) be admitted. *See* our Memorandum and Order of April 17, 1984 (unpublished).

safety, and environmental matters (and, since a licensing action will be involved, a hearing may be requested by interested parties at that time). An additional factor for consideration at that time will be the availability of an established disposal site. All of this is spelled out in the FES. This is the licensing action on which the NRC offered a hearing.

Illinois would transform the present licensing decision into something else. In all of its material filed in this case, it distorts the NRC Staff's position into a present licensing decision for permanent disposal of the waste at West Chicago. Based on this distortion, the State contends that the FES is subject to myriad infirmities and sins of omission. However, permanent disposal is not the issue in this hearing. Illinois will not be denied a hearing on the issue of permanent disposal. Such a hearing will be available when that issue is ripe.[19]

Before addressing the subparts of this contention, we discuss the law applicable to segmentation of proposals for federal action in the context of the Staff's proposal. At the outset we note that the FES discusses eight alternatives, as follows:[20]

I — Kerr-McGee's plan for permanent disposal at the disposal site in West Chicago;

II — Another plan for permanent disposal at the disposal site which differs from Alternative I in the construction and configuration of the disposal cell;

III — Staff's preferred alternative, which would authorize storage for an indeterminate period in a cell very similar to that proposed in Alternative I and would defer the decision on permanent disposal;

IV — Shipment of the tailings to an existing site in Illinois for either storage or disposal;

V — Shipment of the tailings to a licensed burial site at Beatty, Nevada; Hanford, Washington; or Barnwell, South Carolina;

VI — Minimal protective action to reduce airborne emissions and groundwater contamination pending the selection of a permanent disposal site;

VII — Segregation and disposal of the less radioactive material at West Chicago and storage of the more radioactive material there pending future removal for permanent disposal; and

VIII — No action.

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[19] NRC Staff Memorandum in Opposition to State of Illinois Contentions of June 21, 1984, at 4 (footnote omitted).

[20] These alternatives are discussed in Chapters 1 and 3 of the FES.

A few facts concerning Staff's preferred alternative are necessary to this discussion. First, the disposal cell which Staff would approve for interim storage is essentially the same as that proposed by Kerr-McGee for permanent disposal. The cost of building this cell is estimated by Staff to be $16.4 million, compared with a cost of $16 million attributable to building the cell proposed by Kerr-McGee. Staff estimates the cost of subsequent removal of the wastes to Hanford, Washington, should the factory site not be ultimately approved for permanent disposal to be upwards of $56.9 million, a figure which would be less if removal were to a less distant permanent disposal site. If permanent disposal elsewhere were approved now, the cost would be approximately $51 million for Hanford, $43.3 million for Beatty, Nevada, and $27.8 million for disposal in a shale quarry located 270 miles away.[21]

Analysis of the costs set out in Table 3.2 of the FES reveals that, should Alternative III be adopted and the factory site not be approved for permanent disposal, the cost would be at least $50.1 million,[22] a figure only slightly less than, and substantially more than, the cost of permanent disposal at Hanford or Beatty, respectively. Staff regards the cost of permanent disposal at Hanford or Beatty to be prohibitive.[23]

The FES recognizes that, if Alternative III is implemented and the tailings subsequently are moved, radioactive dust releases equivalent to that released during initial burial would result.[24] The FES also recognizes that radiological impacts from all alternatives (except the no-action alternative) are about equal.[25] Thus radiological impacts could be doubled if Alternative III were adopted and the tailings subsequently moved.

The FES estimates the radiological releases which would occur during movement of the tailings to be 6.44×10^{-4} Ci of the U-238 and U-234 series, 1.49×10^{-3} Ci of Th-230 and daughters, 1.58×10^{-2} Ci of Th-232, and 1.78×10^{-2} Ci of Ra 228 and daughters. Additionally, the FES estimates that 2 Ci and 28 Ci Rn-222 and Rn-220 would be released.[26] The FES estimates the doses which would result from either

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[21] These costs are set out in § 3.8, Table 3.2, of the FES.

[22] Table 3.2 reveals that the additional cost of removing the wastes from the disposal cell are $5.9 million ($56.9 million cost of removal from the cell and disposal at Hanford as compared with $51 million cost of disposal at Hanford now). If the $5.9 million cost is added to the $27.8 million cost of disposing of the tailings now at a shale quarry 270 miles distant, and this total is added to the $16.4 million cost of implementing Alternative III, the result is $50.1 million.

[23] FES, ch. 1, ¶ IV.B, at 1-7.

[24] FES, § 5.9.2.3, at 5-25.

[25] *Id.* at 5-24.

[26] *Id.* at 5-25.

disposal or storage at the disposal site or disposal elsewhere to be the following:

	Dose to Individual at Nearest Residence (mrem)			
Dose to Population (person-rem)	**Whole Body**	**Bone**	**Lung**	**Bronchial Epithelium**
80	5	90	90	5

Should the wastes be stored at the disposal site and subsequently moved, these doses would double.[27] The FES recognizes that the costs and environmental impacts discussed above make eventual removal of the tailings from the disposal site undesirable:

> Implementation of Alternative III will, however, make eventual removal of the wastes from the West Chicago site a less desirable option because of the additional costs and environmental impacts associated with recovery and movement of the stabilized waste material. It should be noted that implementation of Alternative III requires expenditures in the near term that might otherwise be unnecessary if it were known now that the wastes would be removed from the site in the future.[28]

Nonetheless, Staff apparently felt compelled to reject Alternative I in favor of Alternative III because of a lack of regulatory standards governing disposal of these kinds of wastes.

> Under UMTRCA, the USEPA is required to promulgate standards of general application for the protection of the public health, safety, and the environment from radiological and nonradiological hazards associated with the disposal of byproduct material. The USEPA has not published such standards in final form. In 1980, the NRC, based on a published Generic Environmental Impact Statement on Uranium Milling, established criteria relating to the disposition of tailings or wastes produced from source material processing. Use of these criteria, however, has been embargoed by Congressional legislation. Although licensing criteria exist for uranium tailings disposal on a case-by-case basis, there are no existing standards or criteria the NRC can use to assess the current suitability of any site for disposal of thorium waste under Title II of UMTRCA.
>
> Under Alternative I, Kerr-McGee would retain ownership of the site under an NRC license for a 25-year period. At the end of the period, the license would be terminated if safe performance criteria had been met. As discussed above, criteria applicable to UMTRCA thorium waste-disposal sites have not yet been established; therefore,

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[27] FES, § 5.9.3.1, at 5-26, 5-27; Table 5.5, at 5-28.
[28] FES, ch. 1, ¶ V, at 1-8.

the staff has no basis on which to evaluate the applicant's proposal for use of the site as a disposal site. The staff is unwilling to commit to terminate a license at a fixed time in the future without knowledge of the rules and regulations that might apply to disposal of this class of material at that future time.[29]

Subsequent to the publication of the FES, EPA published its standards in final form. It is against this background that we examine the propriety under NEPA of the Staff's preferred alternative, Alternative III.

SEGMENTATION

Now that EPA has promulgated final rules governing disposal of these mill tailings, Staff's justification for refusing to consider Alternative I, that there is no basis on which to evaluate it, no longer exists. Staff relies on *Kleppe v. Sierra Club*, 427 U.S. 390, 49 L. Ed. 2d 576 (1976); *Sierra Club v. Froelke*, 534 F.2d 1289 (8th Cir. 1976); *United States Department of Energy* (Clinch River Breeder Reactor Plant), CLI-82-23, 16 NRC 412 (1982), and *Offshore Power Systems* (Floating Nuclear Power Plants), LBP-79-15, 9 NRC 653 (1979) for the proposition that it may properly limit its proposed action and hence its NEPA consideration to Alternative III. Staff does not, however, furnish any substantive reason for so limiting its consideration now that the EPA guidelines have been published.

Staff relies on *Kleppe v. Sierra Club* for the proposition that it is the proposed federal action which determines the scope and content of the FES. Staff's description of the proposed federal action contained in its brief is quoted at pp. 1307-08, *supra*. We agree with Staff's statement of the holding in *Kleppe*. However, we find, after careful comparison of the opinion in *Kleppe* with the facts presented here, that *Kleppe* does not support Staff's position.

In *Kleppe*, the Supreme Court reversed the holding of the Court of Appeals for the District of Columbia Circuit[30] that certain federal officials contemplated development of coal resources in a particular region and that that contemplation might trigger the need to prepare a comprehensive environmental impact statement covering the regional development. In reaching its conclusion, the Court of Appeals did not overturn the District Court's findings that there was no existing or proposed plan or program pertaining to the region on the part of the federal officials

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[29] *Id.*, ¶ IV B, at 1-6.

[30] *Sierra Club v. Morton*, 514 F.2d 856 (D.C. Cir. 1975).

and that there was no evidence that the various projects proposed by private industry for the region (and requiring approval of the federal officials) were integrated into a plan or otherwise interrelated.[31] The Court of Appeals nonetheless concluded that a regional development plan was within the contemplation of these officials.

The Supreme Court held that mere contemplation of a proposed federal action was not sufficient to trigger NEPA's requirements. Rather, a concrete proposal for federal action must be present. The Court pointed out that not only is NEPA precise in indicating what triggers the necessity of an environmental impact statement, it would be futile to attempt to prepare such a statement in the absence of a concrete proposal because of the uncertainty over what such an impact statement would address.

The Supreme Court went on to address the Sierra Club's argument, not addressed by the Court of Appeals, that the intimate relationship of the projects planned for the region nonetheless required a comprehensive impact statement. The Supreme Court agreed that "when several proposals . . . that will have cumulative or synergistic environmental impact upon a region are pending concurrently before an agency, their environmental consequences must be considered together."[32] However, the Court refused to accept the Sierra Club's conclusion that such was required in the case before it on the ground that the federal officials' refusal to prepare a comprehensive impact statement had not been shown to be arbitrary.

The factual situation in the instant case is quite different from that in *Kleppe*. Here we are concerned with essentially one proposal — that of Kerr-McGee to permanently dispose of these mill tailings on its disposal site. Staff would divide this proposal into two separate steps, one pertaining to storage during which time certain data would be gathered which would permit consideration of the second step, authorization of permanent disposal. While such an approach might well have been required in the absence of standards governing disposal, the promulgation of those standards by EPA appears to remove any bar to consideration of Kerr-McGee's proposal now.

Thus, one of the findings of the District Court upon which the Supreme Court in *Kleppe* relied — that there was no evidence that the projects proposed by private industry for the region were interrelated — has no parallel here. Here there is but one proposal by private industry for which NRC approval is sought. Here, in contrast, that one proposal has been divided into two steps by the Staff.

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[31] *See Kleppe v. Sierra Club, supra*, 427 U.S. at 400-01, 49 L. Ed. 2d at 585.
[32] *Id.*, 427 U.S. at 410, 49 L. Ed. 2d at 590.

Nor do we believe that the concrete steps set out by Alternative III under which Kerr-McGee's proposal would ultimately be reviewed parallel the "contemplation" of a federal action which the Court found insufficient to trigger NEPA's requirements. Here Staff proposes 5 to 10 years of monitoring prior to deciding whether to approve Kerr-McGee's cell and disposal site as a permanent repository. Consequently there is little uncertainty surrounding the goal which Staff ultimately wishes to reach and concomitantly little reason why that goal cannot be subjected to an environmental analysis now. Alternative III essentially provides a means to demonstrate whether the cell and disposal site are suitable for permanent disposal of the mill tailings. In this sense it is not readily separable from the issue of permanent disposal for NEPA purposes. And it presents an entirely different set of facts than that addressed by the Supreme Court in *Kleppe*.

Staff relies on the Commission's decision in *Clinch River*[33] for the proposition that "it is well settled that an agency may consider separately under NEPA the different phases of a proposed federal action where approval of the phase under consideration will not result in any irreversible or irretrievable commitments to the remaining phases of the proposed action."[34] The Commission did indeed reach this conclusion in *Clinch River*. However, we view the facts presented to the Commission in *Clinch River* to be substantially different from the facts presented here.

In *Clinch River*, the proposed federal action was the issuance of a construction permit for the Clinch River project, a demonstration liquid metal-cooled fast breeder reactor. Staff had conducted an environmental review of this proposal, and had issued an FES and a draft supplement to the FES. An adjudicatory proceeding on the proposal was under way. It was in this context that the *Clinch River* applicants sought an exemption which would permit them to undertake site preparation activities in advance of completion of that portion of the adjudicatory hearing and issuance of a partial initial decision which would ordinarily constitute a prerequisite to these activities.[35] Thus applicants sought to begin their construction activities in advance of the completion of the environmental review incident to their application for a construction permit. Their request made it necessary for the Commission to consider whether commencement of site preparation activities would prejudice that review. The Commission concluded that it would not, and it was in this context

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[33] CLI-82-23, *supra*.

[34] Staff Memorandum at 10.

[35] *See* 10 C.F.R. §§ 2.761a and 50.10(c) which provide for authorization of the site preparation activities upon completion of environmental hearings on the proposed project and issuance of a favorable initial decision.

that the Commission emphasized its conclusion that "[t]he key point . . . is that site preparation . . . will not result in any irreversible or irretrievable *commitments to the remaining segments of the CRBR project.*"[36]

Here the facts are different. Here Staff proposes to limit this licensing proceeding to one phase of an overall plan to dispose of the mill tailings in question. In contrast, in *Clinch River* no such proposal was made. No question existed that the licensing proceeding would consider the entire proposal to permit construction of a breeder reactor. The only question was whether a portion of that construction could be authorized in advance of the completion of the environmental review. In short, we do not believe *Clinch River* provides support for the Staff's proposed limitations on the scope of this proceeding.

Staff relies on *Sierra Club v. Froelke, supra,* and *Offshore Power Systems, supra,* for the proposition that other relevant factors to consider are whether there is an overall federal plan and whether the proposed action has independent utility. We do not quarrel with Staff's statement of these propositions. However, we do not agree with Staff's conclusions that there is no overall federal plan for permanent onsite disposal and that licensed onsite storage has independent utility.

Staff now appears to view the independent utility consideration in terms of demonstration of the performance capability of the proposed cell and the disposal site as a permanent repository. Staff states that demonstration of the performance capability of the cell is a central aspect of Alternative III.[37] In the FES itself, Staff appeared to view Alternative III as providing an acceptable means of providing for storage of the tailings while awaiting the development of standards by EPA governing permanent disposal, a means which might also provide for permanent disposal once those standards were published.[38]

Because EPA's standards have now been published, Staff's view of Alternative III expressed in the FES is no longer valid and hence does not establish the independent utility of Alternative III. This leaves demonstration of the performance capability of the disposal cell as its independent utility.

While it is true that Alternative III would provide for the collection of monitoring data which would bear on the performance capability of the cell, so would Alternative I,[39] or, for that matter, any other alternative. Thus, Alternative III has independent utility only if it avoids some

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[36] CLI-82-23, 16 NRC at 424 (emphasis supplied).
[37] Staff Memorandum at 9.
[38] *See* FES, ch. 1, ¶ IV.B, at 1-5, *et seq.*
[39] *See id.*, ¶ II.A, at 1-1 to 1-2.

regulatory restraint which would inhibit Staff from requiring that the tailings be removed to another site in the event that the disposal or storage cell failed to meet the applicable standards. We inquired of Staff with regard to this matter in connection with its opposition to Kerr-McGee's contentions, asking whether Staff viewed Alternative I as posing regulatory restraints not posed by Alternative III. Our conclusions are stated at pp. 1304-05, *supra*. For purposes of this discussion, we simply note that we do not believe Alternative III would avoid any regulatory restraints posed by other alternatives.

Nor can we agree with Staff that there is no overall plan regarding permanent disposal of these tailings on the factory site. First, we note that Staff has conceded that compliance of the disposal cell and the factory site with the EPA standards can be litigated in this proceeding under Alternative III, and that the results of that litigation will be *res judicata* to the parties. Second, Staff has outlined the conditions under which it would approve the cell and disposal site for permanent disposal under Alternative III.[40] Third, Staff has already evaluated the radiological doses resulting from onsite disposal. Fourth, Staff notes that subsequent removal of the tailings after implementation of Alternative III would not only result in unnecessary expenditures of money, but would double the radiological doses received by the population.

The FES notes that under Alternative III one of the conditions for termination of Kerr-McGee's license is:

> The removal of the wastes to an established offsite disposal site and the release of the storage site for unrestricted use following a final NRC determination that the removal of the wastes to an established offsite disposal site is necessary to meet health, safety, and environmental requirements.[41]

However, the FES fails to indicate what an "established offsite disposal site" is and what NRC would consider in reaching a conclusion that removal to such a site was necessary to meet "health, safety, and environmental" requirements. Because the FES contemplates monitoring of the cell and disposal site to determine their compliance with EPA standards, and does not specifically contemplate removal of the tailings to another site because such other site may be superior to the disposal site,

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[40] We must also note that there is ambiguity with regard to these conditions. Staff does not say whether it would take the position that the tailings should be moved if a future proceeding revealed that an "obviously superior" site existed even though the disposal cell and site met applicable criteria, or whether Staff would only take such a position in response to a demonstrated, irreparable failure of the disposal cell and site.

[41] FES, ch. 1, ¶ VI, at 1-8.

we are left with the inference that the wastes would only be moved if the cell and disposal site failed to meet the EPA standards. This is strongly indicative that Staff does plan to ultimately approve permanent disposal at the disposal site.

Regardless of the existence of an overall plan for permanent disposal, other considerations dictate that permanent disposal be evaluated now. The Commission's regulations implementing NEPA provide for the use of certain definitions set out in the Council on Environmental Quality's regulations. Two of those definitions are applicable to this situation. First, 40 C.F.R. § 1508.23[42] defines the time when a "proposal" exists as "that stage in the development of an action when an agency subject to [NEPA] has a goal and is actively preparing to make a decision on one or more means of accomplishing that goal and the effects can be meaningfully evaluated." This definition also notes that a proposal may exist in fact as well as a result of an agency's determination that it exists.

This definition is applicable here. Kerr-McGee has proposed permanent disposal. Staff recognizes that permanent disposal eventually must be implemented. Its selection of Alternative III is but one step toward that goal. Staff is thus actively moving toward that goal, and the existence of the EPA standards means that that goal, as well as Alternative III, may now be meaningfully evaluated. Staff's position that the compliance of the cell and disposal site with those standards may be litigated under Alternative III concedes no less.

Further, 40 C.F.R. § 1508.25 defines the scope of an environmental impact statement.[43] This definition requires that three types of actions be considered in determining scope. The first of these are connected actions, or actions which are closely related. Clearly Alternative III is closely related to a future action to pass on permanent disposal which Staff notes will require another FES and another proceeding.[44] The second type of actions are cumulative actions, or actions which may have cumulative impacts. Under Alternative III it would be necessary to consider exhuming the tailings and moving them to another location, an action which has cumulative radiological impact. The third type of actions are similar actions, or actions which when viewed with other reasonably foreseeable actions have similarities which provide a basis for evaluating their impacts together. Here such similarities clearly exist between Staff's presently proposed action (implementation of Alternative

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[42] 10 C.F.R. § 51.14(b) adopts this definition.
[43] 10 C.F.R. § 51.14(b) adopts this definition.
[44] *See* Staff Memorandum at 4.

III) and the future action on permanent disposal which would thus become necessary.

In short, given the circumstances, we agree with Kerr-McGee and the People that the public interest demands that permanent disposal be considered now. Moreover, we find that CEQ's regulations mandate that permanent disposal be considered now. Having reached these conclusions, we proceed to our discussion of the specific subparts of Contention AG 1.[45]

Contention AG 1(f) notes the possibility that tailings which have found their way off site by various means may be returned to the site for storage and/or disposal. This contention alleges that the Staff's failure to consider this possibility in the FES also amounts to an illegal segmentation of the proposal for federal action.

The tailings in question consist of material used for fill at various residences, Reed-Keppler Park, and the sewage treatment plant in West Chicago, as well as tailings which found their way into Kress Creek. The former are the subject of a voluntary agreement between the City of West Chicago and Kerr-McGee under which tailings used as fill material at residences have been excavated and returned to the site and those deposited in the park and sewage treatment plant have been evaluated. Both the City and Kerr-McGee believe that the thorium-containing material at the park and plant should also be returned to the site, if possible.[46] Staff has approved the return to the site of the material deposited at residences and has requested further information on the disposition of the material at the park and sewage treatment plant.[47]

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[45] Contention AG 1(a) states that the FES fails to explicitly disclose the fact that onsite disposal of the mill tailings will be permanent. The effect of our rulings on Contentions KM 1 and AG 1 is to require that the issue of permanent disposal be addressed in this proceeding. Thus it becomes irrelevant whether the FES improperly failed to disclose that onsite disposal would be permanent. This issue is moot.

Contention AG 1(b) states that the FES implicitly but clearly acknowledges that onsite disposal will be permanent. This contention alleges that the FES fails to address the long-range environmental, social, and economic significance of this fact, and provides examples of these alleged failings. In their brief, the People have added to this list of examples. Our ruling stated above requires that this contention be accepted. Staff will need to assess the extent to which the FES should be supplemented to meet any shortcomings with regard to its consideration of long-range environmental, social, and economic factors. After Staff's assessment and any supplementation which Staff believes necessary have taken place, we will consider this contention on its merits.

Contention AG 1(h) alleges that Staff has given inadequate consideration to comments on the DES. In their Post-Prehearing Conference Brief, the People cite three areas in which this consideration was inadequate: alternate sites, the rationale for rejecting offsite disposal, and long-term environmental impacts. Our ruling on AG 1(b) immediately above accepts a contention on the last point, and our rulings on AG 1(c) and (e), *infra*, accept contentions on the first two points. Therefore, this contention is rejected as redundant.

[46] *See* "Program Outline — Offsite Thorium Removal — West Chicago, Illinois" dated June 25, 1984, attached to Staff's July 12 submittal of further information.

[47] *See* Letters of July 26, 1984, from R.E. Cunningham, Director, Division of Fuel Cycle and Material Safety, to C. Rice, Vice President, Kerr-McGee and A.E. Rennels, Mayor of West Chicago.

The Kress Creek materials are the subject of a Show Cause Order of March 2, 1984, which would force Kerr-McGee to develop and execute a plan for the removal and disposition of these tailings. Kerr-McGee is resisting this Order and a proceeding has been commenced in which the People have intervened.

Staff relies on *Kleppe v. Sierra Club* for the proposition that no proposal for federal action now exists with respect to these tailings and therefore there is no requirement to prepare an environmental impact statement.[48] The People assert that *Kleppe* and common sense dictate that the amount of wastes proposed to be stored or disposed of at the disposal site be discussed in the FES which Staff has prepared.[49]

We agree with Staff that no proposal for federal action now exists which would require supplementation of the FES in this respect. Our discussion of *Kleppe*, at pp. 1311-12, above, is applicable here and need not be repeated. Suffice it to say that no concrete proposal for federal action now exists which may be effectively addressed in the FES.[50]

However, we cannot lose sight of the fact that a proposal to add large quantities of material to the tailings already on site would require supplementation of the FES. We note that Staff also recognizes this fact.[51] In light of our ruling that permanent disposal must be considered now, we think it prudent to ask Staff and Kerr-McGee to consider what volume of material could be added to the proposed cell without significantly affecting the analyses which have taken place to date and whether the volume of material which conceivably might be added to that already on site exceeds that amount. We would, of course, also welcome the People's views on this subject. We believe this consideration will be helpful in charting the future course of this proceeding. Pending a decision to add substantial amounts of material to the proposed cell, we will hold AG 1(f) in abeyance.[52]

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[48] Staff's June 21 Memorandum at 29-35.

[49] People's August 7 Reply Brief at 11-15.

[50] We recognize that tailings have been removed from residences for ultimate storage or disposal with the tailings on site. Having viewed the pile of this material on our recent site tour and having reviewed the maps accompanying the program outline for offsite thorium removal (note 46, *supra*) we regard the volume of these tailings as inconsequential for purposes of this contention.

[51] *See* Staff's June 21 Memorandum at 34-35.

[52] Contention AG 2(f) is related. It asserts that Kerr-McGee has not evaluated the effect of the addition of these materials to its proposed cell. In our Prehearing Conference Order of February 24 (at 7), we held this contention in abeyance pending a ruling on AG 1(f). We will continue to hold this contention in abeyance pending a decision on Kerr-McGee's part to include substantial amounts of additional material in its proposed cell. In the event of such a decision, this contention will be admitted.

ALTERNATE SITES

Contention AG 1(c) challenges the review of alternative sites contained in the FES. The People regard Alternative IV as the only realistic alternative to onsite disposal.[53] This alternative contemplates the acquisition by Kerr-McGee of a site within Illinois and the shipment of the tailings to and disposal at that site.[54]

The People criticize Staff's treatment of this alternative on the following grounds:

> First, Staff left it to Kerr-McGee to search for and identify possible alternative sites. The People assert that Kerr-McGee's economic self-interest unduly limited that search.[55]
>
> Second, Staff required that only reconnaissance-level information be furnished by Kerr-McGee in order to evaluate the identified sites.[56]
>
> Third, Staff did not supervise Kerr-McGee's efforts.[57]
>
> Fourth, in accepting and evaluating the sites identified by Kerr-McGee, Staff committed the same error which lead to a rejection of its alternative site analysis in *Boston Edison Co.* (Pilgrim Nuclear Generating Station, Unit 2), LBP-77-66, 6 NRC 839 (1977), *aff'd,* ALAB-479, 7 NRC 774 (1978). This error, according to the People was Staff's acceptance, as a threshold matter, of the acceptability for disposal at the West Chicago site.[58] The gist of People's position is that, while they do not quarrel with the Commission's requirement that Kerr-McGee submit the information for the alternate site inquiry, they do quarrel with the alleged lack of requirements and guidelines governing the acquisition of that data, as well as the Staff's allegedly uncritical review of it.[59] They argue that, as a result, the alternative site analysis is inadequate and that, contrary to Staff's and Kerr-McGee's position, the FES does reveal a superior site.[60]

In its response, Staff relies on the Commission's discussion of alternative site considerations contained in the Statement of Consideration accompanying the revision of 10 C.F.R. Part 51.[61] Although it notes that

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53 People's Post-Prehearing Conference Brief at 31.
54 *See* FES, ch. 1, ¶ II.D, at 1-2; § 3.4.1, at 3-18, *et seq.*
55 People's Post-Prehearing Conference Brief at 34.
56 *Id.* at 35-39.
57 *Id.* at 39-41.
58 *Id.* at 42-44.
59 People's Reply Brief at 15-19.
60 *Id.* at 20-25.
61 49 Fed. Reg. 9352 (March 12, 1984).

this discussion is aimed at power reactors, Staff views it as clearly applicable to this case. Accordingly, Staff views the issue as whether the alternative site analysis in this case conformed to the criteria set out in the Statement of Consideration.[62]

Staff maintains that what was done here conforms with those criteria. First, Staff asserts that Kerr-McGee's slate of alternative sites was among the best that reasonably could be found. The specific criteria which Kerr-McGee used to identify alternative sites were based on those contained in 10 C.F.R. Part 61.[63] These overlap the criteria contained in 10 C.F.R. Part 40, Appendix A. Although the latter, and not the former, apply, at the time Kerr-McGee initiated its survey, the decision had not been made whether to characterize the material in question as low-level waste or mill tailings, so that it was uncertain whether Part 40 or Part 61 of the regulations would be applicable. Out of eighty-four sites identified, six were selected as best. Kerr-McGee's methodology was very much like that used by Boston Edison Company to cure the deficiencies identified in LBP-77-66, *supra*. Staff notes that this methodology was approved in *Boston Edison Co.* (Pilgrim Nuclear Power Station, Unit 2), LBP-81-3, 13 NRC 103 (1981). Thus Staff concludes that the first criterion stated by the Commission was met: the alternate site selection process was adequate and the six sites identified were among the best that reasonably could be found.[64]

Second, Staff defends its conclusion that none of the identified sites is markedly better than the West Chicago site, and consequently, none is obviously superior. Staff acknowledges that the socioeconomic impacts might be less at an alternate site, but concludes that this factor alone does not make such a site obviously superior "since the population factor is only one of many factors that have to be considered in determining whether a site is obviously superior." Staff relies on *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-471, 7 NRC 477 (1978) for the latter proposition.[65]

Third, Staff defends the use of reconnaissance-level information gathered by Kerr-McGee to evaluate the alternative sites as sufficient to permit an adequate evaluation and reasonable resolution of the alternative site question.[66]

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[62] Staff's Memorandum Opposing the People's Contentions at 12-15.

[63] The specific criteria were population, land use, hydrology, geology, accessibility, natural resources, and distance from West Chicago.

[64] Staff's Memorandum Opposing the People's Contentions at 15-16.

[65] *Id.* at 16-18.

[66] *Id.* at 18-19.

Kerr-McGee begins its answer to the People with a recitation of the steps it took in conducting its alternative site search[67] and points out that 10 C.F.R. § 51.40[68] requires it to gather and submit data on alternative sites. Consequently, it views the People's criticism as an impermissible attack on the regulations. Kerr-McGee also maintains that the People do not quarrel with its methodology, the application of that methodology, or the accuracy of the data submitted.[69]

Kerr-McGee defends the adequacy of the analysis of the alternative site data against the People's charge that it committed the same error found in the analysis of the *Pilgrim* alternative site data by LBP-77-66, *supra*.[70] Kerr-McGee maintains that, when viewed in light of applicable precedents, this analysis is adequate.[71]

The People's first charge is that Staff left it to Kerr-McGee to search for and identify possible alternative sites. The People assert that Kerr-McGee's economic self-interest unduly limited this search. However, the regulations clearly contemplate that it is the applicant who is to gather the information which the Staff considers in its FES. *See* 10 C.F.R. §§ 51.45(c) and 51.60. This is a long-standing NRC practice which reflects the necessity that, in the absence of some reason not to, the Commission must rely on information generated and furnished by applicants in the discharge of its responsibilities.

The People, in their reply brief, clarify their position by pointing out that they do not quibble with the requirement that applicants submit information, but do contend that where an applicant's economic self-interest is contrary to a full and complete investigation, the Staff must establish requirements for that investigation and view the results critically.[72] Staff, in its Memorandum opposing the People's contentions, points out that it has no reason to believe that Kerr-McGee falsified or omitted any relevant data.[73] Moreover, the FES reflects that Staff reviewed and approved Kerr-McGee's methodology used in its investigation.[74]

We view the People's position as elaborated in their reply brief as raising what is essentially a question of fact: Was Kerr-McGee's investiga-

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[67] Kerr-McGee's Brief on the People's Contentions at 19-22.

[68] Section 51.60 of revised Part 51 is now applicable. At the time the information was gathered, § 51.40 was applicable.

[69] Kerr-McGee's Brief on the People's Contentions at 23. Staff makes a similar argument at page 19 of its memorandum.

[70] Kerr-McGee's Brief on the People's Contentions at 24.

[71] *Id.* at 24-26.

[72] People's Reply Brief at 18-19.

[73] Staff's Memorandum at 19.

[74] FES, § 3.4.1 at 3-19.

:ion of alternative sites on which the Staff based its NEPA consideration tainted by self-interest? This is clearly an appropriate inquiry because the information generated by Kerr-McGee forms the basis for the Staff's discharge of its duties under NEPA. If that information is tainted — i.e., incomplete or inadequate to permit the "hard look" at alternatives which NEPA requires[75] — then Staff's analysis must similarly be inadequate.

We cannot resolve this question on the papers before us. The People's allegations state an acceptable contention which can only be resolved after hearing.

The remaining charges brought by the People are all subsumed within the first. The People's second charge is that Staff should have required more of Kerr-McGee than "reconnaissance level" information. In their reply brief, the People clarify their position by stating that the issue is not whether reconnaissance-level information may be used, but rather "whether adequate data has [sic] been presented to allow the decision-maker to make a rational, informed decision . . . ."[76] Thus this issue is subsumed within the issue of whether Kerr-McGee's investigation of alternative sites was adequate to support the Staff's NEPA analysis.

Similarly, the People's third charge, that Staff failed to supervise Kerr-McGee's investigation, is also contained within the issue of the adequacy of that investigation. In response, Staff points out that it never supervises the preparation of an applicant's reports.[77] While we agree that this is so in the usual sense of the word "supervise," in a larger sense Staff does exercise supervision when it asks for more information or rejects a report. It is in this larger sense that we view the People's charge. We view it as simply saying that not only was Kerr-McGee's investigation inadequate, but Staff should have recognized that inadequacy and acted accordingly.

> Indeed, if the Staff believes that inadequate data about environmental considerations is [sic] available or that reasonable alternatives have not been adequately explored, it can and should decline to issue a DES.[78]

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[75] *See Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 524-25 (1977); *Pilgrim*, ALAB-479, *supra*.

[76] People's Reply Brief at 21.

[77] Staff's Memorandum at 19.

[78] CLI-77-8, *supra*, 5 NRC at 525.

In this sense, the People have stated an acceptable contention which requires resolution after hearing.[79]

The People's last charge, that the Staff has accepted, as a threshold matter, that the West Chicago site is appropriate,[80] may be viewed as a rationalization of Staff's allegedly improper acceptance of Kerr-McGee's allegedly inadequate information. As such, it is subsumed within the issue of the adequacy of that information. However, this charge may also be viewed as challenging the acceptability of the West Chicago site under UMTRCA and Appendix A to Part 40.

Consideration of alternate sites under NEPA cannot be divorced from consideration of compliance with the Commission's health and safety regulations. The two are interrelated. In this case, that interrelationship is perhaps complicated by the fact that the health and safety regulations applicable, 10 C.F.R. Part 40, Appendix A are primarily directed toward environmental protection by isolation of the tailings through both site selection and engineering design with "overriding consideration" being given to siting features,[81] and by the fact that Staff has chosen to treat both NEPA and health and safety considerations in the FES.

NEPA requires an alternate site analysis which the Commission carries out with a view toward selecting a site which minimizes adverse environmental impacts. The NEPA alternate site analysis is meaningful only when comparing sites which have all been found acceptable under applicable health and safety criteria. Contentions AG 1(g) and AG 2(s), (u), (v), and (w) all bear on requirements laid down by UMTRCA and its implementing regulations. As will be seen, these contentions also bear on the alternate site analysis under NEPA.

Contention AG 1(g) begins with the assertion that the FES gives inadequate consideration to federal, state, and local policies. It goes on to

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[79] We note that the second paragraph of this contention criticizes the Staff's failure to have considered disposal of these mill tailings at a Title I UMTRCA site. In its initial response to the People's contentions of January 20, 1984, the Staff characterized this criticism as patently frivolous because Title I allows the Department of Energy to dispose of tailings from certain designated processing sites only and because the West Chicago site is not such a designated site. In their brief (at 44 n.11), the People point out that they do not mean to suggest that the cleanup of the West Chicago tailings be funded to any extent by the government and that disposal at a Title I site would further the objective of Criterion 3 of 10 C.F.R. Part 40, Appendix A, to minimize the proliferation of disposal sites. Neither Staff nor Kerr-McGee responded to this position. While we have no opinion with regard to the feasibility of this suggested alternative, we believe that it should be the subject of more consideration than it apparently has received. It may well be that UMTRCA or other considerations would preclude implementation of this alternative. However, Staff should explain in more detail why this alternative is legally precluded, or, if not legally precluded, why it is infeasible.

[80] Contention AG 1(e) states this proposition conversely; it asserts that the FES fails to provide an adequate rationale for onsite disposal. In their briefs, the parties have raised what are essentially factual arguments on this contention which can only be resolved after hearing. We will admit AG 1(e) and consolidate it with AG 1(c).

[81] 10 C.F.R. Part 40, Appendix A, Criterion 1.

assert that federal policy requires selection of a site that minimizes the need for long-term maintenance and monitoring. It refers to the requirements of Part 61, and it alleges that Staff has disregarded applicable State policies on groundwater quality, disposal of industrial wastes, and local policies on land use.

Contention AG 2(s), (u), (v), and (w) spell out the ways in which the People maintain that the site-selection process has not complied with the federal policy set out in UMTRCA. AG 2(s) asserts that Kerr-McGee gave inadequate consideration to below-grade disposal at another site and has not demonstrated that above-grade disposal at the disposal site will provide equivalent isolation. AG 2(u) asserts that the tailings must be disposed of at a site that will minimize the need for long-term maintenance and monitoring, while AG 2(v) asserts that Kerr-McGee's stabilization proposal is inconsistent with the requirement that Kerr-McGee bear the cost of long-term environmental protection. AG 2(w) asserts that Kerr-McGee's proposal is inconsistent with Criterion 1 of Appendix A that, in selecting disposal sites, primary emphasis be placed on hydrologic and other natural conditions, and demography, rather than on short-term convenience.

Apparently, recognizing the overlap between AG 1(g) on the one hand and AG 2(s), (u), (v), and (w) on the other, the People have briefed all together.[82] Their arguments rely primarily on UMTRCA and Appendix A to Part 40. Thus, AG 2(s) — relating to below-grade disposal — relies on Criterion 3 of Appendix A, AG 2(u) — relating to the need to select a site which will minimize long-term maintenance and monitoring — relies on § 203 of UMTRCA and Criteria 1 and 12, and AG 2(w) — that the site-selection process should not emphasize short-term convenience — relies on Criterion 1 of Appendix A.[83]

In their June 18 Memorandum, the People discuss AG 1(g) in terms of the failure of the FES to discuss the matters raised by AG 2(s), (u),

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[82] The People briefed AG 2(s) and (v) in their May 2 Post-Prehearing Conference Brief and AG 2(u) and (w) in an untimely May 31 Memorandum. Kerr-McGee responded to the May 31 Memorandum on June 18; Staff did not respond.

[83] Contention AG 2(v) asserts that Kerr-McGee's proposal is inconsistent with the requirement of Criterion 10 that it bear the cost of long-term maintenance and monitoring. At the first prehearing conference, counsel for the People explained that by this contention, the People were asserting that the long-term maintenance and monitoring needs of the disposal site must be assessed before a decision to utilize the disposal site is made. *See* February 24, 1984 Prehearing Conference Order at 12. However, in their May 2 Brief (at 82-83), the People characterize this contention as asserting that Kerr-McGee's proposal would improperly place on the community the costs of adverse health and socioeconomic effects resulting from utilization of the disposal site. If the contention is interpreted as it was by counsel at the first prehearing conference, it is duplicative of AG 2(u). If it is interpreted as it was by counsel in her brief, a question is raised whether it may be litigated at all. Nothing in § 203 of UMTRCA suggests that a bond is required to cover such costs. To the extent that this interpretation is litigable, it is covered by AG 1(b). Therefore, AG 2(v) is denied.

and (w), as well as Illinois' groundwater quality standards[84] and certain other Illinois policies.

Although Staff has not specifically replied to the People's June 18 Memorandum on AG 1(g) and AG 2(u) and (w), its position seems to be well set forth at pages 35-40 of its June 21 Memorandum. There Staff points out that, to the extent Illinois' groundwater quality standards need to be considered, the absence of their discussion in the FES may be remedied on the record of this proceeding. Staff does not address the other Illinois policies mentioned by the People; we assume that Staff would deal with them in the same manner. Kerr-McGee agrees that any necessary consideration may take place in the hearing process.[85] The People in their reply brief, do not take issue with this proposition.

We agree with Staff that, to the extent necessary, these matters may be considered in the hearing and the FES thus supplemented.[86]

With respect to consideration of the requirements of Appendix A, Staff points out that at the time the FES was in preparation, portions of Appendix A had been suspended in response to congressional action.[87] Thus, there was some question what portions of Appendix A, if any, would be reinstated as valid and enforceable regulations. In light of this and in light of its decision to consider storage rather than disposal, Staff believes its decision not to address Appendix A was a reasonable one.[88]

Staff recognizes that our rulings require that the Appendix A Criteria and 40 C.F.R. § 192.32(b) requirements promulgated by EPA be ad-

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[84] Illinois' groundwater quality standards are also the subject of AG 2(g) which asserts that Kerr-McGee must demonstrate that leachate from the disposal cell will not violate Illinois groundwater requirements. We admitted this contention in our February 24 Prehearing Conference Order (at 7-8) on condition that the People demonstrate that Kerr-McGee is subject to these requirements and on our finding that we are competent to enforce them. The applicability of these requirements is the subject of litigation in the courts of Illinois. Thus, the first condition has not yet been satisfied. The second condition is no longer applicable. In their Post-Prehearing Conference Brief (at 62-63), the People note that they are not asking that the Board enforce these requirements, but rather that the Board withhold its authorization of any license amendment until Kerr-McGee shows that any applicable requirements have been met. Kerr-McGee concurs that this approach is proper. (*See* Kerr-McGee's June 6 Brief at 38-39).

[85] Kerr-McGee also maintains that the People have not demonstrated that the groundwater standards and other policies are applicable and thus must be considered. *See* Kerr-McGee's June 18 Memorandum at 7-9.

[86] Contention AG 1(g) also refers to 10 C.F.R. Part 61. As pointed out by Staff and recognized by the People, Part 61 is not applicable to this proceeding. Contention AG 1(g) will be modified accordingly.

[87] Title IV, Pub. L. 97-88 (95 Stat. 1147, December 4, 1981) prohibited the expenditure of funds to enforce Appendix A. This prohibition extended through September 30, 1983. *See* § 101(f), Pub. L. 97-377 (96 Stat. 1906). Pub. L. 97-415 (96 Stat. 2067) required the suspension of portions of Appendix A.

[88] Although it is now in effect and no proposal to modify it has been published by the Commission, Appendix A is still under a cloud. The uranium milling industry sought review of Appendix A in the tenth circuit. Although that court initially upheld the rule (*see Kerr-McGee Nuclear Corp. v. NRC*, ¶ 20217, CCH Nuclear Regulation Reporter), it subsequently withdrew its opinion on granting petitioners' request for reconsideration. Reargument had not been scheduled at the time Staff's Memorandum was filed.

dressed. We do not view Staff as posing any further objection to Contentions AG 1(g) and 2(s), (u), and (w).

Kerr-McGee, on the other hand, does raise further objections to these contentions. With respect to Contention AG 2(s), Kerr-McGee maintains that the legal basis put forward by the People is invalid. The People relied on Criterion 3 of Appendix A to support their position that below-grade disposal must be considered. Kerr-McGee argues that this criterion is incompatible with EPA's standards, and points out that it was suspended in its entirety on publication of EPA's proposed standards. Kerr-McGee further argues that it has no obligation under the Atomic Energy Act (and UMTRCA) to consider alternatives.[89]

Kerr-McGee reiterates this position with respect to Contentions AG 2(u) and (w).[90] It also attacks Contention AG 2(u) on the ground that this contention seeks to impose an absolute bar to utilization of any site which would require long-term maintenance and monitoring which is not contemplated by UMTRCA or EPA's standards. To the extent that this contention would impose higher standards than those promulgated by EPA, Kerr-McGee views it as a prohibited attack on the latter standards.[91]

The People take issue with Kerr-McGee's interpretation of UMTRCA with respect to the need to consider alternate disposal sites and disposal methods. They point out that the EPA standards are not site-specific, but rather establish goals to be met by all sites. Thus, their failure to address the need to minimize long-term maintenance and monitoring is not dispositive of that issue. The People also note that Kerr-McGee has mischaracterized its position as seeking selection of a site which would make the need for long-term maintenance and monitoring unnecessary. Rather, they point out that their position is that the need for such activity must be eliminated to the maximum extent practicable.[92]

Kerr-McGee's arguments may be quickly dealt with. First, Kerr-McGee relies on the fact that Criterion 3 of Appendix A was suspended in its entirety for the proposition that it is inconsistent with EPA's standards and therefore invalid. Were this argument valid, it would raise a question of whether it constitutes an attack on the Commission's regulations. However, a reading of the Commission's proposal to suspend Criterion 3 quickly shows that it is not a valid argument. The Commission stated its reason for suspending Criterion 3 in its entirety as follows:

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[89] *See* Kerr-McGee's June 6 Brief at 43-45.

[90] *See* Kerr-McGee's June 18 Memorandum at 5-6, 9-10.

[91] Id. at 2-5.

[92] *See* People's Reply Brief of August 7 at 48-55.

> The thrust of Criterion 3 is to maximize below-grade disposal of all tailings. The intent was to establish that the most effective way to assure long-term stability with no maintenance is to restore the disposal area to its original contours and thus eliminate differential erosion over a long term of thousands of years. Since the EPA standard specifies a 1,000-year design objective rather than thousands of years and "minimized" rather than "eliminated" maintenance for nonradiological hazards, the entire criterion is suspended because the EPA standard can be met without below-grade disposal. The suspension does not mean that applicants or licensees should not seriously consider below-grade or partially below-grade disposal on a site-specific basis. The Commission continues to believe that below-grade disposal is a very good way to minimize erosion and provide reliable control measures. EPA also expressed the view that below-grade disposal is a preferred alternative but could not justify the extra costs for across the board application.[93]

Thus, even when the criterion was suspended, the Commission expected applicants and licensees to give some attention to below-grade disposal. The Commission obviously did not consider Criterion 3 to be at odds with the EPA standards. Rather, its suspension reflects a conservative, literal approach which was designed to avoid unnecessary expenditures by applicants and licensees pending completion of EPA's rulemaking and NRC's evaluation of Appendix A in light of the former. The Commission specifically noted that on completion of this effort, it "may well conclude . . . that some or all of the suspended portions of Appendix A represent the preferred method for satisfying the final EPA standards."[94] Kerr-McGee's view that Criterion 3 is inconsistent with EPA's standards is simply incorrect.[95]

Kerr-McGee's argument that UMTRCA does not require it to consider alternatives is clearly without merit. The Commission in promulgating Appendix A has clearly interpreted UMTRCA as requiring such consideration. We are bound by that interpretation.

Finally, we note that Kerr-McGee has misinterpreted Contention AG 2(u) as maintaining that no site may be approved if it would require long-term maintenance and monitoring. This contention merely maintains that the need for long-term maintenance and monitoring must be eliminated to the extent practicable. It is an acceptable contention. The

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[93] *See* 48 Fed. Reg. 23,649, 23,651-52 (May 28, 1983).

[94] *Id.* at 23,651.

[95] We recognize that there may be potential difficulties in applying both the Appendix A criteria and the EPA standards. However, we note that under UMTRCA the Commission is to ensure that mill tailings are managed in such a manner as will adequately protect the public health and safety as well as conform to the EPA standards and standards promulgated by the Commission with EPA's concurrence. Thus, we are inclined to view the EPA standards as providing a minimum level of protection which may not in all cases be deemed sufficient by the Commission after it considers the level of risk posed by any specific tailings pile, economic costs, and such other factors as it deems appropriate. *See* § 84(a) of the Atomic Energy Act, 42 U.S.C. § 2114(a). We are also inclined to the view that these matters may appropriately be raised in connection with these contentions.

fact that it may seek the imposition of requirements which are more stringent than EPA's standards is, for the reasons discussed in connection with below-grade disposal, no bar to its consideration.

In sum we admit Contentions AG 1(g) and AG 2(s), (u), and (w) for litigation.[96]

COST-BENEFIT BALANCE

Contention AG 1(d) asserts that the FES contains an inadequate cost-benefit balance. The People begin their discussion of this topic with the proposition that NEPA requires a cost-benefit analysis which quantifies to the extent possible the various costs and benefits of the proposed action and its alternatives. They assert that the Staff has not fulfilled this obligation, but rather has only attempted to assess the costs of onsite and offsite disposal. They criticize this effort on the following grounds:

> First, because no site-specific data were gathered for alternatives, costs of disposal at an alternate site cannot be realistically estimated. In particular, they question the adequacy of the analysis of storage or disposal costs at New Douglas. Additionally, they question the accuracy of the figures which are given in the FES.
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> Second, no attempt was made to estimate long-term maintenance and monitoring costs, long-term radiological doses and

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[96] Contentions AG 2(h), (i), and (j) are related to AG 2(u) and (w). AG 2(h), (i) and (j) assert that Kerr-McGee's plan fails to give attention to the need to exclude humans from the disposal site over the long term, fails to identify the ultimate custodian of the disposal site, and fails to address the financing of long-term maintenance and monitoring, respectively. Staff poses no objection to AG 2(h) but suggests that AG 2(i) and (j) may constitute challenges to the regulations. Kerr-McGee objects to all three on the ground that they are challenges to the regulations.

We agree with Staff and Kerr-McGee that AG 2(i) is not litigable. While the People have raised certain factors which bear on the question which government, state or federal, should become the owner of the disposal site and therefore the ultimate custodian, the fact remains that the choice is completely within the control of the state. Section 83(b)(1)(A)(ii) of the Atomic Energy Act as implemented by Criterion 11 of Appendix A clearly provides that if the State elects not to become owner of the site, the federal government must. This contention is denied.

Kerr-McGee objects that Contention AG 2(h) goes beyond the EPA requirements and thus poses a challenge to these regulations. That may be so. However, as indicated in the above discussion, that fact may not preclude the imposition of requirements by NRC which are more stringent than necessary to meet the EPA standards in appropriate cases. This contention is admitted.

Kerr-McGee believes that Contention AG 2(j) should be addressed shortly before license termination when the costs of long-term maintenance and monitoring may be more accurately assessed. While we agree that specific attention will have to be given to this point at that time, we also note that this issue must be addressed in at least general terms now. We have held that permanent disposal must be considered now. Section 84(a)(1) of the Atomic Energy Act provides that factors such as this are relevant to the Commission's responsibility to ensure that tailings are properly managed. Criterion 9 of Appendix A requires that the surety to be established by a licensee prior to the commencement of milling activities must include payment of the charge for long-term surveillance and control required by Criterion 10. If this matter must be considered prior to operation, it clearly must be considered when the issue posed is ultimate disposition of the tailings. This contention is admitted.

health effects, long-term land use considerations, or long-term groundwater contamination.

The People maintain that all these factors are amenable to some degree of quantification and that Staff's efforts in this area are inadequate. In their reply brief, the People clarify their position as follows:

> While they do not demand that all considerations entering into the cost-benefit balance be monetized, they maintain that a cost-benefit analysis be struck which compares all relevant costs and benefits in qualitative terms where quantification is not reasonably possible.[97]

In its response, Staff agrees that the FES does not contain a formal cost-benefit analysis. Staff maintains that the Commission's regulations do not require one. Rather, Staff points out that the regulations require that all considerations, both qualitative and quantitative, which go into a cost-benefit analysis receive appropriate consideration. Staff relies on the Statement of Considerations accompanying revised Part 51 for its position, and maintains that many considerations, such as dose reductions and improvement in the quality of an aquifer, are difficult to quantify. Staff also maintains that it is premature to monetize the long-term maintenance and monitoring needs at West Chicago or elsewhere because Staff is not ready to consider where permanent disposal should take place.[98]

Kerr-McGee takes the position that none of the People's arguments can withstand scrutiny. Nonetheless, Kerr-McGee believes that an evaluation of costs and benefits no longer supports Alternative III because the justification for selecting that alternative, the lack of EPA standards, is no longer available. Kerr-McGee believes a balancing of costs and benefits now supports Alternative I,[99] a point with which the People strongly disagree.

We agree with the People that a more rigorous cost-benefit analysis is required in this case. The portion of the Statement of Considerations quoted by the Staff in its Memorandum supports the People's point of view. That quotation closes with the statement that "the Commission intended to make clear that a comprehensive environmental analysis should include the consideration and balancing of qualitative as well as quantitative impacts."[100] Staff should therefore set out its cost-benefit balance as a separate topic within the FES and should consider therein

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[97] People's Brief at 44-51, and Reply Brief at 25-32.

[98] Staff's Memorandum at 23-26.

[99] Kerr-McGee's Brief at 27-31.

[100] 49 Fed. Reg. 9363 (March 12, 1984).

in qualitative terms those elements which cannot be reasonably quantified.

Our rulings herein require that permanent disposal of these mill tailings must now be considered. This will undoubtedly affect the content of the information to be included in the cost-benefit analysis. In this regard, we agree with the People that long-term maintenance and monitoring costs, land use values, doses to the surrounding population, and impacts on groundwater must be considered and compared with respect to the West Chicago site and the possible alternative sites. These considerations are intimately bound up with the Staff's consideration of alternate sites which is also being challenged by the People. Without some evidentiary basis, we are not in a position to pass on the adequacy of the consideration or quantification of these factors in the FES. Thus these are matters which must be subjected to 10 C.F.R. Part 2 procedures before they may properly be resolved.

RADIOLOGICAL DOSES

Contentions AG 1(i) and AG 2(x) concern radiological doses. AG 1(i) argues that, because children are more radiosensitive than adults, the FES should consider the health effects of doses received by a child rather than an adult. Both Staff and Kerr-McGee offer rationalizations for considering doses to an adult rather than a child. While their rationalizations may ultimately prove to be correct, we may not reach that conclusion prior to subjecting these rationalizations to the hearing process. Contention AG 1(i) is admitted.

Contention AG 2(x) asserts that Kerr-McGee's and Staff's assessment of post-closure radiation doses are inaccurate and that Kerr-McGee has not demonstrated that these doses will be low enough to avoid endangering the health of the public. The People moved to have this contention admitted on August 15, but did not furnish the text of the contention until August 22, when we heard argument on it.[101]

While Staff believes that this contention is inexcusably late, it also believes that it is subsumed within AG 1(b), so that, if the latter is admitted, AG 2(x) will be covered. The People, in their motion, indicated that the same issue was raised with respect to Staff in AG 1(b). They note that AG 2(x) would raise this issue with respect to Kerr-McGee. Staff also has concerns that the contention is overly vague and perhaps a

[101] Tr. 224-31.

challenge to the regulations. Kerr-McGee opposes the contention on the ground that it is untimely.

We share the Staff's concern that the contention is overly vague. While the first phrase of this one-sentence contention clearly calls into question the accuracy of the assessment of post-closure radiological doses, the second phrase is subject to two interpretations. The first is that because of inaccurate assessment, Kerr-McGee and Staff have not demonstrated that the doses will be low enough to adequately protect the health of the public. We believe that this is what was intended because the People have alluded in their motion to the preliminary view of their consultant that there may be significant problems with calculations contained in the FES and justify the acceptance of this contention on the need to begin discovery on this matter now, rather than waiting for a ruling on AG 1(b). While this contention does specifically bring these allegations to bear on Kerr-McGee (AG 1(b) is directed only at Staff), we believe this to be a distinction without a difference in this instance. Staff has chosen to utilize the FES as the vehicle for its health and safety analysis. The assessment and health effects of radiological doses are plainly a principal part of that analysis and must be performed by Kerr-McGee in the first instance. Thus, in this respect AG 1(b) calls Kerr-McGee's work into question as well as Staff's. We therefore deny AG 2(x) as redundant.

SCOPE OF PROCEEDING

The rulings which we have made require that permanent disposal of these mill tailings be considered now and that that consideration must include both disposal at the disposal site as well as at alternative sites. The People have indicated that they believe that Alternative IV presents the only realistic alternative to disposal at the disposal site.[102] Therefore, absent some new development with respect to alternatives, this proceeding should focus on Alternatives I and IV as set forth in FES.

On September 24, 1984, the People moved the Board to direct Staff to clarify a statement made in its September 6 answer to our question regarding any regulatory constraints which might adhere to Alternative I as opposed to Alternative III.[103] The statement in question notes that an application to dispose of tailings at a new site in a residential neighborhood would likely be rejected out of hand, citing Criterion 1 of Appendix

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[102] People's Post-Prehearing Conference Brief at 31.
[103] This matter is discussed at pp. 1303-05, *supra*.

A. The People note that Appendix A makes no distinction between new and existing sites, and take the position that they may be entitled to an immediate disposition of the proceeding in their favor. Staff opposes the People's motion.

The motion is denied. Kerr-McGee and, to the extent it supports Kerr-McGee's application, Staff will have to satisfy us that this site may be approved for permanent disposal of these tailings. A motion to clarify is not the procedural vehicle to raise this issue.

It is so ORDERED.[104]

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Dr. Peter A. Morris
ADMINISTRATIVE JUDGE

Dr. James H. Carpenter (by JHF)
ADMINISTRATIVE JUDGE

John H Frye, III, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 19th day of October 1984.

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[104] Appendix A gives the disposition (and date of disposition) of each of the contentions. Appendix B sets out the language of the contentions. [The Appendices have been omitted from this publication but can be found in the NRC Public Document Room, 1717 H Street, NW, Washington, DC 20555.]

Cite as 20 NRC 1333 (1984) LBP-84-43

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

B. Paul Cotter, Jr., Chairman
Mr. Gustave A. Linenberger, Jr.
Ivan W. Smith, Alternate Chairman

In the Matter of

Docket Nos. 50-463-CP
50-464-CP
(ASLBP No. 76-300-01-CP)

PHILADELPHIA ELECTRIC COMPANY
(Fulton Generating Station,
Units 1 and 2)

October 23, 1984

In this Initial Decision, the Licensing Board dismisses the proceeding without prejudice as moot, subject to the condition that the Applicant is barred from filing a future application identical to the one dismissed.

RULES OF PRACTICE: DISMISSAL WITH OR WITHOUT PREJUDICE

An unparticularized, unsupported general allegation of harm to property values caused by Applicant's delay in dismissing its application is not of sufficient weight or moment to cause the Board to inquire further.

RULES OF PRACTICE: DISMISSAL WITH OR WITHOUT PREJUDICE

General allegations of psychological stress, even if factually supported, provide no basis for a legally cognizant claim for relief.

RULES OF PRACTICE: DISMISSAL WITH OR WITHOUT PREJUDICE

Costs incurred by the NRC Staff in reviewing an application subsequently withdrawn may not be billed to the applicant as a condition of dismissal, where those costs were incurred prior to the November 6, 1981 adoption of revised regulations.

INITIAL DECISION

I. INTRODUCTION

On February 4, 1982, the Commission declined to review an appeal board decision, ALAB-657, 14 NRC 967 (1981), which had vacated this Board's decision to dismiss the captioned proceeding with prejudice. The appeal board decision remanded the proceeding "for further action in conformity with this opinion." *Id.* at 979. ALAB-657 held that the licensing board had abused its discretion in deciding to dismiss with prejudice Philadelphia Electric Company's (Applicant or PECO) application for a permit to construct twin high-temperature gas-cooled reactors (HTGR) at its Fulton site 17 miles south of Lancaster, Pennsylvania. Following a review of the entire record in this matter, the application to construct twin high-temperature gas-cooled reactors at the Fulton site is hereby dismissed without prejudice as moot. The dismissal is conditioned, all as more fully set out below.

II. BACKGROUND

The sole issue before this Board* is whether this remanded proceeding should be dismissed with or without prejudice. The issue is before us on a motion for summary decision filed by Applicant.

The background of this proceeding is set forth in greater detail in the prior licensing board's unpublished opinion dated February 27, 1981, and the ALAB-657 decision to vacate and remand. Those decisions recite that the original application for a construction permit to build twin HTGRs at the Fulton site was filed in July 1973; that PECO's reactor supplier unilaterally stopped work on the project and NRC suspended its

*The board was reconstituted on December 9, 1983 (48 Fed. Reg. 55,789) and February 28, 1984 (49 Fed. Reg. 8097) by replacing two of its three members.

review of the application in 1975; and that the proceeding was then suspended for 3 years, although PECO filed monthly status reports with the licensing board from December 1975 to December 1978. The decisions further recite that the Commission issued its regulation authorizing Early Site Review (ESR) in 1977; that in March 1978 PECO informed NRC Staff informally that PECO would amend its application to seek early site review, that PECO filed the application in December 1978, but then on December 5, 1980, PECO moved to withdraw its application without prejudice. The ESR application was not actually docketed by the NRC Staff prior to its withdrawal. Thereafter, one of the three principal groups of intervenors requested that the licensing board dismiss the application with prejudice. The board granted Intervenor's* request in 1981, and an appeal led to the issuance of ALAB-657.

The ALAB-657 decision was based on the appeal board's defining the licensing board dismissal with prejudice to mean that PECO could be barred from filing an application to construct *any* reactor at the Fulton site. The appeal board's chosen definition was the third of three possible limitations it saw on PECO's future activities, namely:

> (1) refiling an identical application to construct an *HTGR* at th_ *Fulton* site; (2) filing a new application to construct *any* type of nuclear reactor at *any* site; or (3) filing a new application to construction *any* type of nuclear reactor at *Fulton*.
>
> If the Board contemplated the first alternative, then this appeal may be much ado about nothing.

Id. at 973. (Emphasis in original.) We agree. The dismissal with prejudice in the original licensing board decision meant that PECO was barred from refiling an identical application to have General Atomic Corporation construct the twin HTGRs proposed at the Fulton site.

However, the licensing board's decision contained discussion of PECO's intent and good faith in reaching its final decision to withdraw the ESR application. The original application proceeding had been actively litigated by the parties for the first 2 years after the application was filed, and the NRC Staff had produced both a Safety Evaluation Report and a Final Environmental Statement by the time General Atomic Company announced its unilateral decision not to build the facility in September 1975. The proceeding was essentially suspended for 3 years while PECO reassessed its options and then was reactivated in December 1978 by PECO's amending its construction permit application to seek early site review instead. The licensing board's discussion of those events in conjunction with the dismissal with prejudice in 1981 apparently prompted PECO's appeal.

Upon reconstitution in late 1983, this Licensing Board issued a proposed decision and order dismissing this proceeding with prejudice for the narrow purpose of bringing to a final conclusion the original application to build the General Atomic HTGRs at the Fulton site. Nevertheless, PECO and the NRC Staff objected, and PECO filed a Motion for Summary Decision seeking to terminate the proceeding without prejudice as moot. Staff supported PECO. Intervenor York Committee for a Safe Environment, a member of Environmental Coalition on Nuclear Power (ECNP) opposed PECO's motion, and the only other respondent, the Susquehanna River Basin Commission, did not object to dismissal of the proceeding. Thereafter, oral argument on PECO's motion, including any possible claim for intervenors' fees and expenses, was held in Philadelphia, Pennsylvania.

III. POSITIONS OF THE PARTIES

Applicant states that the record demonstrates and ALAB-657 held that there is no evidence either of a bad faith prosecution of PECO's amended application for early site review or any injury to any legally cognizable interest. PECO argues that a dismissal with prejudice requires both bad faith and harm to an individual or the public, that the burden of making such a showing is on the one seeking dismissal with prejudice, not the Applicant, and that no such showing has been made. Consequently, PECO concludes the proceeding should be dismissed without prejudice. PECO asserts further that it would not object to a condition that any future application for a Fulton nuclear plant could not be identical to the amended application now pending before this Board. Motion for Summary Decision at 23.

Dr. Judith H. Johnsrud, representing the York Intervenors, asserts that the only reason for PECO's actions (which she characterizes as unreasonable, arbitrary, and capricious) in connection with the ESR application was to keep it alive. Tr. 23-27. While not asserting bad faith as such, Dr. Johnsrud sees three distinct injuries resulting from PECO's actions: (1) an unspecified harmful effect on property values; (2) damaging stress on individual citizens concerned about the application; and (3) the substantial cost to the Commission in Staff time and effort expended on reviewing the original and the amended applications. Tr. 48-66; January 7, 1984 Intervenors' Response. Nevertheless, Dr. Johnsrud affirmatively asserts that Intervenors York, the central Pennsylvania group, and herself personally, do not seek fees or costs. Tr. 61, 66. Rather, they seek in the first instance an order "that this utility may not raise another application for a reactor license at the Fulton site" (Tr.

52), or, in the alternative, dismissal with prejudice confined to a ban against building the original General Atomic HTGR at the Fulton site. Intervenors' Response at 4.

The NRC Staff concurs with PECO's position, and adds that because PECO paid a licensing fee on the original application and a First Circuit Court of Appeals' decision banned retroactive imposition of fees equal to the amount the Staff had expended in reviewing the application, no further fees are payable. Staff submitted a copy of its letter to PECO in 1982 stating that position. Tr. at 70.

IV. DISCUSSION

The grounds for either form of relief sought by intervenors has evolved at this juncture into two broad categories: (1) harm to those near the site either to property values or in the form of psychological stress; and (2) recoupment of costs incurred by the Commission Staff above and beyond the initial application fee. For the reasons set out below, no such relief is available.

The claimed harm to property values has never risen above the status of an unparticularized, general allegation. No property or properties have ever been identified, no affidavits proffered, nor has any basis of any kind been offered such as would require this Board to inquire further. The allegation has been brief and casual to say the least. In short, it is not

> supported by a showing, typically through affidavits or unrebutted pleadings, of sufficient weight and moment to cause reasonable minds to inquire further.

Puerto Rico Electric Power Authority (North Coast Nuclear Plant, Unit 1), ALAB-662, 14 NRC 1125, 1133-34 (1981); *Fulton*, ALAB-657, *supra*, 14 NRC at 979.

Similarly, general allegations of psychological stress are wholly unsupported. ALAB-657, *supra*. More significantly, however, even if a threshold factual showing were made, no basis for a legally cognizable claim for harm to psychological health has been suggested. In *Metropolitan Edison Co. v. People Against Nuclear Energy*, 103 S. Ct. 1556, 75 L. Ed. 2d 534 (1983), the Supreme Court held that the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq.*, did not create a cause of action for harm to psychological health resultant from the prospect of renewed operation of the Three Mile Island nuclear plant. Harm to psychological health is a perception of risk beyond the scope of

NEPA. Dr. Johnsrud's claim of psychological stress has even less purported foundation than that asserted in the Supreme Court case where an accident had occurred in the twin to the reactor proposed for renewed operation. In the instant case there has not only been no accident, there has been no reactor. This Board has found no other legal basis for a claim for psychological harm, and thus it must fail both factually and legally.

Finally, Intervenors allege that the Commission has incurred additional costs that should be compensated. Intervenors make no legal arguments, they simply allege the fact of additional costs. The allegation as to additional costs may well be grounded in fact, but there is no basis for asserting a right to compensation in law. In opposition, Staff points to *New England Power Co. v. NRC*, 683 F.2d 12 (1st Cir. 1982). There the Court held that applicants could not be billed for withdrawn applications if the request for withdrawal was filed before November 6, 1981. The application at issue here was withdrawn in 1980. Consequently, the Staff has concluded that it is barred from billing PECO for costs of review beyond those in effect prior to the time the Commission's revised rule became effective on November 6, 1981 to enlarge the amount that could be billed. We concur in the Staff's conclusion. *Id.* at 18.

All litigation must come to an end some time. *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-750A, 18 NRC 1218, 1220 (1983). To that end we accept PECO's lack of objection to a condition on the dismissal barring "any future application at Fulton . . . identical to the one which, as amended, is presently pending before . . ." this Licensing Board. The term "identical" is used in our Order to mean, as PECO points out, that with changes in technology and regulations, it is highly unlikely that a future application would be the same in all respects as the HTGR application at issue here.

ORDER

For all the foregoing reasons and upon consideration of the entire record in this matter, it is, this 23rd day of October 1984,

ORDERED

That Philadelphia Electric Company is barred from filing a future application at Fulton identical to the one, as amended, which is presently pending before this Licensing Board; and

That Applicant's Motion for Summary Decision is granted and *In the Matter of Philadelphia Electric Company*, NRC Docket Nos. 50-463-CP and 50-464-CP, is dismissed without prejudice as moot.

THE ATOMIC SAFETY AND
LICENSING BOARD

B. Paul Cotter, Jr., Chairman
ADMINISTRATIVE JUDGE

Ivan W. Smith
ADMINISTRATIVE LAW JUDGE

Gustave A. Linenberger, Jr.
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 23rd day of October 1984.

Cite as 20 NRC 1340 (1984) LBP-84-44

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Peter B. Bloch, Chairman
Dr. Kenneth A. McCollom
Dr. Walter H. Jordan

In the Matter of

Docket Nos. 50-445
50-446
(Application for Operating License)

TEXAS UTILITIES ELECTRIC COMPANY, *et al.*
(Comanche Peak Steam Electric Station, Units 1 and 2)

October 25, 1984

In this Memorandum, the Licensing Board requests information concerning certain technical issues.

TECHNICAL ISSUES DISCUSSED

Safety factors derived from materials tests;
Tests of materials (representativeness of sample tested);
A36 and A307 steels as structural materials.

MEMORANDUM
(Information on Composition of A36 and A307 Steel)

Because of the variability in A36 (A307) steel, the Licensing Board requires information about the extent to which the items tested by Applicants have been representative of the steels actually employed at the plant. This issue was brought to our attention by CASE in "CASE's Answer to Applicants' Statement of Material Facts Relating to Richmond Inserts as to Which There Are No Material Issues in the Form of Affidavit of CASE Witness Mark Walsh," September 10, 1984, at 10-12.[1] The issue relates to the validity of the tests of U-bolts[2] and of A36 bolts used in Richmonds. It may also relate to limitations of testing techniques.

Another relevant question about testing techniques is what the appropriate safety factor is in allowables established by test. It is our understanding that manufacturers' specifications and code allowables include safety factors designed to compensate for a variety of tolerances, including installation tolerances. We have not been informed about how safety factors are accounted for in the use of test results.

ORDER

For all the foregoing reasons and based on consideration of the entire record in this matter, it is, this 25th day of October 1984,

ORDERED

Texas Utilities Electric Company, *et al.*, may respond to this request for information within 1 month from the time of issuance of this Order. It shall provide to CASE and the Staff all underlying documents and analyses on which it relies in its response. CASE shall have 1 month

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[1] In this filing, Mr. Walsh cites Applicants' witness, Dr. Robert Iotti, "In the Matter of Questions on Summary Dispositions Filed by Texas Utilities on Comanche Peak" (Staff Meeting), August 8, 1984, Tr. 15-16.

[2] Westinghouse Electric Corporation, Comanche Peak Steam Electric Station U Bolt Support/Pipe Test Report, May 17, 1984 (Attachment 1 to Attachment 1 to Applicants' Motion for Summary Disposition of CASE's Allegations Regarding Cinching Down of U-Bolts, June 29, 1984), at 3-4 describes the "Test Items" which are comprised of A36 material, without reference to their chemical composition, the method by which they were chosen or their representativeness. Indeed, there also is no mention of the extent of their representativeness of the dimensions of U-Bolts used at the plant. *See also* Affidavit of Robert C. Iotti and John C. Finneran, Jr. Regarding Cinching Down of U-Bolts (Attachment 1 to Applicants' Motion, *supra*) at 21 n.8, stating without a description of the variation in dimensions within the plant and without any explanation, that "small differences in dimension do not affect the conclusion of this study."

from the receipt of the last underlying document and analysis within which to respond.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Peter B. Bloch, Chairman
ADMINISTRATIVE JUDGE

Walter H. Jordan (by PBB)
ADMINISTRATIVE JUDGE

Kenneth A. McCollom (by PBB)
ADMINISTRATIVE JUDGE

Bethesda, Maryland

Cite as 20 NRC 1343 (1984) **LBP-84-45**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Marshall E. Miller, Chairman
Glenn O. Bright
Elizabeth B. Johnson

In the Matter of

Docket No. 50-322-OL-4
(ASLBP No. 77-347-01C-OL)
(Low Power)

LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Station, Unit 1)

October 29, 1984

Licensing Board grants 10 C.F.R. § 50.57(c) exemption to requirements of general design criteria to authorize license for low-power operation in reliance upon an "enhanced" offsite AC emergency power system in the absence of a fully qualified onsite system.

REGULATIONS: EXEMPTIONS

Pursuant to Commission direction, applicant for 10 C.F.R. § 50.57(c) exemption to portions of design criteria must show that the operation of the plant will be "as safe as" it would be were it in full compliance, and that equities of exigent circumstances favor the grant of the exemption.

REGULATIONS: INTERPRETATION AND APPLICATION

An examination of "inconsistencies" in NRC regulations must include not only inconsistencies in their literal wording, but also inconsistencies in their application in practice.

SAFETY STANDARDS: COMPLIANCE

If no core cooling is necessary to protect public health and safety during certain phases of Applicant's low-power testing program, no emergency AC power can be needed for that purpose; compliance with requirement for sufficient available emergency power is achieved, even in the absence of any emergency AC power sources whatsoever.

SAFETY STANDARDS: COMPLIANCE

The safety limits of 10 C.F.R. § 50.46(b) are set conservatively to provide a safety margin. A plant is deemed safe if it can show that it meets these limits; it need exceed them by no particular margin of safety.

SAFETY STANDARDS: COMPLIANCE

NRC reactor safety standards are viewed in the functional sense: What must safety systems be able to do in order to protect public health and safety, and are they able to do it? A point-by-point comparison of each component of alternate systems is not appropriate.

DESIGN CRITERIA: GDC 17

An exemption to the requirement for a fully qualified onsite emergency AC power source is granted for purposes of low-power operation where emergency power is available from "enhanced" offsite systems.

SEISMIC AND GEOLOGIC CRITERIA: OFFSITE POWER SOURCES

Although, in lieu of a fully qualified source of onsite emergency AC power, normal offsite power sources will be relied upon, in part, for emergency power during low-power operations, there is no requirement or justification for imposing the seismic qualification of these normal offsite power sources.

SINGLE FAILURE CRITERION: APPLICATION

Where emergency AC power is to be supplied utilizing a system comprised of multiple separate power sources, the single failure criterion is applied to determine the impact of a single failure on the ability to provide power to the system as a whole, not on the ability of each component thereof.

OPERATING LICENSES: LOW POWER

An exemption to GDC 17 may be authorized for low-power operation where applicant has shown that operation would be as safe as it would be if it were in full compliance, and that exigent circumstances favor the grant of the exemption.

SECURITY PLAN: VITAL AREAS

Where an exemption is sought from regulation requiring a qualified source of onsite emergency AC power, the offsite power "enhancements" provided as sources of additional emergency power need not be treated as vital.

OPERATING LICENSE HEARINGS: ISSUES FOR CONSIDERATION

Cost to applicant of protracted litigation may be considered as an "economic and financial hardship" experienced by it relevant to an equitable "exigent circumstances" determination.

TECHNICAL ISSUES DISCUSSED

Emergency AC Power
General Design Criterion 17
LOCA at Low Power
Low-Power Operation
Offsite Electrical Power Grid
Safety Standards
Single Failure Criterion
Standby Gas Treatment System.

APPEARANCES

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INITIAL DECISION

I. PROCEDURAL HISTORY

The Applicant, Long Island Lighting Company (LILCO), tendered its application for an operating license for the Shoreham Nuclear Power Station in August 1975. Proceedings on the application began in April 1976 with the appointment of a licensing board constituted to conduct adjudicatory hearings in this matter.[1] In the 8 years since that time over 180 days of evidentiary hearings have been held, generating more than 34,000 transcript pages, before seven different licensing boards which have issued more than 2900 pages of decisions. More than 310 witnesses have testified, and almost 400 exhibits have been offered into evidence.[2]

This Initial Decision decides issues relevant to authorization of a low-power operating license, pursuant to 10 C.F.R. § 50.57(c) for the Shoreham plant. For reasons set forth below, this Board authorizes the grant

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[1] 41 Fed. Reg. 17,979 (1976).
[2] Tr. 1726-27.

of an exemption from the requirements of certain General Design Criteria (GDC), specifically GDC 17,[3] and recommends that a low-power operating license be granted.

Shortly after the close of the record as to all issues in the proceeding except for offsite emergency planning, LILCO on June 8, 1983, submitted its original motion for a low-power operating license. However, after a failure during testing of the facility's onsite emergency diesel generators (TDIs)[4] a new contention regarding these generators was admitted June 22, 1983.[5] Thus, when the Partial Initial Decision (PID) was issued in this proceeding on September 21, 1983,[6] it said,

> Even though we resolve all contentions which are the subject of this Partial Initial Decision favorably to LILCO, at least insofar as operation at levels up to five percent of rated power is concerned, we do not authorize the issuance of the license for fuel loading and low-power operation which LILCO has requested at this time. No such license may be authorized until such time as that portion of Suffolk County's recently admitted emergency diesel generator contention may be resolved in LILCO's favor, at least insofar as necessary to support a finding of reasonable assurance that Shoreham can be operated at levels up to five percent of rated power without endangering the health and safety of the public.

Id., 18 NRC at 634.

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[3] GDC 17 states:

> *Electric power systems.* An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.
>
> The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.
>
> Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights of way) designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.
>
> Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.

[4] So-called because of the manufacturer, Transamerica Delaval, Inc.

[5] "Memorandum and Order Ruling on Suffolk County's Motion to Admit New Contention," LBP-83-30, 17 NRC 1132 (1983).

[6] LBP-83-57, 18 NRC 445 (1983).

The Licensing (Brenner) Board which authored that PID did not, however, preclude LILCO from proposing other ways it could qualify for low-power operation (Brenner Board, Tr. 21,630-61).

On March 20, 1984, LILCO submitted its "Supplemental Motion for Low-Power Operating License." Therein, LILCO submitted that the pending diesel generator issues need not be resolved prior to the granting of a low-power license for Shoreham,[7] as these generators were not necessary to assure the public health and safety during low-power operations. Because two members of the Licensing Board with jurisdiction over nonemergency planning matters for Shoreham were heavily committed to work on another proceeding, the instant Board was established on March 30, 1984, to hear and decide LILCO's supplemental motion.[8]

LILCO has divided its proposed low-power testing program into four distinct phases, each consisting of a separate set of operations and testing. These phases are:

(a) Phase I: fuel load and precriticality testing,
(b) Phase II: cold criticality testing,
(c) Phase III: heatup and low-power testing to rated pressure/temperature conditions (approximately 1% rated power); and
(d) Phase IV: low-power testing (1-5% rated power).

The LILCO motion, supported by affidavits, alleged that during Phases I and II, no AC power whatsoever was necessary to protect public health and safety, and therefore no diesel generators were necessary to satisfy NRC regulations. Furthermore, LILCO said, even assuming the TDI diesels are unavailable, ample alternate sources of AC power are available to provide reasonable assurance of no risk to public health and safety up to 5% rated power.

In addition to the in-place, though not fully litigated, TDI diesels and the site's access to offsite power grid,[9] LILCO had added certain additional AC power generating equipment as "enhancements" for emergency backup power. These are:

- four 2.5-MW EMD (Electro-Motive Division, General Motors) deadline blackstart mobile diesel generators
- a 20-MW gas turbine with deadline blackstart capability.[10]

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[7] Section 50.57(c) of 10 C.F.R. permits the issuance of a "license authorizing low-power testing (operation at not more than 1 percent of full power for the purpose of testing the facility), and further operations short of full power operation."

[8] 49 Fed. Reg. 13,611 (1984).

[9] A 138-kV and 69-kV high voltage network system interconnected with other power networks.

[10] "Blackstart" means able to be started independently of any other power source; "deadline blackstart" means that the equipment recognizes through its own circuitry that a loss of power has occurred, and automatically starts without operator action.

Although the 20-MW gas turbine and the EMD diesels are physically located on the Shoreham site, they are, for NRC licensing purposes, considered "offsite" — that is, not fully qualified as "onsite" power sources in compliance with all safety-related nuclear requirements.[11]

The necessity for onsite diesel generators derives from General Design Criterion (GDC) 17, which requires that electric power systems assure that, in the absence of either onsite or offsite power systems, (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences, and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.[12] LILCO's motion alleged that a review of the spectrum of transients and accidents postulated in Chapter 15 of Shoreham's Final Safety Analysis Report (FSAR) revealed that there were no requirements for AC power during Phases I and II. Thus there was no need for any emergency power sources to protect public health and safety. During Phases III and IV, LILCO said, the public would be exposed to far less risk than it would be during full-power operations, and LILCO would be well able to restore emergency AC power in the ample amount of time available to avert any danger to public health and safety.

Intervenors Suffolk County and the State of New York opposed LILCO's motion.[13] The NRC Staff, however, supported LILCO. The Staff said that in resolving this issue, the Board must focus on the nature of the license being sought: the issue is whether low-power activities, not full-power activities, may safely be conducted in the absence of a fully qualified onsite AC power source. The Staff noted that licensing boards have previously determined that the emergency planning measures required for low-power operation were not the same as for full-power operation. However, the protection offered the public during low-power operation should be no less than that afforded at full-power operation in full compliance with regulations.[14] The Staff concluded that the same concept should be applied to the requirements associated with emergency power sources (specifically GDC 17), and that if the

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[11] Until the main shaft of one of the TDI diesels broke during testing, calling into question the reliability of each of LILCO's three diesels, they were considered fully qualifiable, onsite emergency power sources.

[12] 10 C.F.R. Part 50, Appendix A.

[13] "Supplement to Suffolk County's Preliminary Views on Scheduling Regarding LILCO's New Motion," March 30, 1984; "Preliminary Views of Governor Cuomo, Representing the State of New York, Regarding LILCO's So-called 'Supplemental Motion for a Low-Power Operating License'," March 28, 1984.

[14] *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-3, 15 NRC 61, 185-97 (1982); *see also Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-81-21, 14 NRC 107, 120-23 (1981).

protection afforded the public at low-power levels without approved diesel generators was found to be at least equivalent to the protection afforded the public at full power with approved diesel generators, LILCO's motion should be granted.[15]

At a conference of counsel on April 4, 1984, oral arguments of the parties were heard on the issues raised by LILCO's Motion. At that conference, LILCO agreed that, for purposes of deciding the instant low-power motion, no discussion of any possible or potential use of the TDIs in an emergency would be relevant (Tr. 18-20). This was consistent with the statements made by the original Licensing (Brenner) Board that had the TDI contention before it, namely, that that Board had no confidence that any of the TDIs would operate if needed until it had litigated contentions thereon (Tr. 21,631).

Subsequent to the conference, a "Memorandum and Order Scheduling Hearing on LILCO's Supplemental Motion for Low-Power Operating License" (unpublished) was issued April 6, 1984. Therein, it was held that the provisions of 10 C.F.R. § 50.57(c), which allow an applicant to request a license for low-power testing while the proceeding for full-power license is pending, must be read together with the requirements of GDC 17, harmonizing the two rules in order to reach a sensible result and respect the purposes of both. The Board established an evidentiary hearing for the purpose of determining whether or not there was "reasonable assurance that the low-power activities can be conducted with the protection to the public at least equal to the protection offered at full-power operations with the approved diesel generators" (Memorandum and Order at 12).

II. ISSUES CONSIDERED

Ultimately, the Commission considered the issues raised by the LILCO low-power motion and, after hearing the arguments of counsel, it issued an Order[16] (May 16 Order). The Commission held that "10 C.F.R. § 50.57(c) should not be read to make General Design Criterion 17 inapplicable to low-power operation," and the Board's Order of April

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[15] In the Staff's Safety Evaluation Report, Supplement No. 5 (SSER-5), served on the Board on April 20, 1984, the Staff reiterated this position:

> The basis for acceptance of the alternate AC power sources was conformance with the intent of the GDC for the low-power mode of plant operation. . . . The design provides a level of safety for 5% rated power operations at least equivalent to that required by GDC 17 and 18 for full-power operation, and is acceptable. . . .

Shoreham SSER No. 5, at 8-9.

[16] CLI-84-8, 19 NRC 1154 (1984).

6, 1984, was vacated to the extent that it was inconsistent with such ruling (May 16 Order, 19 NRC at 1155). The Commission noted that LILCO had indicated that it would seek an exemption to NRC regulations under 10 C.F.R. § 50.12(a).[17] The Commission stated that LILCO would have to show that operation of the facility at low-power levels without a qualified AC power source would be as safe as operation with such a source, and to demonstrate the "exigent circumstances" which favor the granting of this extraordinary form of relief. The Commission explained that:

> A finding of exceptional circumstances is a discretionary administrative finding which governs the availability of an exemption. A reasoned exercise of such discretion should take into account the equities of each situation. These equities include the stage of the facility's life, any financial or economic hardships, any internal inconsistencies in the regulation, the applicant's good-faith effort to comply with the regulation from which an exemption is sought, the public interest in adherence to the Commission's regulations, and the safety significance of the issues involved.

(May 16 Order, 19 NRC at 1156 n.3.)

LILCO submitted its Application for Exemption on May 22, 1984, in which it requested an exemption under § 50.12(a) from the requirements of GDC 17, and from other applicable regulations, if any, which require that the TDI diesel contentions be fully adjudicated prior to conducting the low-power testing described in LILCO's March 20 Motion. On May 31, 1984, we issued our "Order Establishing Schedule for Resumed Hearing" (unpublished). The evidentiary hearing commenced on July 30, 1984, and the record was closed on everything except security issues (discussed *infra*, pp. 1356-58) on August 7, 1984.

A. Summary Disposition of Phases I and II

On May 22, 1984, following the issuance of the Commission's May 16 Order, LILCO filed motions for summary disposition on Phases I and II of its low-power testing program.[18] LILCO stated that, in the words of GDC 17, the onsite AC power source must be of "sufficient capacity and capability" to assure the performance of the specified safety

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[17] Section 50.12(a) specific exemptions:

> (a) The Commission may, upon application by any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

[18] *See* p. 1349, *supra*, for definitions of the phases of low-power testing.

functions. LILCO's affidavits demonstrated that during Phase I fuel loading and precriticality testing, there are no fission products in the core and no decay heat. Therefore, core cooling is not required because with no fission product inventory, fission product releases are not possible. Thus, LILCO contended that as to Phase I, no AC power, either off site or on site, is necessary to perform health and safety functions. The reliability of LILCO's onsite diesels is therefore not material, and hence a license for fuel loading and precriticality testing should be granted without any litigation.[19]

LILCO also requested summary disposition of its Phase II testing program. LILCO contended that during Phase II, which includes cold criticality testing of the plant at essentially ambient temperature and atmospheric pressure, the extremely low levels of fission products and decay heat in the core provide essentially unlimited available time before core cooling would have to be restored in case of an accident. Thus, LILCO said, in this Phase there is also no need for AC power, and the activities of Phase II should be authorized prior to litigation of other low-power issues.

On July 24, we issued our "Order Granting in Part and Denying in Part LILCO's Motions for Summary Disposition on Phase I and Phase II Low-Power Testing" (unpublished). In ruling on the LILCO motions, we gave weight to the guidance that the NRC Staff had provided in its June 13 Response to the motions. Therein, the Staff had opined that the Commission's May 16 Order (CLI-84-8) stands for the proposition that GDC 17 must be literally satisfied (or an exemption thereto must be obtained) before any license may be issued pursuant to 10 C.F.R. § 50.57(c). Thus, we granted summary disposition only as to some of LILCO's uncontroverted statements of material facts.[20] Those facts were of a technical nature, supported by affidavits, and not disputed by any other party. Those admitted facts are as follows:

Phase I:

(1) During all of the activities in Phase I, the reactor will remain at essentially ambient temperature and atmospheric pressure. The reactor will not be taken critical. Any increase in temperature beyond ambient conditions will be due only to external heat sources such as recirculation pump heat. There will be no heat generation by the core.

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[19] The Commission has recently approved fuel loading and precriticality testing in *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-83-27, 18 NRC 1146 (1983).

[20] *See* Findings No. 7-19, *infra*.

(2) Of the thirty-eight accident or transient events addressed in FSAR Chapter 15, eighteen of the events could not occur during Phase I because of the operating conditions of the plant. An additional six events could physically occur, but given the plant conditions, would not cause the phenomena of interest in the Chapter 15 safety analysis. The remaining fourteen events could possibly occur, although occurrences are highly unlikely given the plant conditions. The potential consequences of these fourteen events would be trivial.

(3) During Phase I fuel loading and precriticality testing, there are no fission products in the core and no decay heat exists. Therefore, core cooling is not required. In addition, with no fission product inventory, no fission product releases are possible.

(4) Even a loss-of-coolant accident would have no consequences during Phase I since no core cooling is required. No fission products exist and therefore no decay heat is available to heat up the core. The fuel cladding simply would not be challenged, even by a complete draindown of the reactor vessel for an unlimited period of time.

Phase II:

(1) Under the plant conditions present in Phase II, many events analyzed in FSAR Chapter 15 could not occur or would be very unlikely. Even the possible Chapter 15 events would have no impact on public health and safety regardless of the availability of the TDI diesels.

(2) Of the twenty-three possible Chapter 15 events reviewed, twenty would not be adversely affected by the loss or unavailability of offsite AC power. Therefore, the consequences of these events are unaffected by the unavailability of the TDI diesels.

(3) The three events that are adversely affected by the loss or unavailability of offsite AC power are: pipe breaks inside the primary containment, feedwater system pipe break, and the loss-of-AC-power event.

(4) Because of the extremely low power levels reached during Phase II testing, fission product inventory in the core will be only a small fraction of that assumed for the Chapter 15 analysis. The FSAR assumes operation at 100% power for 1000 days in calculating fission product inventory; inventory during Phase II low-power testing will be less than 1/100,000 (0.00001) of the fission product inventory assumed in the FSAR.

(5) If a LOCA did occur during the cold criticality testing phase (Phase II), there would be time on the order of months available to restore makeup water for core cooling. At the power levels achieved during Phase II, fission product inventory is very low. At most, the average power output will be a fraction of a watt per rod, with no single rod exceeding approximately 2 watts. With these low decay heat levels, the fuel cladding temperature would not exceed the limits of 10 C.F.R. § 50.46 even after months without restoring coolant and without a source of AC power. Thus, there is no need to rely on the TDI diesel generators, or any source of AC power.

(6) During Phase II cold criticality testing conditions, there is no reliance on the diesel generators for mitigation of the loss-of-AC-power event or the feedwater-system-piping-break event. For these events, no loss of coolant occurs and the decay heat is minimal. Core cooling can be achieved for unlimited periods of time without AC power using the existing core water inventory and heat losses to ambient.

(7) The LOCA and the feedwater system piping break postulate the double-ended ruptures of a piping system. Because the reactor will be at essentially ambient temperature and atmospheric pressure during Phase II, it is extremely unlikely that such a pipe break would ever occur. The NRC Staff does not require double-ended ruptures to be postulated for low-temperature and low-pressure systems in safety analyses.

(8) None of the events analyzed in Chapter 15 could result in a release of radioactivity during cold criticality testing that would endanger the public health and safety.

(9) Even if AC power were not available for extended periods of time, fuel design limits and design conditions of the reactor coolant pressure boundary would not be approached or exceeded as a result of anticipated operational occurrences, and the core would be adequately cooled in the unlikely event of a postulated accident.

On September 5, 1984, we issued an "Order Reconsidering Summary Disposition of Phase I and Phase II Low-Power Testing," LBP-84-35A, 20 NRC 920. Therein, we concluded that the Staff's original advice to the Board regarding the summary disposition motions for Phases I and II was not correct. Accordingly, we reconsidered and revised our prior order.

The LILCO motions had asserted that because no emergency AC power was needed for protection of public health and safety during Phases I and II, there was no requirement that AC power sources be available during these phases. The Staff, in its June 13, 1984 filing said, "the Staff believes this argument runs afoul of the position taken by the Commission in CLI-84-8. In arguing that no AC power is needed during Phases I and II, LILCO is essentially arguing that GDC 17 does not apply at this level of operation" (Staff's Response at 4). The Staff mischaracterized LILCO's argument. LILCO did not assert that GDC 17 is inapplicable to Phases I and II; what LILCO said was that the requirements of GDC 17 (power capacity and capability sufficient to assure performance of safety functions specified by the criterion), *when applied*, are satisfied, even with no power source available during Phases I and II. This is not an attempt to "harmonize" GDC 17 and 10 C.F.R. § 50.57(c), contrary to the Commission's May 16 Order. Rather, we simply took the original requirements of GDC 17 as set forth in the regulation and applied a rule of reason in its interpretation as a matter of "simple logic and common sense" (September 5 Order, 20 NRC at 924).

B. Safeguards/Security

On June 2, 1984, LILCO filed a motion to preclude discovery upon security issues in this proceeding. The Board granted that motion based upon the fact that a Final Security Settlement Agreement had been signed by the parties on November 24, 1982,[21] and ratified by a specially appointed Licensing Board on December 3, 1982.[22] Our "Order Granting LILCO's Motion *In Limine*" (unpublished) was issued June 20, 1984.[23]

Subsequently, the Commission found that some guidance on the litigability of security issues in this proceeding was appropriate. Although LILCO's exemption application was held not to be an occasion for parties to relitigate issues already decided in the main operating license proceeding, the Commission said parties would be permitted to raise new contentions that were: (1) "responsive to new issues raised by LILCO's exemption request"; (2) "relevant to the exemption application and the decision criteria as set forth in the Commission's Order of May 16, 1984"; (3) "reasonably specific"; and (4) "otherwise capable of

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[21] The agreement was signed by LILCO, Suffolk County and the NRC Staff. Although the State of New York was at that time a party to this proceeding, it chose not to participate in security issues.

[22] "Memorandum and Order Canceling Hearing, Approving Final Security Settlement Agreement, and Terminating Proceeding," December 3, 1982 (unpublished).

[23] The Agreement itself containing safeguards information, was not before the Board; our ruling was based upon the discussion set forth in the December 3, 1982 Memorandum and Order, *supra* note 22.

on-the-record litigation." The Commission further explained that security issues, if any, may only be litigated:

> (1) to the extent they arise from changes in configuration of the emergency electrical power system, and
> (2) to the extent they are applicable to low-power operation.[24]

On August 13, 1984, Suffolk County and the State of New York filed seven proposed security contentions. These proposed contentions were designated as restricted "safeguards information" by the proffering parties. On August 17 we issued a Protective Order setting requirements for the restricted treatment of safeguards information. All subsequent filings on this matter have been designated as safeguards information and treated as such. After LILCO responded to the proposed contentions, the Intervenors filed replies which contained a new superseding set of seven "revised" contentions. At an *in camera* conference of counsel[25] on August 30, we heard the additional arguments of all parties.[26] On September 19, we issued a twenty-page "Restricted" Order Denying Revised Security Contentions, and a brief summary thereof for public release.

A pervasive issue throughout the proffered revised security contentions was whether LILCO's power "enhancement" equipment should be treated as "vital," thus located in "vital areas" under NRC regulations.[27] We held as a matter of law that under a request for *exemption* from certain regulations for the purpose of low-power testing, the power enhancements need not be treated as "vital." To require this equipment to be treated as vital would, in effect, negate the exemption provisions. Thus, we rejected contentions which asserted that the enhancements must be so treated.

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[24] Commission's Memorandum and Order, entered July 18, 1984 (unpublished).

[25] All proceedings involving security issues were held *in camera*, and were reported in restricted transcripts numbered S-1 through S-333.

[26] Subsequent to that conference, but before this Board had ruled on the contentions, the NRC Staff (Division of Licensing, Office of Nuclear Reactor Regulation) issued a letter which apparently constituted an abrupt change in the previous position of the Staff on the issues of vital areas or equipment. We therefore found it necessary to hold another conference with counsel on September 14, 1984, to discuss the "effect and implications" of the Staff's letter "upon substantive issues and scheduling" in this proceeding.

[27] Section 73.2 of 10 C.F.R. contains the following definitions:

> (h) "Vital area" means any area which contains vital equipment.
> (i) "Vital equipment" means any equipment, system, device, or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure, destruction, or release are also considered to be vital.

The Intervenors also argued that the "change in configuration" wrought by the addition of the enhancements created new or different vulnerabilities for the site. However, these proffered contentions failed to show with reasonable specificity that they were not encompassed within the approved Security Plan, as to which the Intervenors have had detailed information for almost 2 years. The proposed revised contentions also failed to meet the six criteria described in the Commission's guidance in its July 18, 1984 Memorandum and Order, *supra*, and they were denied for reasons set forth with more specificity in our Restricted Order Denying Revised Security Contentions, entered September 19, 1984 (unpublished).

On October 2, 1984, LILCO informed the NRC Staff[28] that it would voluntarily implement certain "enhancements" to the physical security arrangements provided for the EMD diesels.[29] The "enhancements" would be in place prior to the commencement of Phase III of low-power operation, and would remain until the regular emergency power system (TDI diesels) was fully qualified. The NRC Staff indicated its belief that LILCO's commitments "adequately resolve the security concerns" which had prompted the Staff to determine that the subject power equipment must be treated as "vital."[30]

C. "As Safe As"

In its May 16 Order, the Commission said that LILCO must show that "at the power levels for which it seeks authorization to operate, operation would be as safe under the conditions proposed by it, as operation would have been with a fully qualified onsite A/C power source" (19 NRC at 1156).

LILCO states that it has shown that "[o]peration of Shoreham as proposed by LILCO will be as safe as operation would have been with a fully-qualified onsite AC power source because the effect on public health and safety will be the same; there will be none."[31] Suffolk County says that "reliance on the alternate AC power system substantially reduces the margin of safety and constitutes a severe reduction in the defense in depth protection which generally is central to the NRC's licens-

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[28] Letter of October 2, 1984, from John Leonard, LILCO, to Harold Denton, NRC (SNRC-1090).

[29] The additional security arrangements were set forth in an attachment to LILCO's letter, designated "safeguards information," and will be documented in an Appendix to the Shoreham Security Plan.

[30] Letter of October 10, 1984, from Albert Schwencer, NRC, to John Leonard, LILCO.

[31] Long Island Lighting Company's Post-Hearing Brief in Support of Application for Exemption, August 31, 1984, at 3.

ing concept."[32] Thus, LILCO would have us define "as safe as" to mean providing equivalent safety in the functional sense. The County on the other hand would hold us to a point-by-point comparison which would require the alternate power sources to be absolutely equivalent in all respects, such as qualifications, automation, and speed of response, regardless of whether they provide an equivalent level or amount of safety.

The NRC Staff approaches this question from the standpoint of function. The Staff states that it has been shown that, following a loss of offsite power (LOOP), LILCO would have at least 55 minutes to restore power necessary to mitigate a loss-of-coolant accident (LOCA). Because it has also been shown that there exists adequate assurance that power can be restored using alternate power sources well within 55 minutes, the proposed alternate power system provides as comparable level of protection as would a source in compliance with GDC 17 and thus it meets the "as safe as" standard set out by the Commission in CLI-84-8.[33] We adopt the Staff's definition and application of the "as safe as" standard.

Staff witness Wayne Hodges described the concept of "margin of safety" as like driving on a four-lane bridge, being in the outside lane near the edge as opposed to the inside lane. There is no less margin of safety in crossing the bridge (Tr. 1751). Suffolk County points out that there are differences between the emergency electric power configuration as originally proposed (the TDIs) and LILCO's proposed alternate. With a fully qualified power system, emergency power could be supplied to safety loads within 15 seconds; the alternate power sources could not supply power for several minutes, perhaps as long as 30 minutes.

There is unquestionably a lesser margin of safety provided by LILCO's alternate power system. Nevertheless, evidence regarding the time needed to restore power[34] and the time in which the alternate system would be able to do it, shows that power will be restored in time to prevent harm to the public notwithstanding the reduction in margin of safety. The difference in "margins of safety" involved does not preclude a finding of "as safe as" when applied to operation "at the power levels for which it seeks authorization to operate" (May 16 Order, 19 NRC at 1156).

NRC regulations do not require that a licensee be able to restore emergency power within 10 seconds, or 15 seconds, or any other specific

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[32] "Brief of Suffolk County in Opposition to LILCO's Motion for Low-Power Operating License and Application for Exemption," August 31, 1984, at 3.

[33] Staff Proposed Findings at 23.

[34] This time — 55 minutes using the most conservative assumptions in the very worst case — is uncontroverted in the record.

time. Rather, an applicant makes analyses of a variety of accident scenarios and determines the times needed to prevent any resulting danger to the public. The Staff reviews the applicant's analysis, and tells it that it must be able to restore emergency power within a specified time.

The main purpose of emergency power relevant here is to get emergency cooling water to a reactor's core in order to avoid, or immediately reverse, uncovering the core. At full-power operation, equipment that can provide power in a matter of seconds, such as the TDIs, is essential.[35] However, in the limited circumstances before us, of low-power operations at not more than 5% of rated power, emergency power is not needed as quickly.[36] Since there are at least 55 minutes to restore emergency power before core damage results, it is not necessary to restore power within 10 seconds. Safety, after all, is the purpose of design requirements.

Suffolk County's arguments would have us conduct a point-by-point comparison of Shoreham's emergency power configuration with TDI diesels and without them. "As safe as" cannot be based on such a point-by-point comparison of the components of systems. In comparing any roughly equivalent power systems, neither is required to be better than the other in every respect; even two "qualified" systems would not be identical in every respect. If LILCO's original and alternate emergency power systems were identical in every respect, there would be no need for an exemption. The purpose of these systems is to provide protection for public health and safety, by whatever combination of features they possess. Even the General Design Criteria themselves are premised upon the idea of what a system must be able to do, not upon whether one machine might be somewhat better than another.

In short, the question of "as safe as" must be approached in a functional sense (does it serve the purpose of protecting public health and safety) rather than in an absolute sense (is it the very best possible machine available for the purpose). To make such a finding, we approach the question from the viewpoint of the time needed to restore power and the availability of power from the alternate system during that time.

The General Design Criteria set forth the functional requirements of what safety equipment must be able to do. In 10 C.F.R. § 50.46(b), concrete criteria are set forth. An operating reactor must be able to withstand postulated accidents and transients and remain within the limits

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[35] The core of a reactor operating normally at full power can survive uncovery for approximately 30 seconds before safety margins set forth in NRC criteria are violated.

[36] Nor is as much emergency power needed, in view of the capacity of mitigating systems, the lesser inventory of fission products, and lower decay heat.

specified in § 50.46(b) with regard to fuel cladding temperature, oxidation of fuel cladding, hydrogen generation, changes in geometry, and decay heat removal. The limits are set conservatively to provide a safety margin (Tr. 1786-87). Any plant operating with a fully qualified onsite power system in accordance with GDC 17 must meet the limiting criteria of § 50.46(b). Plants with differing onsite emergency power systems are all deemed to be safe once they have met those criteria, no matter by how small or great a margin.

In this case LILCO is asking authorization to operate its plant at low power with no emergency AC power system. There is evidence that in the event of a LOOP/LOCA while the plant is operating in the low-power mode, the core can be cooled before the limits of § 50.46(b) are exceeded. Thus, the requirements of the regulations are met notwithstanding that the challenge is met by "offsite" power enhancements rather than by a qualified "onsite" source. If the core will be cooled in time to satisfy the regulations, the system is as safe under our regulations as any other emergency power system (including Shoreham's TDIs) would be during low-power operation.

The term "as safe as" may be defined as presenting no greater potential harm to the public than would a plant operating at low power with a fully qualified power source. However, the NRC Staff has suggested that "as safe as" should be interpreted to mean "substantially as safe as."[37] In other words, that the system is *in substance* just as safe. The substance of safety is the actual protection provided to the public, and under this definition our finding herein would be the same. In any case, the standard set forth in the NRC Staff's proposed findings ("a comparable level of protection") clearly falls within the ambit of our interpretation of "as safe as."[38]

The "as safe as" standard used by the Commission in CLI-84-8 is an articulation of what LILCO had said it could prove. The applicable regulation, 10 C.F.R. § 50.12(a), requires only a showing that the grant of an exemption "will not endanger life or property." If LILCO can show that it has met this higher standard, it will have done more than is necessary to make the safety showing required to support the grant of its requested exemption.

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[37] Tr. 3045-47.
[38] Tr. 3043-47.

III. PUBLIC HEALTH AND SAFETY

A. Time Required to Restore AC Power

1. Phases I and II

LILCO described in its supplemental low-power motion before this Board the activities that would occur during each phase.[39] As discussed above (§ II.A, pp. 1352-53, *supra*), its request for summary disposition of Phases I and II included proposed statements of material fact which were uncontroverted and were therefore admitted.[40] In no case did either Intervenor challenge any technical aspect contained in the statements of material fact.

Phase I included loading fuel into the reactor and performing certain tests, summarized in the testimony of William E. Gunther.[41] During Phase I, the reactor will be at atmospheric pressure and at essentially ambient temperature; the only additional heat would be from sources external to the core, such as the recirculation pump. Of the thirty-eight transient or accident events identified and analyzed in Chapter 15 of the Shoreham FSAR, almost half could not occur during Phase I because of the operating conditions of the plant. Of the remaining number, some could not cause the phenomena of interest in the safety analysis, and the potential consequences of the rest would be trivial. Since the reactor would remain subcritical, there would be essentially no fission products. Therefore there would be no decay heat and hence no necessity for cooling the fuel.[42] Even should a LOCA occur, in the absence of decay heat there would be no means of increasing the temperature of the core; it could remain without water indefinitely without harm. It follows that if no cooling is required to mitigate any untoward event that might occur under the conditions that would exist during Phase I, there is no requirement for emergency AC power.[43]

During Phase II the reactor would be taken critical and operated at very low power levels.[44] Otherwise the system conditions (temperature and pressure) would be the same as in Phase I. Many of the events analyzed in Chapter 15 of the FSAR could not occur or would be highly unlikely. Even the possible events could have no effect on the public health and safety regardless of the availability of AC power from any

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[39] LILCO's Supplemental Motion for Low-Power Operating License, dated March 20, 1984.

[40] Order Granting in Part and Denying in Part LILCO's Motions for Summary Disposition on Phase I and II Low-Power Testing, entered July 24, 1984, slip op. at 10, *et seq.*

[41] Gunther, Tr. 202-04, 214-17.

[42] Findings No. 9, 10.

[43] Findings No. 11, 20.

[44] Finding No. 12.

source. Should there be a break in the feedwater system piping, the minimal amount of decay heat could be removed through the existing core water inventory and heat losses to ambient. The fission product inventory postulated in the Chapter 15 analyses is based on operation for 1000 days at 100% power, while Phase II power would be, at most, 0.001% of thermal rated power and for much shorter periods of time. Thus the decay heat would be appreciably lower than at full power and the limits on fuel temperature would not be approached, even should a LOCA occur and coolant not be restored for months.[45]

Since there is no reasonable means of releasing the relatively few fission products that could be generated during Phases I and II, there can be no adverse impact of loss of AC power on the public health and safety. Accordingly, the Board reaffirms the findings and conclusions contained in its Orders of July 24 and September 5, 1984.

2. *Phases III and IV*

As set forth in LILCO's supplemental motion for low-power license as well as its exemption request, Phases III and IV would encompass increasing the power of the core to 1% and 5%, respectively, of rated power. During Phase III the system is taken, in steps, to the rated temperature and pressure conditions and the power raised to about 1% of the rated level. These conditions are beyond the essentially zero power and ambient temperature and pressure conditions of Phase II. Testing of systems and components will be carried out under plant operating conditions, except for heat output from the reactor core. Phase IV extends the thermal reactor power to 5%, thereby permitting testing and calibration of additional portions of the total system.[46] These activities are all necessary and conventional preliminaries to bringing a plant on-line at full design operating power, whether they be performed during a formally designated low-power program or as part of a full-power license.

Although LILCO separated Phases III and IV, they are discussed together here since they are bounded by Phase IV conditions with respect to the necessity of restoring AC power should offsite power be lost. In other words, if LILCO has demonstrated that AC power can be restored in a sufficiently short time to take care of the decay heat from the fission products resulting from operation at 5% power,[47] operation at

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[45] Findings No. 13-20.

[46] Findings No. 31, 32.

[47] Although LILCO indicated that operation at 5% power would be for a time short of equilibrium conditions, the analyses on which our opinion is based assume, for conservatism, 5% power for essentially unlimited time.

1% power will be no problem because the required time in which power must be restored would be longer.

Chapter 15 of the FSAR identified and analyzed the transients and accidents that must be accommodated by the Shoreham plant, at full-power operation, in order to demonstrate compliance with NRC regulations. Two witness panels, one of LILCO and one of NRC Staff, presented testimony concerning those events that could occur during low-power operation.[48] Essentially all of those witnesses agreed that the thirty-eight accidents and transients of Chapter 15 fall into three categories: (1) those that cannot occur during low power, (2) a loss-of-coolant accident (LOCA), and (3) all others. Of these thirty-eight events, three could not occur[49] and, of the remaining ones, only four require the assumption of the unavailability of offsite power. These four events are: loss of AC power, LOCA, steam line break, and feedwater system piping break, of which the LOCA is obviously the one of most severe potential consequence.[50] For the purposes of this exemption request there is no need to discuss any save the four events, since the others are not affected by the assumption of loss of offsite power. In addition, their consequences are bounded by the Chapter 15 analyses, and therefore pose no undue threat to health and safety.

In the absence of a LOCA during low-power operation and without available AC power, the water in the reactor vessel would boil off slowly, dropping from the normal level to the top of the fuel over an extended period of time. Two systems would be available to provide makeup water: the Reactor Core Isolation Cooling (RCIC) System and the High Pressure Coolant Injection (HPCI) System. These systems, which operate automatically, are steam-driven and use DC (battery) power supplies that will last without recharging a minimum of 24 hours. Each system has sufficient coolant makeup inventory to supply any required core cooling.[51] If either system acts even once during the first 4 days to restore the water level, the subsequent heat losses would compensate for the decay heat being generated in the core and thereby prevent the water level falling below the top of the fuel and the peak clad-

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[48] Rao, *et al.*, Tr. 265, *et seq.*; Hodges and Quay, Tr. 1782-1800.

[49] Staff witnesses considered that five events could not occur. In addition to those identified by LILCO, Staff determined that control rod removal and fuel assembly insertion error during refueling could not occur by definition, since no fuel handling activity is contemplated during Phases III and IV (Hodges, Tr. 1789).

[50] Finding No. 32.

[51] Finding No. 35; LILCO's DC power supplies will last a minimum of 24 hours providing sufficient power for at least 2 more days of core cooling. Using an onsite portable generator and battery chargers, the DC power can be maintained indefinitely.

ding temperature[52] of 2200°F would never be reached. Containment and suppression pool limits would not be exceeded for approximately 30 days following loss of AC power.[53]

For loss-of-coolant accidents, 10 C.F.R. § 50.46(b)[54] lists five limits that must be satisfied. These limits address maximum cladding temperature, cladding oxidation, hydrogen generation, core deformation, and the requirement for removal of decay heat for an extended period of time.

Both NRC Staff and LILCO witnesses testified that a LOCA is the most potentially damaging accident that can be anticipated at power levels up to and including 5% of rated power.[55] Analyses of the consequences of a LOCA occurring during either Phase III or Phase IV were performed to determine the times within which core cooling would have to be restored in order to meet these criteria. Using the conservative assumptions required by the models of Appendix K of Part 50 (including the accumulation of 1% of the fission products assumed in the FSAR for full-power operation, no convective heat transfer following the initial blowdown, and loss of inventory until spray or injection is initiated), the occurrence of a LOCA at 1% power would require restoration of AC power within about 6 hours. Using more realistic assumptions as input to the same models, more than 24 hours would be available for core cooling. Staff and LILCO differed slightly in the results of their analyses for a LOCA at 5% power using conservative assumptions, reporting 55 and 86 minutes, respectively. Values that more nearly reflect actual core conditions and history during operation at 5% power, such as peaking factor and 60 days equivalent operation rather than 1000 days, predict

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[52] This value delimits the peak cladding temperature in accordance with 10 C.F.R. § 50.46(b) for loss-of-coolant accidents.

[53] Finding No. 33.

[54] Section 50.46(b) states:

> (b)(1) *Peak cladding temperature.* The calculated maximum fuel element cladding temperature shall not exceed 2200°F.
>
> (2) *Maximum cladding oxidation.* The calculated total oxidation of the cladding shall nowhere exceed 0.17 times the total cladding thickness before oxidation. . . .
>
> (3) *Maximum hydrogen generation.* The calculated total amount of hydrogen generated from the chemical reaction of the cladding with water or steam shall not exceed 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react.
>
> (4) *Coolable geometry.* Calculated changes in core geometry shall be such that the core remains amenable to cooling.
>
> (5) *Long-term cooling.* After any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.

[55] Rao, *et al.*, Tr. 252, 297-98, 302, 313; Hodges, Tr. 1785.

times of 110 minutes and more than 3 hours by Staff and LILCO, respectively.[56]

The potential need for the standby gas treatment system (SGTS) was investigated. The Staff assumed that this system would mitigate the consequences of the fuel handling accident and the LOCA. Since no fuel handling is anticipated during low-power testing, there is no need to consider that potential accident. The availability of the standby gas treatment system would be important in the case of a LOCA with breach of fuel cladding and consequent release of iodine to the environment. However, if core cooling can be restored within 55 minutes following a LOCA accompanied by loss of offsite power, the cladding temperature will not exceed 2200°F at any location, and there will be no cladding failure and no need for the SGTS.

It is possible that an oxidation limit would be reached before the fuel temperature limit is reached. However, this would occur at less than 5% power, and a substantially longer time would be available before any limits are approached. Therefore restoration of AC power within the time suggested by the most conservative assumptions, 55 minutes, would prevent reaching any of the limits of § 50.46.

The peak cladding temperature limit of § 50.46 is a conservative value chosen to assure that the cladding retains some ductility so that the fuel will remain in a coolable geometry when coolant is restored. Some data indicate that the cladding would retain some ductility at 2700°F and the fuel would not melt. At 2200°F the local cladding oxidation is 6.5% (the regulatory limit is 17%). Thus the fuel and cladding would remain intact and there could be no release of fission products.[57]

It is apparent that the worst case would be a LOCA while operating at 5% power accompanied by a loss of offsite power. If AC power can be restored to move cooling water, in addition to that supplied by the HPCI and/or the RCIC systems, onto the core within 55 minutes (the most conservative estimate), the regulatory limits will not be exceeded. Therefore there will be no fuel or cladding damage and no release of fission products or effect on health and safety.

Neither Suffolk County nor the State proffered any witness who challenged these calculations or any technical aspect of low-power operation under the conditions of the requested exemption. The only challenge offered by the Intervenors to the above conclusions regarding times available for restoration of AC power had nothing to do with the validity of the results or with whether the criteria of § 50.46 would be met. Their

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[56] Finding No. 36

[57] Findings No. 37, 38, 39, 42

sole assertion in this area was only that the enhanced AC power sources might not be available within the 15 seconds postulated for the "fully qualified" onsite emergency power. The Intervenors did not challenge the assertion of LILCO and Staff that it is unimportant whether core cooling starts within 15 seconds or 55 minutes as far as protection of the core and therefore public health and safety are concerned. We find the temperature difference between 550° and 1086° is of no consequence, because both are substantially less than the regulatory limit of 2200°F.[58]

B. Availability of AC Power

This opinion has explored the circumstances under which AC electrical power could be required during fuel loading and operation up to 5% of rated power. Under the terms of the requested exemption from the literal requirements of the General Design Criteria, particularly GDC 17, for operation at low power, all electrical power for the site should be considered off site, including the enhanced power sources discussed *infra*. The Board has held that, for the purposes of this case, LILCO can take no credit for its TDI diesels, which were intended to be the source of emergency AC power, although the Board is aware that LILCO has rebuilt them and is in the process of again attempting to qualify them as onsite sources. The Board is also aware that LILCO has purchased Colt diesels and is preparing for their installation and subsequent qualification; these, also, are beyond the scope of the Board's consideration in this low-power decision. Thus for the purposes of this case, all sources of power are considered to be off site, no matter where they are physically located. It is therefore necessary to determine what and where the sources are, the diversity of routing to the Shoreham site, the reliability of the system, and the time within which AC power could be reestablished should it be lost.

1. Reliability of LILCO's Normal Offsite Power System

With respect to normal offsite electrical power sources, GDC 17 mandates two physically independent circuits, not necessarily on separate rights-of-way, which may come together in a common switchyard; functional requirements for these power sources are also specified.[59] LILCO has exceeded these physical requirements significantly, as the following

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[58] Finding No. 39.

[59] GDC 17 states in pertinent part: "Electric power from the transmission network . . . vital safety functions are maintained." (*See* complete text at note 3, *supra*).

discussion indicates, which would presumably augment in like amount the realization of the functional requirements.[60]

LILCO has at present 3721 MW of its own generating capacity consisting of baseload, mid-range, and peaking steam turbine units, and internal combustion units, both gas turbines and diesel generators.[61] Four major steam power generating stations essentially surround Shoreham on three sides. Each of these stations is equipped with one or more blackstart[62] gas turbines.[63] In addition to those on the sites of the steam generating stations, deadline blackstart[64] gas turbines are also at three other locations near the Shoreham site. Any one of the gas turbines is of sufficient capacity for Shoreham's emergency power needs. Should Shoreham receive an operating license, standing orders to the system operator will require restoration of power to Shoreham as a priority action; the times estimated or determined for this power restoration are between 6 and 25 minutes, depending on the transmission routing available.[65]

In addition to its own generating capacity, LILCO has a single connection with the New England Power Exchange and three with the New York Power Pool.[66] It also has in place automatic load-shedding capabilities for removing loads from the grid and reducing voltages to prevent cascading outages on the system. The single outage on a substantial portion of LILCO's grid since the 1965 Northeast Blackout occurred in 1979, before all of the present equipment and procedures for power restoration were in place. Even so, power was restored to the system within slightly more than an hour.[67]

Seven circuits from LILCO's system serve the Shoreham site through two switchyards. Four separate 138-kV lines enter the 138-kV switchyard, about 1300 feet south of the plant, over two separate and independent rights-of-way, each of which carries two circuits. This switchyard consists of two sections that can be electrically isolated from each other in case of trouble in one section. Each section receives two of the four 138-kV circuits, one from each right-of-way. From this switchyard, power is transmitted to the normal station service transformer (NSST).[68]

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[60] Findings No. 56, 57.

[61] Finding No. 43.

[62] Blackstart means that, when a loss of power exists, an independent source of starting power allows the systems operator to start a gas turbine from either a local or a remote location.

[63] Findings No. 44, 45, 46, 49, 51.

[64] Deadline blackstart means that the unit can recognize through its own circuitry that power on the line has been lost and can start automatically without operator action.

[65] Findings No. 45, 46, 49, 51.

[66] Finding No. 47.

[67] Finding No. 48.

[68] Finding No. 54.

The Wildwood Substation, approximately 1 mile south of Shoreham, is fed by three 69-kV circuits from two separate rights-of-way. From the Substation a single line, part of which has been placed underground, can supply power, via the 69-kV switchyard, to the reserve station service transformer (RSST), thereby providing independence between the NSST and the RSST. In addition, a bypass (partially overhead and partially underground) of the underground portion of this line, around the 69-kV switchyard, goes directly to the RSST. These provisions allow restoration of power to the RSST without the necessity of repairing the underground line from the switchyard or a fault in the yard itself.[69]

In summary, seven power circuits enter the Shoreham site along two completely separate and independent corridors, with no ties or interconnections. One of the two switchyards fed by these circuits is apparently electrically equivalent to two yards, and the other can be bypassed completely. Witnesses for the NRC Staff affirmed that this design exceeds NRC requirements for offsite power systems.[70]

With respect to loss of offsite power from natural phenomena, we observe that this has not been a significant problem in the past. The transmission system is designed to withstand winds in the range of 100 to 130 miles per hour; the system has not been extensively damaged by hurricanes in the last 10 years, although major storms have caused outages on individual lines.[71] Similarly, the transmission system has not been adversely impacted by either tornadoes or earthquakes[72] in the last 20 years.[73] The impact of ice storms and lightning strikes on the system has not been severe and has affected at most small segments of line.[74] Even so, LILCO has committed to initiate steps to place the plant in cold shutdown should any of the following events occur during low-power testing in order to minimize the possible consequences of loss of normal offsite power: a "hurricane warning," a "tornado watch," a "severe thunderstorm watch," a "winter storm watch," or a coastal flood warning for the Shoreham area; an indication of seismic activity of 0.01g on the Shoreham seismic monitors;[75] the prolonged or unscheduled outage of two

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[69] Finding No. 55.

[70] Findings No. 56, 57.

[71] Findings No. 58, 59.

[72] *See* "Seismic Capability," § III B.2.d, *infra*.

[73] Finding No. 58.

[74] *Ibid.*

[75] There was some discussion by the Intervenors' seismic witnesses, Meyer and Roesset, that this alarm would provide little protection in the event of a significant seismic event (Tr. 2797-99). This testimony reflected uncertainty that the alarm would precede larger seismic shocks by any appreciable length of time or, alternatively, that an alarm indicating small foreshocks might precede major shocks by so much time as to be meaningless. While there are clearly uncertainties, the commitment to shut

(Continued)

of the four LILCO interconnections to the New York Power Pool and the New England Power Exchange; or a low electrical frequency condition on the LILCO transmission system which reaches an alarm set point.[76] LILCO's procedures direct immediate commencement of a controlled shutdown upon notification from the system operator that any of these conditions exist.[77]

The Board orders that these commitments shall become a part of the license conditions for low-power operation.

The Intervenors essentially ignored the normal offsite power system except for some attack on the vulnerability of transformers, insulators, and line poles to seismic events.[78] We note that the regulations contain no requirements for the seismic qualification of normal offsite power, and we find no justification for imposing such qualification for low-power operation, particularly in light of the commitment of LILCO to proceed to cold shutdown should ground motion of 0.01g be detected by the Station monitor.

We note that the offsite power sources and transmission system discussed above will be the same as that for full-power operation. In considering the exemption request before us for low-power operation, we must be concerned with availability of AC power for operation of those plant systems necessary to protect the public health and safety during low-power operation, regardless of the sources of that power. The Board finds that LILCO's substantial and diverse generating capacity, coupled with the multiplicity of paths through which power can be transmitted to the site, more than satisfies the requirements of GDC 17 with respect to normal offsite power and makes it unlikely that power would be unavailable to either the NSST or the RSST from normal offsite sources.

2. *Offsite Enhancements at Shoreham*

The enhancement of the offsite system which LILCO has put in place consists of two independent power sources, both located on the Shoreham site. One source, a 20-MW deadline blackstart gas turbine, is physically located in the 69-kV switchyard 300 feet south of the reactor

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down the plant in the event of such an alarm indicates LILCO's willingness to avoid any hazard if possible and may, in fact, prevent the operation of the plant during a seismic event. In any event, as discussed below, it is unnecessary to postulate a seismic event concurrent with a LOCA and, therefore, plenty of time would be available to restore AC power even if a transmission line, transformer or other element of the offsite system were to be affected adversely.

[76] Finding No. 61.

[77] Finding No. 62.

[78] *See*, for example, Tr. 340, *et seq.*

building.[79] The other source is a group of four EMD diesel generators, also deadline blackstart, manufactured by General Motors. Each EMD is rated at 2.5 MW, and the total unit supplies 10 MW for emergency power.[80] The four units are grouped together in the protected area just southwest of the reactor building.

The gas turbine is equipped with a compressed air starting system. Air to the starter is supplied from a receiver which is kept pressurized automatically by a compressor.[81] The EMD diesels have dual starting motors which are powered by a continuously charged battery.[82] Upon loss of offsite power the two systems start simultaneously. If power from the gas turbine is available it is routed through a transformer in the 69-kV switchyard to the switchyard bus and then to the safety-related switchgear. If power from the gas turbine is not available, power from the EMD diesels is routed through a nonemergency switchgear room to the safety-related switchgear room. Power from the gas turbine could be established conservatively in 10 minutes; power from the EMD diesels in 30 minutes.[83]

The starting reliability of the gas turbine, based on actual start attempts on a similar unit in 1982-83, was 97.6%. Actual start attempts for the EMD diesels over the same time period showed a reliability of 98.6% per diesel, with the reliability of the system approaching 100% that at least one diesel would start. These levels of reliability compare favorably with qualified emergency power systems, whose industry-wide starting reliability is between 92-99%.[84]

The County offered testimony in the following areas: (a) the reliability of the EMD diesels; (b) the testing of both sources; (c) the vulnerability of both systems to single failure; and (d) the resistance of the sources to seismic events. We consider these, *seriatim*.

a. Reliability of the EMD Diesels

The starting reliability of the EMD diesels has been described above. Suffolk County alleges that occurrences such as breakage of the fuel line supplying all four EMD diesels, fire detection and mitigation of the EMDs, and common location of EMD electrical breakers, among others, show that the EMD diesels are not as reliable as a fully qualified

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[79] Knox and Tomlinson, Tr. 2342.
[80] *Ibid.*; Schiffmacher, Tr. 332, 494.
[81] Tomlinson, Tr. 2346.
[82] *Id.* at 2347.
[83] Knox, Tr. 2349-52.
[84] Schiffmacher, Tr. 463; Tomlinson, Tr. 1863; Knox, Tr. 2346; SSER 6, p. 8-9.

system would be.[85] Even the County does not, however, reach the conclusion that the EMDs are so unreliable that they cannot be considered capable of performing their ultimate mission: that of acting as a backup to the gas turbine. The evidence shows that the EMDs have sufficient reliability to perform their intended function.

Both Staff and LILCO point out that a number of actions have been or will be taken to ameliorate the major concerns that have been stated in the record. These actions would either be executed voluntarily by LILCO or would be made conditions in any license which might issue.[86] Maintenance and repairs of the EMDs will be performed by experts who have a great deal of experience with EMD diesels and, indeed, performed the maintenance and repair of the instant diesels when they were used by New England Power Co. for unattended production of peaking power.[87] The reliability of the EMDs in this previous service was excellent.[88]

b. Testing of the Sources

Suffolk County witnesses testified that the test procedures to be used for the gas turbine were not rigorous enough to demonstrate the availability of the source for capacity loads.[89] The Staff, in its review leading to SSER 6, determined that the proposed test procedure was not complete. The Staff will therefore require LILCO to perform a test of the turbine to full capacity before beginning Phases III and IV. The Staff will also require a monthly test to demonstrate that loads normally connected to certain buses used by the turbine are automatically disconnected, and that the gas turbine output will be automatically connected to the 69-kV bus within 2 to 3 minutes.[90] The Board finds that this requirement adequately addresses Suffolk County's concern.

The Staff also determined that more stringent testing is required for the EMD diesels. Before operation in Phases III and IV, a test will be required which will load each EMD diesel to its design load for 1 hour, and the voltage and frequency must be verified to be within required limits. The Staff will also require all four EMDs to be tested on a biweek-

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[85] Intervenors' Proposed Findings No. 104-89.
[86] SSER 6, at 13-2, 13-3. Knox, Tr. 2354-55.
[87] Iannuzzi and Lewis, Tr. 1173-76.
[88] *Id.* at 1178-79.
[89] Minor and Bridenbaugh, Tr. 2580, 2614-15.
[90] SSER 6, at 8-2, 8-3.

ly basis and demonstrate that they can be normally reconnected to their loads if they are disconnected for any reason.[91]

c. Single Failure Criterion

Suffolk County's testimony was devoted almost exclusively to showing that each unit in the enhanced system (the gas turbine and the EMDs) was either inferior to the qualified system or, in the case of the EMDs, that the potential existed for a single failure which would disable all four of them.[92] The Board finds this line of evidence to be irrelevant. The two units (the gas turbine and the EMDs) were planned as a system, and it is the system that the Staff has reviewed and has determined that the alternate power source was adequate.[93] The only potential common fault is that the output of both units gains entry to the nonemergency switchgear room through a concrete block wall, but even here they are separated by approximately 40 feet.[94] The EMDs also will have an independent line which allows their output to be delivered to the emergency switchgear room.[95] The Board therefore finds that the EMDs and the gas turbine are adequately independent of each other.

d. Seismic Capability

Extensive testimony concerning the seismic capability of the enhanced AC power sources was presented by both LILCO[96] and by Suffolk County.[97] While LILCO does not claim that either the 20-MW gas turbine or the EMD diesels meet the seismic qualification criteria for safety-related equipment, the record shows that it is reasonable to expect that this system will survive a seismic event[98] with little if any damage.[99]

Suffolk County testimony and cross-examination of LILCO witnesses was directed toward establishing that a fully qualified system would be more resistant to seismic forces and therefore a safer system than the enhanced power system. It is, of course, obvious that a fully qualified system would have an established and documented higher resistance to

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[91] *Id.* at 8-4.
[92] Eley, *et al.*, Tr. 2452, 2459-60; Eley, Tr. 2572, *et seq.*
[93] SSER 6, at 8-5; Smith, Tr. 2482.
[94] Knox, Tr. 1885-86.
[95] Schiffmacher, Tr. 842, 863.
[96] Christian, *et al.*, Tr. 962, *et seq.*
[97] Meyer, *et al.*, Tr. 2762, *et seq.*
[98] The operating basis earthquake (OBE) and the safe shutdown earthquake (SSE) for Shoreham were established as 0.1*g* and 0.2*g*, respectively.
[99] Findings No. 83-98.

seismic events than does the system proposed by LILCO for use during low-power testing. However, there is no need to consider the relative merits of the two systems *per se*, because for the purpose of the exemption request, it is only necessary to establish that the enhanced system is capable of performing its intended function.[100]

A LOCA is by design an unlikely event. In addition, the plant, including the piping that would be affected to produce a LOCA, was designed to withstand any credible seismic event, the occurrence of which is considered unlikely. Thus a LOCA and a seismic event must be considered independent events. To have a LOCA concurrent with an earthquake, one must postulate the simultaneous occurrence of two unlikely events, and this is not required for licensing purposes.[101]

Although these power sources are not formally qualified to withstand possible seismic forces, they do have seismic capabilities as demonstrated by testing and analysis of similar units. These studies revealed some accessory items that might not be operable following a seismic event, and recommendations were made for corrective modifications. These modifications LILCO has either implemented or has indicated it will complete should an exemption be granted.[102] As a result, the units should be capable, by analysis if not by test, of withstanding an SSE.[103]

The portions of the RCIC system required for coolant injection are seismically qualified and modifications to the HPCI system to complete its seismic capability will be implemented prior to Phase III operation. These systems are steam-driven and use DC power supplies (*see* § III.A.2, *supra*).[104]

There are no requirements in the regulations for seismic qualification of offsite power sources, transmission lines, or any other portion of the offsite system. The record indicates that there are no practices in the industry directed specifically toward mitigating the effects of ground motion on transmission systems, even in areas of frequent and more potentially severe seismic activity. It was noted *supra*[105] that the number and diversity of paths for supplying offsite power to Shoreham far exceed the regulatory requirements.

The Board has determined[106] that for any event that made the enhanced system inoperable but did not result in a LOCA, the plant has at

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[100] Findings No. 99, 101.
[101] Finding No. 102. *See also Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), CLI-81-33, 14 NRC 1091, 1092 (1981).
[102] Findings No. 97, 98.
[103] Findings No. 83-100.
[104] Finding No. 104.
[105] Section III.B.1.
[106] Section III.A.2, pp. 1364-65, *supra*.

least 30 days in which to restore AC power.[107] The Board has also found that there is a high likelihood that this could be done. The Board therefore finds that it is not necessary that the enhanced system be able to withstand a seismic event.

The Board has reviewed all of the pertinent parts of the record in this proceeding. We have concluded that the enhanced offsite system has the required redundancy, meets the single failure criterion and has sufficient capacity, capability and reliability to supply adequate emergency power for low-power operation of the Shoreham unit. We find that there is adequate assurance that the enhanced system can supply sufficient power within 55 minutes in the event of a concurrent LOCA and loss of offsite power. We therefore further find that the enhanced system provides a comparable level of protection[108] as a fully qualified system would and thus meets the "as safe as" standard set by the Commission in CLI-84-8.[109]

IV. EXIGENT CIRCUMSTANCES

Under the provisions of 10 C.F.R. § 50.12(a), the Commission may "grant such exemptions from the requirements of the regulations" as it determines are authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest. This regulation has a long history, as a version of it authorizing specific exemptions has been in existence for over 20 years. The specific exemption route of § 50.12(a) was used extensively to approve site preparation activities prior to the issuance of construction permits, until passage of the National Environmental Policy Act (NEPA) necessitated certain changes.[110]

In 1974, alternative methods were developed to handle early site preparation activities consistent with then-new NEPA responsibilities, by establishing limited work authorization (LWA) procedures under § 50.12(b). A specific exemption under § 50.12(a) was still maintained as an option, but the Commission stated that it should be used "sparingly" and only in cases of "undue hardship" or "extraordinary" circumstances.[111] After the LWA provisions became final in 1974, only one

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[107] *Id.*

[108] *See* § II.C, *supra*, at p. 1361; Tr. 3043-47.

[109] Section II.C, "As Safe As," *supra*, at pp. 1358-61.

[110] *United States Department of Energy* (Clinch River Breeder Reactor Plant), CLI-82-4, 15 NRC 362, 373 (1982).

[111] 39 Fed. Reg. 14,506, 14,507 (April 24, 1974).

§ 50.12(a) specific exemption for site preparation activities had been issued prior to *Clinch River I*, whereas that specific exemption route had been used for forty-nine facilities prior thereto.[112]

In the instant case, the Commission stated in its May 16, 1984 Order that it "regards the use of the exemption authority under 10 C.F.R. § 50.12 as extraordinary." Citing a later *Clinch River* decision,[113] the Commission further noted that "[t]his method of relief has previously been made available by the Commission only in the presence of exceptional circumstances. . . . A finding of exceptional circumstances is a discretionary administrative finding which governs the availability of an exemption" (CLI-84-8, 19 NRC at 1156 n.3). A reasoned exercise of such administrative discretion should take into account the equities involved in the surrounding circumstances of each situation.

The later *Clinch River* decision alluded to above was issued in order to clarify the Commission's previous findings of "exigent and other extraordinary circumstances" which warranted the grant of an exemption for the initiation of early site preparation activities.[114] The term "extraordinary" was used in the *Waterford*[115] and *Shearon Harris I*[116] decisions. In *Shearon Harris II*[117] it was held that "the timely satisfaction of public needs by reducing unexpected delays in the realization of facility benefits and the avoidance of costs induced by such unexpected delays constitute exigent circumstances."[118] It thus appears that Commission precedent on the grant of exemptions provides some illustrations of exigent circumstances, and establishes that they are to be determined "by the totality of the particular circumstances in each case."[119]

The Commission's May 16 Order stated that a reasoned exercise of discretion governing the availability of an exemption should take into account the equities of each situation. Here, these

> equities include the stage of the facility's life, any financial or economic hardships, any internal inconsistencies in the regulation, the applicant's good-faith effort to

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[112] *Clinch River I*, CLI-82-4, *supra*, 15 NRC at 373, 380. *See also* 37 Fed. Reg. 5744, 5746 (March 21, 1972); 39 Fed. Reg. 14,506, 14,507-08 (April 24, 1974); 40 Fed. Reg. 8774 (March 3, 1975).

[113] *United States Department of Energy* (Clinch River Breeder Reactor Plant), CLI-83-1, 17 NRC 1, 4-6 (1983) (*Clinch River II*).

[114] CLI-83-1, 17 NRC at 2.

[115] *Louisiana Power and Light Co.* (Waterford Steam Electric Station, Unit 3), CLI-73-25, 6 AEC 619, 622 n.3 (1973).

[116] *Carolina Power and Light Co.* (Shearon Harris Nuclear Power Plant, Units 1, 2, 3 and 4), CLI-74-9, 7 AEC 197, 198 (1974) (*Shearon Harris I*).

[117] *Carolina Power and Light Co.* (Shearon Harris Nuclear Power Plant, Units 1, 2, 3 and 4), CLI-74-22, 7 AEC 938 (1974) (*Shearon Harris II*).

[118] *Clinch River II*, CLI-83-1, 17 NRC at 4.

[119] *Id.* at 3.

comply with the regulation from which an exemption is sought, the public interest in adherence to the Commission's regulations, and the safety significance of the issues involved.

These equities, of course, do not apply to the findings on public health and safety and common defense and security required by § 50.12(a) (19 NRC at 1156 n.3).

A. Stage of the Facility's Life

The only evidence addressing the stage of the facility's life was the testimony of William Gunther, LILCO's operating engineer for the Shoreham facility. His uncontradicted testimony established that the plant is physically completed, and that it is being maintained in condition that would allow fuel to be loaded within 2-3 weeks of obtaining a low-power license.[120] Proceedings involving the application for an operating license have been pending in one phase or another for 180 hearing days over 8 years before seven different licensing boards. The facility has now been physically completed, and all contentions have been decided in favor of licensing except emergency planning and TDI diesel generator issues, now pending before two other licensing boards.[121] Under these unusual circumstances, this equity favors the grant of a low-power exemption.

B. Financial or Economic Hardships

It is almost self-evident that there must be financial hardships to someone when there is a physically completed nuclear facility, standing unused and nonproductive because of substantial licensing delays. It is not necessary to allocate blame for such a situation, but the economic consequences and waste of resources make no sense. Someone has spent or is spending billions of dollars for capital investment or debt servicing in connection with the construction costs of the Shoreham facility, but it cannot produce electricity for a utility that uses chiefly oil as fuel. Consequently, Shoreham cannot earn revenues to compensate for its costs of construction and maintenance.

Financial data and analyses of Shoreham's operations were presented by Anthony Nozzolillo, LILCO's Manager of Financial Analysis and Planning Department.[122] His testimony showed that LILCO has serious

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[120] Tr. 866, Finding No. 105.
[121] PID, LBP-83-57, 18 NRC 445 (1983).
[122] Tr. 1377.

financial problems which make it difficult for it to obtain necessary external financing. In his opinion, the granting of a low-power exemption would send a positive signal to the capital markets that could help to alleviate LILCO's financial distress in obtaining vitally needed cash by the issuance of securities.[123] We find this testimony to be reasonable and credible.

If necessary low-power testing is completed 3 months earlier as a result of granting the exemption request, commercial operation could also commence approximately 3 months earlier. Earlier commercial operation would allow an equivalent earlier displacement of oil-fired generating capacity. The resulting fuel savings would be approximately $50,000,000 over the 3-month period.[124] This reduced dependence on foreign oil as a fuel source at a rate of four to five million barrels a year, would also be consistent with our national policy in that respect.[125] A 3-month earlier commercial operation date could also result in an economic benefit of approximately 8 million dollars in terms of present worth of revenue requirements, assuming that LILCO receives conventional rate treatment.[126] However, a claimed benefit of $45 million based on synchronization of the plant for federal income tax purposes in 1984 cannot be allowed, because licensing for full-power operation and connection to the LILCO grid, as required, cannot reasonably be anticipated to occur before the end of December 1984.[127] Low-power operations could not achieve this tax reduction result.

The costs of unusually heavy and protracted litigation may also properly be considered in evaluating financial or economic hardships as an equity in this exemption proceeding. Brian McCaffrey, LILCO's Manager for Nuclear Licensing and Regulatory Affairs, described the very lengthy and expensive litigation associated with the Shoreham licensing process.[128] The unremitting and often bitter opposition of Suffolk County as an intervenor has resulted in litigation of very extensive scope and depth. It is beside the point to argue that such litigation is permitted under NRC regulations. Although not illegal, such interminable litigation has resulted in great expense to LILCO, both in terms of time and resources.[129] These proceedings to date have cost LILCO more than $33 million.[130] These proceedings have involved over 15,000 pages of

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[123] Tr. 1377-82, 1385-86, 1395, 1398.
[124] Tr. 1393-94.
[125] Tr. 1322, 2889-91.
[126] Tr. 1354, 1407.
[127] Tr. 1357-62, 1373, 1406, 1410, 1904, 1988-92.
[128] Tr. 1715, *et seq.*
[129] Tr. 1722-23.
[130] Tr. 1726-27.

written testimony, 400 exhibits, 180 days of hearings, more than 310 witnesses, 34,000 pages of transcripts, and more than 160 depositions.[131] From the record scope and intensity of this litigation, both direct and collateral,[132] it can be concluded that Suffolk County's costs of litigation including attorneys' fees must also be measured in the millions of dollars.

The unusually heavy financial and economic hardships associated with the very protracted Shoreham licensing proceedings constitute a significant equity, which we hold can reasonably be held to amount to exceptional circumstances in the context of granting a low-power exemption.

C. Internal Inconsistencies in the Regulations

Another equity to be considered in exercising discretion regarding an exemption request is the presence of internal inconsistencies in the regulations. That inquiry includes an analysis of the prior interpretations and applications of the regulations, as well as the four corners and literal wording of the regulations standing alone. In that connection, the prior practice of the NRC Staff in handling licensing situations involving less than full compliance with the regulations, is illuminating.[133]

For over 2 decades, the Staff had recognized that although a plant was ready for low-power operation, it might not fully comply with every regulation at full power. In those circumstances, "noncompliances" typically were dealt with by Staff-imposed license conditions requiring completion before a particular power level, or by a particular time. In issuing operating licenses, the NRC Staff only considered or explicitly granted exemptions in instances of long-term or permanent noncompliance with regulations. Recently in seeking guidance from the Commission on the standard for exemptions, the Staff stated that the *Shoreham* decision in CLI-84-8, "establishes practices and requirements for licensing which differ significantly from prior regulatory interpretation and practice."[134] The Staff cited this *Shoreham* decision as ruling (at least implicitly) that an exemption must be granted if Shoreham is to be licensed for low-power operation prior to compliance with GDC 17. The Staff further

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[131] Tr. 1726-27.

[132] ALAB-777, 20 NRC 21; ALAB-779, 20 NRC 375 (1984). *See also* Memorandum by Nunzio J. Palladino, Chairman, CLI-84-20, 20 NRC 1061 (1984).

[133] These prior inconsistent practices and interpretations were discussed in our Order Reconsidering Summary Disposition of Phase I and Phase II Low-Power Testing, LBP-84-35A, 20 NRC 920, 923 (1984). That Order is pending before the Commission for an immediate effectiveness review pursuant to CLI-84-8.

[134] July 17, 1984 Staff Paper on "Need and Standards for Exemptions," SECY-84-290, at 1 and 2.

stated that in the context of exemptions, "these determinations regarding 'exigent circumstances' and 'as safe as' are wholly new requirements going beyond anything explicitly required by 10 C.F.R. § 50.12. (The concept of 'exigent circumstances' had previously been considered a factor only in exemptions granted pursuant to 10 C.F.R. § 50.12(b), issuing limited work authorizations.)"[135] The Staff further observed that the *Shoreham* exemption requirement "is a substantial departure from past staff interpretation and practice. . . ."[136] The Commission has under consideration the Staff's request for guidance, but it is clear that there are substantial inconsistencies between prior NRC interpretation and practice regarding exemption situations, compared with whatever guidance the Commission ultimately gives concerning the interpretation and application of the "*Shoreham* rule."

Another inconsistency in the treatment of Shoreham lies in the fact that both the Catawba and Grand Gulf facilities have unresolved questions about similar TDI diesel generators, yet they have received low-power and full-power licenses, respectively.[137]

The Staff has also applied the security and safeguards regulations inconsistently in the case of Shoreham. For example, in SSER No. 5 filed in April 1984, the Staff stated that "there is no technical reason to protect the temporary diesels and the gas turbine generator as vital equipment because they are not required for safe shutdown (in the absence of a LOCA" (at 13-3). However, with admittedly no changes in circumstances, the Staff issued a letter September 11, 1984, directing LILCO to amend the previously approved Security Plan to protect the temporary alternative equipment as vital equipment. No adequate reasons were given for this abrupt change in the application of regulations, which was overruled by the Licensing Board as a matter of law.[138] Subsequently, LILCO voluntarily agreed to make certain security enhancements to its safeguards arrangements. The Staff has indicated that such commitments adequately resolve its security concerns.[139]

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[135] *Id.* at 3.

[136] *Id.* at 4.

[137] Catawba Nuclear Station, Unit No. 1, Issuance of Facility Operating License, 49 Fed. Reg. 30,611 (1984). *See also* our Order Reconsidering Summary Disposition of Phase I and Phase II Low-Power Testing, issued September 5, 1984, 20 NRC at 926.

[138] Order Denying Revised Security Contentions, issued September 19, 1984. At the same time the Board issued an expanded order containing the underlying reasons for overruling the Staff's actions in this case, but that order is Restricted because it might contain security or safeguards information.

[139] *See* § II.B, p. 1358, *supra*; Finding No. 25.

D. Good-Faith Effort to Comply with Regulations

The evidence shows that LILCO intends to comply fully with the requirements of GDC 17 for full-power operation. This proceeding involves only a limited and temporary exemption for the purpose of low-power testing. The testimony of Brian McCaffrey showed that the TDI diesels were purchased under specifications designed to comply with GDC 17. When problems were discovered, extensive efforts were undertaken to cure the deficiencies. LILCO is installing another qualified source of AC onsite power (Colt diesels) that are designed to meet all GDC 17 requirements. LILCO has also provided enhancements to its offsite power system to assure that AC power will be available during low-power testing.[140] The Intervenors attempted by cross-examination to show that in hindsight, LILCO might arguably have pursued some problems differently or more aggressively.[141] However, the requirement established by the Commission involved "good-faith efforts" to comply with the regulations, not whether they were perfect or sufficiently prudent. LILCO's efforts as described in detail constitute the good faith to be considered in evaluating the equities, and support the grant of an exemption.

E. Public Interest in Adherence to Regulations

In view of the demonstrated safety of low-power testing as proposed under the circumstances of this case, there is minimal public interest in strict or mechanical adherence to the regulations. There is also a concurrent public interest in recognizing that the practice of granting exemptions from regulations "is in accord with both the Act and sound principles of administrative law."[142] The U.S. Supreme Court has stated the principle as follows:

> It is well established that an agency's authority to proceed in a complex area . . . by means of rules of general application entails a concomitant authority to provide exemption procedures in order to allow for special circumstances.[143]

The low-power exemption requested in this proceeding is for a very limited period of time, about 3 months. The extensive evidentiary hear-

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[140] Tr. 1703-15; Findings No. 106-112.

[141] Tr. 1439-1510.

[142] NRC General Counsel's Discussion of Exemptions, dated July 24, 1984 (SECY-84-290A), at 6.

[143] *United States v. Allegheny-Ludlum Steel Corp.*, 406 U.S. 742, 755 (1972). *See also United States v. Storer Broadcasting Co.*, 351 U.S. 192 (1956); *National Broadcasting Co. v. United States*, 319 U.S. 190 (1943).

ing record has demonstrated that the grant of the requested exemption would have no adverse effects upon the public health and safety. In view of the level of protection that will be provided to the public by the enhanced AC power sources and the limited nature of the low-power operations requested, this equity favors grant of the exemption.

F. Safety Significance of the Issues Involved

With regard to Phases I and II of the proposed low-power testing operations, we have already found that no AC power is needed to provide core cooling in the event of a postulated accident or transient.[144] Accordingly, if no emergency AC power is required, then the proposed changes or enhancements in the power source could have no effect upon the "functioning of structures, systems, and components important to safety," as required by GDC 17.

As to operations under Phases III and IV, the Board has found that operations at low power with the proposed enhancements for emergency AC power, will be "as safe as" operation would have been if a source in compliance with GDC 17 were used.[145] Therefore, there is no adverse safety significance of the issues involved, and this equity favors granting the exemption.

On balancing the equities identified by the Commission in its May 16 Order, the Board finds that they meet the "exigent circumstances" test there described, and warrant a discretionary finding of exceptional circumstances that justify the granting of the exemption requested.

V. FINDINGS OF FACT

In making these findings of fact, the Board has reviewed and considered the entire evidentiary record of this proceeding. The positions of the parties are set forth in their proposed findings and briefs as follows:

LILCO's Proposed Findings of Fact;

LILCO's Post-Hearing Brief;

Suffolk County and State of New York Proposed Findings of Fact;

Brief of Suffolk County in Opposition to LILCO's Motion;

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[144] Section II.A, pp. 1352-56, and § III.A.1, pp. 1362-63, *supra*. *See also* our Order Reconsidering Summary Disposition of Phase I and Phase II Low-Power Testing, LBP-84-35A, *supra*.

[145] Section II.C, pp. 1358-61, and § III.A.2, pp. 1363-67, *supra*.

Brief of State of New York in Opposition to LILCO's Motion;

NRC Staff Proposed Findings of Fact and Conclusions of Law (all dated August 31, 1984); and

LILCO's Reply to Suffolk County/State of New York Proposed Findings of Fact, dated September 7, 1984.

Matters examined during the evidentiary hearings which are not discussed herein were considered by the Board and found to be without merit or immaterial to our decision. Those proposed findings not incorporated below, either directly or by fair implication, are rejected as being unsupported by the record or unnecessary to the rendering of this decision.

1. LILCO tendered its application for an operating license for the Shoreham Nuclear Power Station in August 1975 (Tr. 1715). As of the middle of 1984 there had been over 180 days of prehearing conferences and hearings, with approximately 310 witnesses testifying, 15,000 pages of written testimony and 400 exhibits, resulting in over 34,000 pages of written transcript. There have been over 160 persons deposed, and the written rulings of various boards and the Commission exceed 2900 pages (Tr. 1726).

2. On June 8, 1983, LILCO submitted its original motion for low-power operating license. The motion was denied in a Partial Initial Decision issued on September 21, 1983 (LBP-83-57, 18 NRC 445), in which another Licensing Board said that a low-power operating license could not be granted prior to conclusion of litigation on outstanding contentions regarding the TDI diesels. At a conference of the parties on February 22, 1984, the Chairman of that Board indicated that LILCO was not precluded from proposing ways it might qualify for low-power operation without reliance on the TDI diesels (Brenner Board, Tr. 21, 630-61).

3. LILCO filed a "Supplemental Motion" for low-power operating license on March 20, 1984. On March 30 this Board was established to hear and decide issues relevant to that motion (49 Fed. Reg. 13,611).

4. LILCO proposes to test Shoreham at low power employing "power enhancements" to provide emergency AC power in lieu of the TDI diesels. The "enhancements" are four EMD diesels and one 20-MW gas turbine. LILCO's low-power testing program consists of four discrete phases: Phase I is loading fuel into the reactor vessel and precriticality testing; Phase II is initial criticality and testing at power levels of 0.0001% to 0.001% of rated power at essentially ambient temperature and atmospheric pressure; Phase III is reactor heatup and pressurization to rated temperature and pressure conditions at approxi-

mately 1% of rated power; and Phase IV is testing at up to 5% of rated power (Gunther, Tr. 201-11).

5. The Commission in CLI-84-8 said LILCO must apply for and obtain an exemption to the requirement for an "onsite" source of emergency AC power, as set forth in GDC 17. LILCO sought an exemption by filing its Application for Exemption on May 22, 1984.

6. This low-power proceeding has involved 9 days of hearings, and 6 days of conferences with counsel. Transcript pages generated have been 3118, plus pages S-1 through S-333 *in camera* proceedings on security issues.

7. LILCO moved for summary disposition on its proposed Phases I and II on May 22, 1984. We granted summary disposition as to certain statements of material facts on July 24, 1984. On September 5, upon reconsideration, we granted summary disposition as to the ultimate issues by authorizing commencement of Phase I and II activities.

8. Phase I of LILCO's proposed low-power testing program involves placing fuel in the reactor vessel and conducting various tests of reactor and support systems (Gunther, Tr. 162, 164, 201-02).

9. During Phase I, the reactor will not be taken critical. It will remain at essentially ambient temperature and pressure. There will be no decay heat generated, and there will be no fission products in the core. Therefore, core cooling will not be required, and no fission product releases are possible (Rao, *et al.*, Tr. 279, 284).

10. Of the thirty-eight accident or transient events addressed in Chapter 15 of Shoreham's FSAR, eighteen could not occur during Phase I, another six could physically occur, but would not cause phenomena of interest in Chapter 15 safety analysis. The remaining fourteen events could possibly occur, although their occurrence would be highly unlikely. The potential consequences of these events would be trivial from a safety standpoint (Rao, *et al.*, Tr. 279-80).

11. A LOCA would have no consequences during Phase I. In the absence of fission products and decay heat, the fuel cladding would remain unchallenged, even in the event of a complete draindown of the reactor vessel for an unlimited period of time. Since no core cooling is required during Phase I, no AC power is necessary to cool the core (Rao, *et al.*, Tr. 284-85).

12. Phase II of LILCO's proposed low-power testing program involves achieving criticality at 0.0001% to 0.001% of rated thermal power utilizing a specified control rod withdrawal sequence. Criticality is maintained for periods of up to 5 minutes during this Phase (Gunther, Tr. 204-06).

13. Of the thirty-eight transients and accidents addressed in Chapter 15 of Shoreham's FSAR, fifteen cannot occur during Phase II. Of the remaining twenty-three that could occur, twenty are independent of onsite or offsite power. The three events that would be adversely impacted by loss of offsite AC power are: pipe breaks inside the primary containment (LOCA), feedwater system pipe break, and the loss-of-AC-power event. Even the possible Chapter 15 events would have no impact on public health and safety regardless of the availability of TDI diesels (Rao, *et al.*, Tr. 286-96).

14. The fission product inventory in the core during Phase II will be less than 1/100,000 (0.00001) of the fission product inventory assumed in the FSAR (Rao, *et al.*, Tr. 295).

15. A LOCA would be the most serious FSAR event that could happen during Phase II. If a LOCA did occur, there would be time on the order of months available to restore makeup water for core cooling. With power output averaging a fraction of a watt per rod, with no single rod exceeding approximately 2 watts, the fuel cladding temperature would not exceed the limits of 10 C.F.R. § 50.46 even after months without restoring coolant. Thus, there is no need to rely on the TDI diesel generators, or any source of AC power (Rao, *et al.*, Tr. 292-93, 295-96).

16. During Phase II no reliance on the diesel generators is necessary for mitigation of either the loss-of-AC-power event or the feedwater-system-piping-break event. During these events, no loss of coolant occurs and the decay heat is minimal. Core cooling can be achieved for unlimited periods of time without AC power using the existing core water inventory and heat losses to ambient (Rao, *et al.*, Tr. 293-94).

17. The LOCA and the feedwater-system-piping-break events postulate double-ended ruptures of a piping system. With the essentially ambient temperature and atmospheric pressure during Phase II, it is extremely unlikely that such a pipe break would ever occur. The NRC Staff does not require double-ended ruptures to be postulated for low-temperature and low-pressure systems in safety analyses (Rao, *et al.*, Tr. 294).

18. Even if AC power were not available for extended periods of time, fuel design limits and design conditions of the reactor coolant pressure boundary would not be approached or exceeded as a result of anticipated operational occurrences, and the core would be adequately cooled in the event of a postulated accident (Rao, *et al.*, Tr. 295-96).

19. None of the events analyzed in Chapter 15 could result in a release of radioactivity during Phase II that would endanger the public health and safety (Rao, *et al.*, Tr. 295).

20. If no AC power is needed, a change in or the absence of emergency power sources has no effect on the safety of operation (Hodges, Tr. 1792; Rao, *et al.*, Tr. 293).

21. A Final Security Settlement Agreement was signed by LILCO, Suffolk County and the NRC Staff in November 1982. The site security plan is geared toward function, setting forth security principles, procedures and goals, rather than item-by-item specifics. It is readily adaptable to minor changes in plant configuration, such as the addition of the four EMDs and the 20-MW gas turbine.

22. Placement of additional equipment outside of and a reasonable distance from the Shoreham plant's vital areas, does not impair or impact upon established security procedures for protection of the vital areas.

23. Because the degree of potential danger to public health and safety at low-power operations is substantially less than at full power (Rao, *et al.*, Tr. 278), the need for security of emergency AC power systems during low-power operation is diminished. In the posture of a request for exemption from certain regulations for purpose of low-power testing, emergency AC power sources need not be protected as "vital" equipment.

24. LILCO's security arrangements provide reasonable assurance that its emergency power enhancements will be protected during the occurrence of a security-related event.

25. The NRC Staff believes that LILCO's voluntary commitment (as described by letter dated October 2, 1984) to implement "certain identified enhancements" to the physical security arrangements for the EMD diesels, operates to "adequately resolve the security concerns" that had led the Staff to suggest (by letter of September 11, 1984) that LILCO's emergency backup power equipment should be treated as "vital."

26. The main purpose of backup emergency power systems in the context of LILCO's proposed low-power testing program is to assure that cooling water can be provided in order to avoid uncovery of the core.

27. In comparing two roughly equivalent emergency AC power systems, neither is required to be better than the other in every respect in order to be found adequate for the purposes of protecting public health and safety.

28. NRC regulations do not require a licensee to be able to restore emergency power within any specified time. The time limit is determined by analysis of a variety of accident scenarios, based upon the functional determination of how much time is available to effect emergency core

cooling before damage results. So long as there is enough time to cool the core, any "margin of safety" in the form of some shorter time is irrelevant.

29. If a loss of offsite power were to happen concurrently with a LOCA, LILCO would have at least 55 minutes to restore emergency power in order to replace cooling water before core damages would occur (Hodges, Tr. 1786-88). Emergency power could be restored in order to run cooling pumps and other emergency equipment within 55 minutes of a loss of power (Knox, Tr. 2357; Staff Ex. 2 (SSER 6, at 8-9)).

30. Section 50.46(b) of 10 C.F.R. sets forth five specified limits within which an operating reactor must remain during postulated accidents and transients with regard to: fuel cladding temperature, oxidation of fuel cladding, hydrogen generation, coolable core geometry, and long-term decay heat removal. In the specific case of the limiting LOCA at 5% power, the peak cladding temperature limit (2200°F) would be reached prior to any other limit of § 50.46(b) (Hodges, Tr. 1795). In the event of a LOCA with no makeup at all, there are at least 55 minutes before the cladding temperature would exceed 2200°F (Hodges, Tr. 1786). Emergency power could be restored within that time (Finding No. 29). Thus, the plant during low-power operation meets the requirements of § 50.46(b), and is deemed safe regardless of the margin by which it meets or exceeds those requirements.

31. During Phase III, the temperature and pressure of the system are increased to intended operating conditions. This permits testing related to such items as thermal expansion of piping, verification of source range monitor calibration and response, establishment of overlap data between source range and intermediate range monitors, determination of scram time data for reactor control rods, as well as testing of approximately fifty-four plant systems and support systems and their integration into the total plant (Gunther, Tr. 220-27).

32. Operations and testing related to Phases III and IV are clearly separable in that some testing can be performed initially at one or the other power level. However, the consequences of misadventures are less at 1% than at 5% rated power and the time within which to respond is greater. At 1% power, assuming a LOCA and using conservative models and assumptions, power must be restored within 370 minutes, while at 5% power the corresponding time is 86 minutes (Rao, *et al.*, Tr. 251-52, 296, *et seq.*).

33. For a non-LOCA accident at 5% power, if either the Reactor Core Isolation Cooling (RCIC) or the High Pressure Coolant Injection (HPCI) system acts to restore water to the reactor core, a peak cladding

temperature of 2200°F would never be reached. These two systems depend on DC power sources and are completely independent of AC power (Hodges, Tr. 1785; SSER 6, at 15-6 and 15-7; Rao, *et al.*, Tr. 310-11).

34. Operation at low power (up to and including 5% rated power) results in reduced fission product inventory, increased time to take corrective or mitigative action, and reduction in required capacity of mitigative systems (Hodges, Tr. 1789-92; Rao, *et al.*, Tr. 298-301; Staff Ex. 2 following Tr. 721, at 15-4, 15-5).

35. For an accident other than a LOCA during Phases III or IV, water in the reactor vessel would boil off very slowly and the level would drop to the top of the fuel after an extended time, if no system acts to replace coolant. If either the RCIC or the HPCI system acts once during the first 4 days following an accident, heat losses to the environment, through the vessel walls to the containment, would equal the decay heat and the fuel would never be uncovered. The reactor vessel would depressurize slowly and the temperature of fuel and cladding would remain near the saturation temperature of the water (Hodges, Tr. 1785; Rao, *et al.*, Tr. 308-13).

36. Using the conservatisms of the approved evaluation model of Appendix K to 10 C.F.R. Part 50 and no makeup coolant from any source, calculations indicate that the core could be without cooling for 55 minutes before the peak cladding temperature would exceed 2200°F. Using "best estimate" models, this time would be more than 3 hours (Hodges, Tr. 1786; Rao, *et al.*, Tr. 298, 302-08).

37. Exceeding the 2200°F limit does not result in fuel or cladding damage. This value of the temperature is chosen conservatively in order to assure that the cladding would retain some ductility following reflooding of the core (Hodges, Tr. 1786-87).

38. Since oxidation is dependent on both time and temperature, it is possible that exceeding 2200°F could result in exceeding the oxidation limit. On the basis of very conservative analysis, the maximum local oxidation was calculated to be 6.5% (Hodges, Tr. 1787-88).

39. The peak cladding temperature following a LOCA with qualified TDI diesels was calculated to be 550°F and local oxidation 0.033%. If it is assumed that the 20-MW gas turbine fails to start and the EMD diesels are started within 30 minutes, the calculated peak cladding temperature would be 1086°F and local oxidation 0.034% (Hodges, Tr. 1788).

40. For operation up to 5% power, the fission product inventory will not exceed 5% of the equilibrium value given in the FSAR (Hodges, Tr. 1790).

41. The standby gas treatment system (SGTS) is not needed at 5% power (Quay, Tr. 1745, 1797).

42. In case of a LOCA at 5%, cladding integrity is maintained and thus no fission products are released if AC power is restored, from any source, within 55 minutes.

43. Without the Shoreham generating station, LILCO has a total generating capacity of 3721 MW, consisting of 2240 MW of baseload and 432 MW of midrange and peaking oil-fired steam turbine units, and 1049 MW from gas turbines and diesel generators (Schiffmacher, Tr. 4487-88).

44. LILCO has four major steam generating stations. Each station is equipped with at least one backup blackstart gas turbine (Schiffmacher, Tr. 486-508).

45. There are ten 50-MW gas turbines at Holtsville, about 15 miles southwest of Shoreham. Five are deadline blackstart. Any one of these gas turbines would be sufficient for Shoreham's emergency needs at low power. Actual tests under simulated conditions have shown that power can be restored to Shoreham from Holtsville in 6 minutes (Schiffmacher, Tr. 446-47, 488-89, 506-08).

46. Port Jefferson is a 380-MW generating station located about 11 miles west of Shoreham. It has a 16-MW gas turbine which starts in about 5 minutes. Switching operations necessary to get the power to Shoreham could take 25 minutes (Schiffmacher, Tr. 500-01).

47. In addition to its own generating capacity, the LILCO grid has three ties to the New York Power Pool and one to the New England Power Exchange. These interconnections provide, through both their normal and reserve capacities, the ability to respond rapidly to changing system conditions in order to provide reliable sources of power (Schiffmacher, Tr. 520-24).

48. LILCO's entire grid has not been lost since the 1965 Blackout. In 1979, it lost the portion of its grid east of the Holbrook Station due to vandalism, but power was restored completely in just over an hour. Since then, LILCO has implemented procedures whereby power could be restored in minutes by utilizing various blackstart gas turbines (Schiffmacher, Tr. 519-22).

49. A 14-MW gas turbine with deadline blackstart capability is located at Southold, about 27 miles east of Shoreham. Power could be restored to Shoreham within 10 minutes via 69-kV lines to Riverhead, thence via either 69- or 138-kV lines to Shoreham (Schiffmacher, Tr. 502-06).

50. The system operator has procedures requiring that power be restored to Shoreham on a priority basis. This requirement should enhance

the already very reliable system, to the benefit of Shoreham (Schiffmacher, Tr. 504-05).

51. A 20-MW gas turbine with deadline blackstart capability is located at East Hampton, about 35 miles from Shoreham. Power from it could be routed to Shoreham in about 15 minutes via 69-kV lines to Riverhead and then via either 69- or 138-kV lines to Shoreham. The transmission system from East Hampton to Riverhead is independent of the transmission system from Southold to Riverhead (Schiffmacher, Tr. 502-03).

52. Power from Holtsville can be routed to Shoreham over various transmission paths leading ultimately to any of the four 138-kV lines or the three 69-kV lines into the plant (Schiffmacher, Tr. 488-89, 508).

53. Three 69-kV circuits enter the Wildwood Substation, about one mile south of Shoreham, over two separate rights-of-way. From the substation, a single 69-kV circuit enters the 69-kV switchyard and has been placed underground in the vicinity of the 138-kV line from the 138-kV switchyard to the normal station service transformer in order to provide additional independence between circuits. The 69-kV line serves the reserve station service transformer (RSST) (Schiffmacher, Tr. 445-46, 517-18).

54. The Shoreham plant is connected to the LILCO system through seven 138-kV and 69-kV circuits. Four separate 138-kV transmission lines serve the 138-kV Shoreham switchyard, approximately 1300 feet south of the plant. The four circuits enter the 138-kV switchyard on two separate and independent rights-of-way, each containing two of the four 138-kV circuits. The 138-kV switchyard is arranged in a two-bus configuration with circuit breakers and switches arranged to permit isolation and/or repair of either bus section. This permits continuation of 138-kV power supplied from separate rights-of-way even in the event a bus section is out of service (Schiffmacher, Tr. 515-19).

55. A bypass 69-kV circuit, around the 69-kV switchyard and its associated cable, runs directly from the 69-kV overhead line from Wildwood to the RSST. This line makes it possible to restore power to the RSST without having to repair the underground cable or route power through the 69-kV switchyard (Schiffmacher, Tr. 371-74, 517).

56. Offsite power circuits enter the plant along two different corridors, with no common points between the corridors and no crossing or meeting. They do not pass through a common switchyard (Knox, Tomlinson, Tr. 2353-54).

57. The multiplicity of transmission lines into the Shoreham site and the use of two separate and independent switchyards decrease the

possibility of common failures and increase the reliability of maintaining normal offsite power.

58. Neither tornadoes nor earthquakes have had serious impact on LILCO's transmission system in the past 20 years. Ice storms and lightning have affected, at most, small segments of line (Schiffmacher, Tr. 511, 513).

59. The transmission system has suffered outages on individual lines but no major outage as a result of high winds or hurricanes in the last 10 years. The transmission system is designed to withstand winds in the range of 100 to 130 miles per hour, which exceeds the requirements of the National Electrical Safety Code (Schiffmacher, Tr. 513-14).

60. LILCO designs, constructs, and maintains its own transmission system, and therefore has the capability to restore any facilities that may become inoperative for any reason. LILCO can restore a mile of 69-kV line within 24 hours (Schiffmacher, Tr. 509-14).

61. LILCO has committed to initiate steps promptly to place the plant in a cold shutdown condition in the event of any of the following during Phases II, III and IV of the low-power testing program, thus further minimizing the probability that a loss of the normal offsite transmission system will occur and adversely affect operation of the plant from a safety standpoint:

(a) a "hurricane warning" for the Shoreham area issued by the National Weather Service;

(b) a "tornado watch" or a "severe thunderstorm watch" for the Shoreham area issued by the National Weather Service;

(c) a "winter storm watch" for the Shoreham area issued by the National Weather Service, including ice storms;

(d) a coastal flood warning for the Shoreham area issued by the National Weather Service predicting that a high tide greater than 5 feet above normal high water will occur within 24 hours;

(e) an indication of seismic activity of 0.01g on the Shoreham seismic monitors;

(f) the outage of two of the four LILCO interconnections to the New York Power Pool and the New England Power Exchange (except short outages of less than 8 hours of a second intertie required for inspection, testing, or minor maintenance where the intertie could be restored to service if needed); and

(g) a low electrical frequency condition on the LILCO transmission system which reaches the alarm set point (Museler Tr. 558, 561-62, 574).

62. A cold shutdown condition can typically be reached in 6 hours from 5% power (Museler, Tr. 562; Gunther, Tr. 412-13; Gunther, ff.

Tr. 1214, at 17). The procedures direct immediate commencement of a controlled reactor shutdown upon notification from the system operator that any of the foregoing weather conditions is predicted (Gunther, ff. Tr. 1214, at 16). Upon notification, the operator is expected to begin insertion of control rods taking the reactor subcritical within 15 minutes. The operator is not precluded from initiating a more rapid shutdown if he feels an unsafe condition exists (Gunther, Tr. 414-15, 471-72).

63. LILCO's two "offsite power enhancements" are one deadline blackstart 20-MW gas turbine and a group of four deadline blackstart 2.5-MW EMD diesels, which supply a total of 10 MW. Both are located on the Shoreham plant site: the turbine in the 69-kV switchyard, approximately 300 feet south of the reactor building, and the EMDs near the southwest corner of the reactor building (Schiffmacher, Tr. 322, 494; Knox and Tomlinson, Tr. 2342).

64. The gas turbine is started using a starting motor which operates on compressed air. The compressed air is supplied from a receiver in which sufficient pressure is automatically maintained by a compressor (Tomlinson, Tr. 2346).

65. Each of the four EMD diesels has two starting motors, powered by a 112-volt, 420 AH lead acid battery (Tomlinson, Tr. 2347).

66. Power from the gas turbine could be established and operating cooling equipment within 10 minutes; from the EMDs, power could be established in 30 minutes (Knox, Tr. 2351-52).

67. Starting reliability of a gas turbine virtually identical to the one at Shoreham is 97.6% (Knox, Tomlinson, Tr. 2346; Schiffmacher, Tr. 497). Starting reliability of the EMD diesels is 98.6% (Tomlinson, Tr. 1863, 1882-84; Schiffmacher, Tr. 463), with reliability approaching 100% that at least one diesel would start (Tomlinson, Tr. 1863). Typical onsite nuclear power system diesel generators exhibit 92-99% reliability (Staff Ex. 2, SSER 6, ff. Tr. 721, at 8-9).

68. The EMD diesels have only a single electric output cable from the EMD control cubicle, a single starter system, a single fuel supply system, and a common location of breakers (Eley, *et al.*, Tr. 2581-91).

69. The EMD diesels contain no fire detection equipment and no fixed, remotely operated fire extinguishing system, and it is unlikely that if one diesel were on fire the other could be kept running (Eley, *et al.*, Tr. 2591-95).

70. The EMD diesels are sufficiently reliable in view of their function as backup for all the other available power sources, as the failure of all other sources of AC power must be assumed before the EMDs would be called upon for emergency power.

71. The EMDs are physically located far enough from the 20-MW gas turbine so that a fire in the EMDs would not incapacitate the turbine (Eley, Tr. 2493).

72. The shutdown of the EMDs would have no effect on the gas turbine (Smith, Tr. 2500).

73. Although the gas turbine and the EMDs are deadline blackstart, manual operations are necessary to transfer their power output to the emergency buses. Demonstration showed that power could be restored to plant systems from the gas turbine in 4 minutes and from the EMDs in 9 minutes (Clifford, Tr. 1852).

74. LILCO will implement the following additional test procedures:

(a) demonstrate on a biweekly basis through an actual test that the Holtsville blackstart gas turbines can supply power to Shoreham in less than 15 minutes;

(b) demonstrate on a biweekly basis through an actual test that the 20-MW gas turbine at Shoreham can be manually started, synchronized and loaded to at least 13 MW on the grid;

(c) demonstrate on a monthly basis that the 20-MW gas turbine at Shoreham will start automatically on a loss of grid voltage signal;

(d) demonstrate on a biweekly basis that the East Hampton and Southold gas turbines can be manually started, synchronized, and loaded to at least 50% capacity of the grid; and

(e) demonstrate on a biweekly basis that at least three of the four GM EMD diesel generators on site can be manually started and can supply power to plant systems (Museler, Tr. 577).

75. The EMD diesels have been adequately maintained and their maintenance and repair will be adequate to assure reliable operation in the foreseeable future (Iannuzzi and Lewis, Tr. 1175-76, 1201-11).

76. The reliability and availability of Shoreham's EMDs while in service at New England Power Company have been high (Iannuzzi and Lewis, Tr. 1178-79).

77. LILCO's performance of a test of the turbine to full capacity prior to Phase III and performance, on a monthly basis, of a test to demonstrate that loads normally connected to certain buses used by the turbine are automatically disconnected and that the gas turbine may be automatically connected to the 69-kV bus within 2 to 3 minutes (Staff Ex. 2, SSER 6, ff. Tr. 721, at 8-2, 8-3), will adequately address significant concerns regarding test procedures for the gas turbine (Minor and Bridenbaugh, Tr. 2580, 2614-15).

78. A test which will load each EMD diesel to its design load requirements for 1 hour and verify that voltage and frequency are main-

tained within required limits, will be performed prior to commencement of Phase III. Additional tests, to demonstrate that the EMDs can be manually reconnected to their loads following disconnection, performed on a biweekly basis (Staff Ex. 2, SSER 6, ff. Tr. 721, at 8-4), will adequately resolve concerns regarding the EMDs (Eley, *et al.*, Tr. 2579, 2597-2600).

79 The gas turbine and the EMDs are considered a system (Smith, Tr. 2482) whose two parts (turbine, EMDs) are adequately independent of one another for compliance with the single failure criterion (Staff Ex. 2, SSER 6, ff. Tr. 721, at 8-5, 8-6).

80 The cables carrying power from the gas tubine and the EMD diesels both go through the block walls in the nonemergency switchgear room (Knox, Tr. 1886). Sufficient independence exists because these two cables enter the nonemergency switchgear room separated by a distance of about 40 feet along the wall (Staff Ex. 2, SSER 6, ff. Tr. 721, at 8-6) and because the EMDs will have an additional, independent line allowing their output to be routed into the emergency switchgear room (Schiffmacher, Tr. 842, 863; Knox and Tomlinson, Tr. 1890).

81 If Shoreham were to lose power from LILCO's normal power grids, the power enhancements' deadline blackstart feature will cause them to sense that there is no power on the grid and start up automatically (Schiffmacher, Tr. 333). Both the turbine and the diesels will start simultaneously. If power is available from the gas turbine the operator will open and close breakers from the control room to supply the safety loads through a transformer in the 69-kV switchyard to the switchyard bus and then to the safety-related switchgear. If power from the gas turbine is unavailable, power from the EMDs is routed through the nonemergency switchgear room to the safety-related switchgear room (Knox, Tr. 2349-51).

82 The gas turbine or one EMD diesel, acting alone, is capable of providing sufficient AC power for cooling the core at low power (Knox, Tr. 2352; Schiffmacher, Tr. 1868).

83 The 20-MW gas turbine and the four GM EMD diesels have significant seismic capabilities and are likely to be available following a seismic event (Staff Ex. 2, SSER 6, ff. Tr. 721, at 8-7 to 8-8).

84 The manufacturer of the 20-MW gas turbine has provided assurance that the machine would remain structurally sound during a design basis seismic event at Shoreham (Staff Ex. 2, SSER 6, ff. Tr. 721, at 8-7; *see also* Meyer, Tr. 2787).

85 Sargent & Lundy performed a study of the seismic capabilities of the four GM EMD diesels at Shoreham (Christian, *et al.*, Tr. 972-73). Sargent & Lundy had previously performed seismic qualifications for

more than twelve GM EMD diesels that are similar to the diesel generator sets installed at Shoreham (Meligi, Tr. 968).

86. Seismic capabilities of the diesel engine were evaluated using a combination of analyses and test results. Shock tests performed by the U.S. Navy on EMD engines similar to those at Shoreham confirmed that the engine block and internals could withstand loads in excess of the Shoreham SSE. In addition, supplemental analysis was performed to address external components attached to the engine. This combination of testing and analysis demonstrated that the engine assembly and all of its integral components would be able to function properly following an SSE-level earthquake at Shoreham (Meligi, Tr. 981-84). The EMD diesels which were used for the testing and analysis were comparable to the EMD diesels at Shoreham (Meligi, Tr. 956-57).

87. Accessory components are those items that are not an integral part of the engine assembly. These components were analyzed using bounding calculations which demonstrated that stresses and deflections of the components were within allowable limits. With some exceptions, all accessory items were found to be suitable to withstand an SSE-level earthquake and remain operable following the event. For the exceptions noted, Sargent & Lundy made recommendations for modifications which will result in those components being able to withstand the SSE (Meligi, Tr. 980-81).

88. LILCO has accepted the recommendations of Sargent & Lundy. The recommendations either have been completed or will be after an exemption is granted. Upon completion of recommendations made by Sargent & Lundy, the four EMD diesel generators at Shoreham will be capable of surviving an SSE-level earthquake and remaining operable following the event (Meligi, Tr. 986).

89. Electrical equipment was also analyzed as part of the Sargent & Lundy study of the seismic capabilities of the EMD diesels. First, a detailed, finite-element analysis was performed on the worst-case electrical panel to demonstrate the structural integrity of the panels (Meligi, Tr. 984). Second, the operability of electrical equipment was confirmed by determining that the elevated response spectra for Shoreham were bounded by the response spectra used by Sargent & Lundy in qualifying other EMD diesels. By confirming that certain electrical devices installed on Shoreham were similar to devices previously analyzed by Sargent & Lundy, it was possible to conclude that these devices would withstand the SSE. For electrical equipment that could not be analyzed using this technique, Sargent & Lundy used methods set out in NUREG/CR-2405, "Subsystem Fragility" February 1982. Additionally, a detailed check was performed of the mounting bolts on many of the instruments.

The overall results of the analysis demonstrated that electrical components and devices on the Shoreham EMD diesels will withstand the SSE (Meligi, Tr. 984-85).

90. In addition to the Sargent & Lundy study, Stone & Webster performed analyses of any aspect of the seismic capabilities of the machines not covered by Sargent & Lundy's study that would affect their ability to operate under seismic conditions (Christian, Wiesel, Tr. 988). The scope of the Stone & Webster work coupled with the Sargent & Lundy work was adequate to determine the overall seismic capabilities of the machines (Wiesel, Tr. 958).

91. A static sliding and overturning analysis was performed on the EMD diesel mounting. Earthquake-induced sliding forces were compared to the support system's capability to resist those sliding forces with friction. This analysis showed that sliding of the EMD diesels will not occur during an SSE. A similar analysis was done for overturning forces and demonstrated that the EMD diesels would not overturn in the event of an SSE (Wiesel, Tr. 941, 989-91).

92. Analysis also demonstrated that the wooden beam support structure for the diesel engines would not slide either (1) at the contact between the wooden beams and the gravel or (2) at a failure surface passing below this contact point through the gravel and soil (Christian, Tr. 992-93). Suffolk County's witnesses agreed that Stone & Webster had correctly concluded that the EMD diesels would not slide or overturn (Meyer, Tr. 2793-94).

93. Similar analyses demonstrated that the switchgear cubicle for the EMD diesels could resist sliding or overturning for a ground input of up to 0.13*g* (Wiesel, Tr. 991).

94. Stone & Webster evaluated the EMD diesel fuel oil line installation and recommended it be buried to improve its ability to withstand a seismic event (Wiesel, Tr. 991-92). Buried, it will have adequate seismic resistance (Christian, Wiesel, Tr. 998).

95. Stone & Webster also performed an assessment of the potential for soil liquefaction in the vicinity of the EMD diesel generators. Soils in that vicinity can withstand up to 0.13*g*, which exceeds the operating basis earthquake of 0.1*g*, without liquefaction. This does not mean that liquefaction will occur above 0.13*g*; it only means that it cannot be predicted with confidence that liquefaction will not occur (Christian, Tr. 993-95).

96. The ability of the GM EMD diesels and switchgear to withstand, at a minimum, an earthquake of 0.13*g* is significant because that level of earthquake exceeds the operating basis earthquake for Shoreham of 0.1*g* (Christian, Tr. 995). Moreover, although Shoreham uses a safe

shutdown earthquake of 0.2*g*, the procedures currently used for determining design basis earthquakes for nuclear power plants set out in 10 C.F.R. Part 100, Appendix A, would only require an SSE of 0.13*g*. In other words, if the NRC's existing standard procedures for relating earthquake intensities to peak ground acceleration had been applied to Shoreham, which they were not, Shoreham would have an SSE of 0.13*g* (Christian, Tr. 995).

97. The capability will exist to connect the EMD switchgear directly to Emergency Switchgear Room 102, through a cable routing independent of, and bypassing, the normal feed and normal switchgear room. Power can then be provided to the other Emergency Switchgear rooms from Room 102. This will provide added assurance of AC power availability in the event the normal switchgear room is unavailable. Installed raceway for the alternate feed will either be supported to withstand a seismic event, or installed after a seismic event. Conceptual design has been completed and feasibility has been verified. Final engineering and construction of pre-installed portions will be done if a low-power license exemption is granted, prior to commencing the Phase III testing program (Gunther, Schiffmacher, Tr. 813-15; Schiffmacher, Tr. 818-20, 832-37, 842, 863-65; Gunther, Tr. 832, 862-63; Knox, Tomlinson, Tr. 1890).

98. LILCO has committed to completing selected portions of this alternate tie-in prior to commencement of Phase III of the low-power testing program. Other elements of the modification will be installed after a seismic event if this tie-in is needed (Schiffmacher, Tr. 865).

99. LILCO has not qualified the EMD diesels for a seismic event (Schiffmacher, Tr. 349). The proposed TDI diesels are fully qualified (Minor, Tr. 2800).

100. If an SSE knocked out the 138-kV and 69-kV systems, there would still be three independent 3.5-MW seismically qualified systems available. Under the same conditions, for the enhanced system there would remain only the EMD diesels (Meyer, Rousset, Minor, Tr. 2801-02).

101. The EMD diesels, not being seismically qualified, also might not be able to survive an SSE due to potential for failure of the fuel line or the concrete block walls of the nonemergency switchgear room or from soil liquefaction (Meyer, Rousset, Minor, Tr. 2802).

102. It is not necessary to assume the simultaneous occurrence of a LOCA and a seismic event. The piping systems are designed to withstand seismic loads in combination with other loads. Therefore, seismic loads will not cause a piping failure causing a LOCA. Thus, a LOCA and an earthquake are independent events. As both an earthquake and a

LOCA are low-probability events, their combination is an extremely-low-probability event (Hodges, Tr. 1763, 1794).

103. LILCO's evidence showed that it can restore a mile of the 69-kV transmission line in 24 hours (Tr. 510, Schiffmacher).

104. The RCIC system is seismically qualified. Modifications are being made to the HPCI to ensure that all portions of it are also qualified. Both systems are steam-driven and utilize DC power supplies which will last at least 24 hours. There is on site a portable generator that can be used to maintain the DC power well beyond the 24 hours (Rao, *et al.*, Tr. 309-11; Hodges, Tr. 1766-67; Staff Ex. 2 (SSER 6), ff. Tr. 721, at 15-7).

105. The Shoreham nuclear plant is physically completed and is being maintained in a condition that would allow fuel loading within 2 to 3 weeks of the grant of a low-power license. The major requirement prior to fuel loading is the installation of neutron sources into the reactor vessel. These sources will be shipped upon receipt of a license and will be installed within 2 to 3 weeks, and final pre-fuel load testing will be completed during that period so that fuel loading activities may commence (Gunther, Tr. 866).

106. LILCO's exemption request is a short-term interim measure to allow fuel loading and low-power testing prior to completion of the litigation concerning the reliability of the TransAmerica Delaval, Inc. (TDI) diesel generators. Shoreham will be provided with fully qualified diesels prior to full-power operation (McCaffrey, Tr. 1704-05).

107. Prior to the crankshaft failure on one of the TDI diesel generators in August 1983, LILCO included in Shoreham's design three emergency diesel generators intended to meet all applicable regulatory requirements for onsite power sources. LILCO purchased three diesel generators from TransAmerica Delaval, Inc. (TDI), requiring that these machines be manufactured in accordance with approved specifications (McCaffrey, Tr. 1705). To ensure that TDI produced a machine that met the performance rating required in the FSAR and specifications, LILCO provided a specification which called for certain performance standards and assured through a preoperational test program that the machines were capable of running at the performance rating (McCaffrey, Tr. 1440-41, 1467-68). LILCO utilized its own and its architect-engineer's quality assurance program to oversee TDI's quality assurance programs (McCaffrey, Tr. 1459-60, 1468-69).

108. The preoperational test program identified problems needing correction. LILCO responded by correcting individual problems and by initiating a Diesel Generator Operational Review Program in March

1983 to review problems and make recommendations to improve reliability of the TDI diesel generators (McCaffrey, Tr. 1706-08, 1492-93).

109. Within a few days of the failure of the crankshaft of diesel generator 102 in August 1983, LILCO engaged the services of Failure Analysis Associates (FAA) to conduct a comprehensive investigation into the cause of the failure (McCaffrey, Tr. 1708, 1470-71). That effort included:

(a) inspection of the crankshafts on DG 101 and 103 for indications of similar problems;

(b) complete metallurgical analysis of the failed crankshaft;

(c) strain gauge and torsiograph testing of one of the remaining original crankshafts to determine actual stresses on the shaft;

(d) complete disassembly and inspection of all three diesel engines to replace the original crankshafts with crankshafts of an improved design and to assess any damage to the engines as a result of the crankshaft problem; and

(e) design analysis using finite element modeling/model superposition analysis to ascertain dynamic torsional response of the original crankshafts.

(McCaffrey, Tr. 1708-09.)

110. At a November 1983 meeting with the NRC Staff, LILCO further undertook a comprehensive diesel generator recovery program consisting of four phases:

(a) disassembly, inspection, repair and reassembly of each diesel;

(b) failure analysis of defective components;

(c) design review and quality revalidation (DRQR) program; and

(d) expanded qualification testing.

(McCaffrey, Tr. 1531, 1709-10.)

111. The DRQR program is a detailed review of the design and quality of the TDI diesel engines including an assessment of the design of important components in the diesels which verifies important quality attributes for the requisite engine components. It has involved over 120 people from LILCO, Stone & Webster, Failure Analysis Associates, Impell and other consultants (McCaffrey, Tr. 1710).

112. LILCO has also undertaken to procure and install at Shoreham three diesel generators manufactured by Colt Industries. These machines are of the type in use at other nuclear power plants and are designed to satisfy the requirements of GDC 17. Stone & Webster has been retained to design a new building for the Colt diesels, to design support systems

and to analyze how to integrate the system into the existing plant (McCaffrey, Tr. 1712-13). The procurement of and engineering for the Colt diesels were pursued on an expedited basis. Construction of site facilities for the Colt diesel generators started in November 1983, after the August 1983 failure of the crankshaft in diesel generator 103. All three Colts have now been manufactured and delivered to Shoreham. Engineering work for the installation of the Colts is essentially complete and construction work is well under way, and construction and testing are scheduled for completion in May 1985 (McCaffrey, Tr. 1713-14).

VI. CONCLUSIONS OF LAW

Based upon the entire evidentiary record in this proceeding and upon the opinion and findings of fact set forth above, the Board makes the following conclusions of law:

1. The evidence establishes that no fission products will be released from the fuel if AC power is restored to the plant within 55 minutes in the event of a LOCA, and that there is adequate assurance that in the event of a simultaneous LOCA and loss of offsite AC power, power would be restored from either the gas turbine or the EMDs within 55 minutes. Thus, the Board finds that the alternate AC sources proposed for use at Shoreham at 5% power provide a level of protection comparable with a fully qualified onsite source of emergency AC power. The Board therefore concludes that reliance by LILCO on the proposed alternate sources meets the "as safe as" standards set forth by the Commission in CLI-84-8 (19 NRC 1154).

2. In view of the Board's conclusion that the Commission's "as safe as" test is met, the Board finds that the proposed exemption for low-power testing would not endanger life or property, within the meaning of 10 C.F.R. § 50.12(a).

3. The terms "common defense and security" as used in 10 C.F.R. § 50.12(a), mean the common defense and security of the United States (10 C.F.R. § 50.2(i); § 11g of the Atomic Energy Act, 42 U.S.C. § 2014(g)). The Commission has held that the terms refer principally to "the safeguarding of special nuclear material; the absence of foreign control over the applicant; the protection of Restricted Data; and the availability of special nuclear material for defense needs" (*Florida Power & Light Co.* (Turkey Point Nuclear Generating Station, Units 3 and 4), 4 AEC 9, 12 (1967)). The United States Court of Appeals for the District of Columbia Circuit further stated that

> the internal evidence of the [Atomic Energy] Act is that Congress was thinking of such things as not allowing the new industrial needs for nuclear materials to preempt the requirements of the military; of keeping such materials in private hands secure against loss or diversion; and of denying such materials and classified information to persons whose loyalties were not to the United States

(*Siegel v. AEC*, 400 F.2d 778, 784 (D.C. Cir. 1968)). The Board concludes that LILCO's exemption request has no impact upon and will not endanger the common defense or security of the United States.

4. After taking into account and balancing the equities identified by the Commission in footnote 3 of CLI-84-8 (19 NRC 1154, 1156 n.3), the Board finds that there are exceptional circumstances that warrant the granting of an exemption under the provisions of 10 C.F.R. § 50.12(a).

5. Based upon a balancing of the equities identified in CLI-84-8, 19 NRC 1156 n.3, *supra*, the Board finds that the Application for Exemption filed by LILCO and the evidence adduced in support thereof demonstrate the "exigent circumstances" that favor the granting of an exemption and show that, in spite of its noncompliance with GDC 17, the health and safety of the public would be protected (CLI-84-8, 19 NRC at 1155).

6. Based upon a finding that the Application for Exemption meets the "exigent circumstances" test set forth by the Commission, the Board concludes that the Application meets the "otherwise in the public interest" provision of 10 C.F.R. § 50.12(a).

7. The Board thus resolves all issues involved in the hearing on this proceeding in favor of authorizing the exemption requested by LILCO.

VII. ORDER

The Director of Nuclear Reactor Regulation is authorized, upon making the findings on all applicable matters specified in 10 C.F.R. § 50.57(a), to issue to the Applicant, Long Island Lighting Company, a license or licenses to authorize low-power testing (up to 5% of rated power) of the Shoreham Nuclear Power Station, Unit 1.

The Commission provided in its Order of May 16, 1984, that "[a]ny initial decision authorizing the grant of an exemption shall not become effective until the Commission has conducted an immediate effectiveness review" (CLI-84-8, *supra*, 19 NRC at 1156). Accordingly, this Initial Decision is transmitted directly to the Commission for its immediate effectiveness review.

The Appeal Board has held in the instant proceeding that in none of the orders entered by the Commission did it "announce that it was

removing us entirely from the appellate review chain" (ALAB-787, 20 NRC 1097, 1100). The Appeal Board further stated at page 1100:

> But, as noted above, all that the Commission "reserved" in CLI-84-8 was its conduct of an immediate effectiveness review of any section 50.12(a) exemption that the Licensing Board might grant to the applicant. It is clear from the terms of 10 C.F.R. 2.764(g) that Commission immediate effectiveness reviews have no bearing upon the exercise by an appeal board of the general appellate review authority in 10 C.F.R. Part 50 proceedings that is conferred by 10 C.F.R. 2.785(a). Rather, if the Commission desires to preclude or to limit the exercise of that authority in a particular Part 50 proceeding, it must — and does — say so expressly.

Any party may take an appeal from this Initial Decision by filing a Notice of Appeal within ten (10) days after service of this decision. Each appellant must file a brief supporting its position on appeal within thirty (30) days after filing its Notice of Appeal (forty (40) days if the Staff is the appellant). Within thirty (30) days after the period has expired for the filing and service of the briefs of all appellants (forty (40) days in the case of the Staff), a party who is not an appellant may file a brief in support of, or in opposition to, any such appeal(s). A responding party shall file a single, responsive brief *only*, regardless of the number of appellants' briefs filed. [*See*, in particular, 10 C.F.R. § 2.762, as amended effective December 19, 1983, 48 Fed. Reg. 52,282, 52,283 (Nov. 17, 1984).]

THE ATOMIC SAFETY AND
LICENSING BOARD

Glenn O. Bright, Member
ADMINISTRATIVE JUDGE

Elizabeth B. Johnson, Member
ADMINISTRATIVE JUDGE

Marshall E. Miller, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 29th day of October 1984.

Cite as 20 NRC 1403 (1984) LBP-84-46

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Peter B. Bloch, Chairman
Dr. Kenneth A. McCollom
Dr. Walter H. Jordan

In the Matter of

Docket Nos. 50-445
50-446
(Application for Operating License)

TEXAS UTILITIES ELECTRIC COMPANY, *et al.*
(Comanche Peak Steam Electric Station, Units 1 and 2)

October 29, 1984

In this Memorandum, the Licensing Board requests information on certain welding issues.

MEMORANDUM
(In-Process Weld Repair Hold Point)

Applicants' Response to Board Request for Additional Information Regarding Weave Welding, October 25, 1984, refuses to respond to the Board question in full and exposes Applicants to a possible adverse finding unless this lack of responsiveness is promptly remedied by Applicants or is adequately addressed by Staff.

In this filing, at page 5, Applicants state that

> when a *final* weld is found to be defective due to excessive weave width, the repair documentation generated requires a hold point after excavation to remove the defective weave weld prior to rewelding, and there is sworn testimony already in the record on this point (Tr. 10005, 10007). [Emphasis added.]

We find this filing nonresponsive for two reasons. First, the Board is concerned with hold points on *all* repairs, not just weave welds. Second, the Board is concerned with obtaining an explanation for why hold points are required on authorized welds but appear not to be required at all for in-process welds. What is there about repairs of in-process welds which makes it appropriate for the welders to make their own inspection of cleanliness, without a hold point, when such an inspection, solely by the welder, is not considered sufficient for repair of a final weld? This just does not seem to make sense and we need an explanation.

ORDER

For all the foregoing reasons and based on consideration of the entire record in this matter, it is, this 29th day of October 1984,

ORDERED

Texas Utilities Electric Company, *et al.*, may respond to this Order by November 9, 1984.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Peter B. Bloch, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland

Cite as 20 NRC 1405 (1984) LBP-84-47

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Sheldon J. Wolfe, Chairman
Dr. David L. Hetrick
Dr. James C. Lamb, III

In the Matter of

Docket No. 50-289-OLA
(ASLBP No. 83-491-04-OLA)
(Steam Generator Repair)

METROPOLITAN EDISON COMPANY,
et al.
(Three Mile Island Nuclear Station, Unit 1)

October 31, 1984

In this Initial Decision, the Licensing Board authorizes the Director of Nuclear Reactor Regulation to issue to the Licensee, upon making requisite findings, an operating license amendment that revises technical specifications to recognize steam generator tube repair techniques other than plugging, specifically the kinetic expansion tube repair technique. The authorization is subject to satisfaction of conditions identified in the Initial Decision.

RULES OF PRACTICE: FINDINGS OF FACT

If a licensing board directs all parties to file proposed findings of fact and conclusions of law and rules that they would be deemed in default for failure to file, an intervenor is deemed to be in default with respect to a contention if it fails to file proposed findings upon that issue. *Florida Power & Light Co.* (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-280, 2 NRC 3, 4 n.2 (1975).

TECHNICAL ISSUE DISCUSSED

Steam Generator Tube Repair.

APPEARANCES

George F. Trowbridge, Esq., Bruce W. Churchill, Esq., Diane E. Burkley, Esq., and **Wilbert Washington, II, Esq.,** for Metropolitan Edison Company

Joanne Doroshow, Esq., and **Louise Bradford,** for Three Mile Island Alert, Inc.

Thomas Y. Au, Esq., for the Commonwealth of Pennsylvania

Mary E. Wagner, Esq., for the U.S. Nuclear Regulatory Commission

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INITIAL DECISION
(Amendment to Operating License)

Opinion

I. INTRODUCTION[1]

A. Background

1. Steam Generators' Description

Three Mile Island Nuclear Station, Unit No. 1 (TMI-1), located in Dauphin County, Pennsylvania, is a 776-megawatt pressurized water reactor having two vertical, straight tube and shell, once-through steam generators ("OTSG"). Each steam generator contains 15,531 Inconel-600 tubes. Each tube is 56 feet, 2-3/8 inches in length, with a 0.625-inch outer diameter and a 0.034-inch minimum wall thickness. The ends

[1] Part I sets forth certain uncontested facts.

were inserted into holes drilled in two 24-inch-thick carbon steel tubesheets at the top and bottom of the steam generator. The tube was fully inserted, and protrudes about ½ inch beyond the upper face of the Inconel-clad upper tubesheet and the lower face of the lower tubesheet, into the primary head at each end of the steam generator. There is a nominal 0.005-inch radial gap between the outer surface of the tube and the surface of the tubesheet hole. During manufacture of the steam generators, the tubes were sealed to the tubesheet at each end by rolling to a depth of about 1¼ inches, and welding on the primary side of the tubesheet surface. Primary coolant (at a pressure of about 2200 psig) flows within the tubes, and secondary system water and steam (at a pressure of about 950 psig) are heated outside the tubes. Thus the tubes, including the seal at each end, constitute part of the reactor coolant pressure boundary between the primary and secondary systems.

TMI-1 has been shut down since its last refueling outage in 1979 pending the outcome of restart proceedings before the Nuclear Regulatory Commission relating to the accident at TMI Unit 2, which occurred on March 28, 1979. In November 1981, primary-to-secondary leakage was discovered during testing of the TMI-1 reactor coolant system. This leakage was caused by intergranular stress-assisted cracking of steam generator tubes. Eddy current testing (ECT) revealed that 95% of the defects occurred within the top 7 inches of the upper tubesheet (UTS).

2. Description of the Kinetic Expansion Repair Process

Of the 31,062 tubes in both steam generators, 29,838 were repaired by kinetically expanding the tubes within the tubesheet to provide a new seal to the tubesheet below where the defects were detected. This was done by detonating an explosive cord encased in a polyethylene insert which had been placed into the tube. The resulting explosive energy was transmitted to the tube wall by the polyethylene insert, pressing the tube against the tubesheet. The tubes were expanded from the top of the upper tubesheet down either 17 inches or 22 inches, depending on the elevation of the lowest ECT indication within the upper tubesheet. This provided a 6-inch or greater ECT indication-free expanded length between the lowest-elevation ECT indication and the bottom of the expansion to serve as the new pressure boundary.

3. Proceedings

On May 9, 1983, the Licensee submitted to the Nuclear Regulatory Commission an application for an amendment to its operating license

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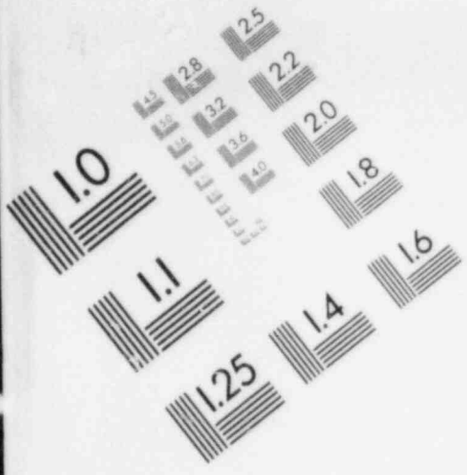
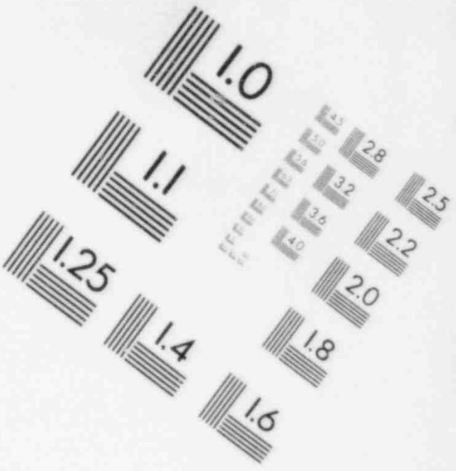
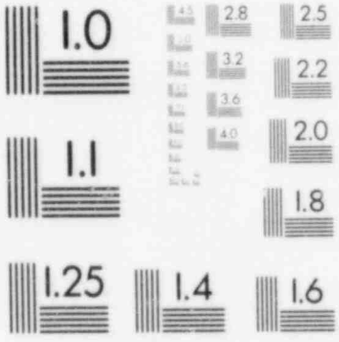
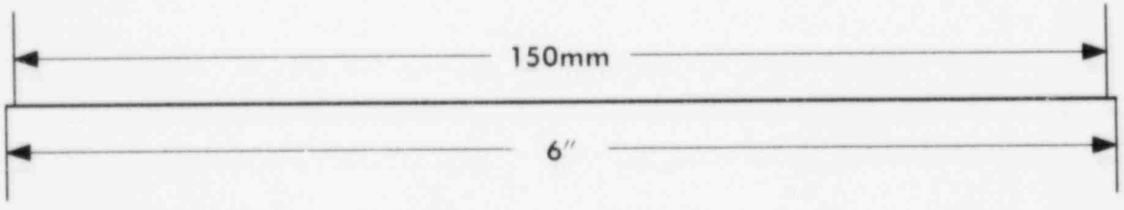
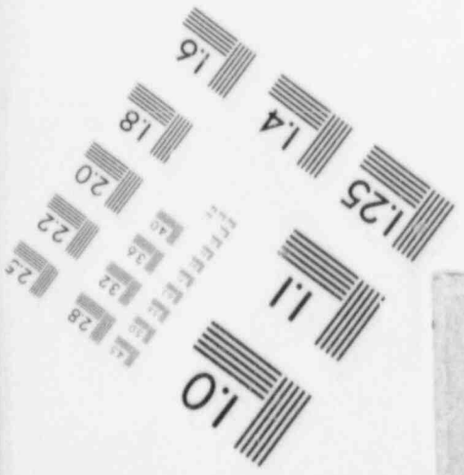
TEST TARGET (MT-3)

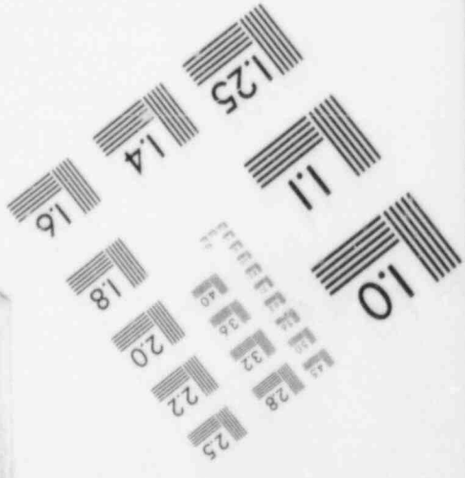












requesting that it be permitted to revise the technical specifications to recognize steam generator tube repair techniques, other than plugging, and that the Commission approve the proposed kinetic expansion repair technique used at the facility. On May 31, 1983, at 48 Fed. Reg. 24,231, the Commission published a notice captioned "Issuance of Amendment to Facility Operating License and Proposed No Significant Hazards Consideration Determination and Opportunity for Hearing."[2]

In a Memorandum and Order of November 29, 1983, LBP-83-76, 18 NRC 1266, as amended by the Order of December 1, 1983 (unpublished), the Board admitted as intervening parties Three Mile Island Alert, Inc. (TMIA) and the Joint Intervenors (Ms. Jane Lee, Mr. Norman Aamodt)[3] and admitted certain subparts of their contentions.

Thereafter, in a Memorandum and Order of June 1, 1984 (unpublished), the Board granted the Licensee's and the Staff's motions for summary disposition of the Joint Intervenors' contentions, and dismissed Joint Intervenors as a party. The Board granted in part and denied in part the Licensee's and the Staff's motions for summary disposition of TMIA's contentions. With respect to TMIA's Contentions 1.a and 1.b, the contentions which were not entirely dismissed, the Board identified specific issues as to which evidence was to be presented at the hearing. These issues are discussed below in Part II.

The evidentiary hearing was held on July 16-18, 1984.[4] The Licensee, the Staff and TMIA participated, as well as the Commonwealth of Pennsylvania which, on July 9, 1984, had filed a motion for leave to participate as an interested State pursuant to the 10 C.F.R. § 2.715(c). Only the Licensee and the Staff presented witnesses.

The Licensee, the Staff and TMIA filed proposed findings of fact and conclusions of law — the Commonwealth of Pennsylvania did not.

B. Content of the Opinion and Findings

Part II of this Opinion discusses and resolves the contentions. Part III reflects our conclusions. The Board's underlying Findings of Fact and

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[2] In a letter dated January 13, 1984, the Staff advised the Board and the parties that, at a meeting of the Commission on January 10, 1984, the Commission considered the question whether to concur in the Staff's proposed final no significant hazards consideration determination for the TMI-1 steam generator repair license amendment. The Staff also stated that, after voting 2-2 on the question, with one Commissioner not voting, the Commission then stated that no action should be taken by the Staff to issue the final determination or the amendment until the Commission had voted again and reached a decision on the matter.

[3] A third joint petitioner, Dr. Bruce Molholt, withdrew his petition for leave to intervene during the course of the special prehearing conference held on October 17, 1983.

[4] Limited appearance statements were also taken during the course of the hearing.

Conclusions of Law are appended and are incorporated by reference. An Order is also appended.

It should be noted that all of the proposed findings of fact and conclusions of law submitted by the parties that are not incorporated directly or inferentially in this Initial Decision are rejected as unsupported in law or fact or as unnecessary to the rendering of this Initial Decision.

II. CONTENTIONS

A. Contention 1.a[5] (Fdgs. 1-65)

Issue 1.a. Reliability of Leak Rate Measurements (Fdgs. 2-20)

The Staff's proposed License Condition 4, as modified in Supplement 1 to the Safety Evaluation Report (SER), reads as follows:

> The Licensee shall confirm the baseline primary-to-secondary leakage rate established during the steam generator hot test program. If leakage exceeds the baseline leakage rate by more than 0.1 GPM, the plant shall be shut down and leak tested. If any increased leakage above baseline is due to defects in the tube free span, the leaking tube(s) shall be removed from service. The baseline leakage shall be re-established, provided that the present Technical Specification limit of 1.0 GPM is not exceeded (SE Section 3.3).

The Board requested evidence on the above-captioned issue because the proposed license condition on leak rate limitations might not be effective if the measurements of leak rates were not sufficiently reliable. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

The Licensee determined the baseline primary-to-secondary leakage to be 0.02 gallons per minute (gpm) during the steam generator hot test program. The facility is to be shut down if leakage increases by 0.1 gpm above the baseline, i.e., if the leak rate reaches 0.12 gpm. This may be compared with the existing leak rate limit of 1.0 gpm. Subsequent tests may increase the baseline, provided that the limit of 1.0 gpm is not exceeded.

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[5] TMIA's Contention 1.a, as originally admitted, alleged with respect to the kinetic expansion repair technique that "post repair and plant performance testing and analysis . . . and proposed license conditions are inadequate to provide sufficient assurance that tube ruptures . . . will be detected in time and prevented . . . ." As noted in Part I.A, above, in the unpublished Memorandum and Order of June 1, 1984, at page 23, the Board denied in part the Licensee's and the NRC Staff's motions for summary disposition of Contention 1.a, and identified seven issues with respect to which evidence was to be presented at the hearing.

Statistical variations and measurement sensitivities are such that these limits are feasible. However, the most sensitive on-line instrument channel (the RM-A5L monitor of radioactive gas in the secondary system) could be out of service for extended periods. Technical Specifications permit plant operation for 28 days with the on-line monitor RM-A5 inoperable. During such periods, grab samples for monitoring radioactive gas every 4 hours would provide notice of a small increase in primary-to-secondary leakage, while other plant indications would quickly register a sudden large increase in leak rate.

We are concerned that a small increase in leak rate, which could be the precursor of a more serious problem, might go undetected for a matter of hours. The Staff considered but rejected a possible license condition that would require operability of the RM-A5 system at all times. We direct that redundancy be supplied in the form of a duplicate RM-A5 system or suitable equivalent of comparable sensitivity and response time. We further direct that the Technical Specifications be modified to permit plant operation for a maximum of 28 days with one of these duplicate systems inoperable, and to require plant shutdown if both of these systems are inoperable. As an alternative to the installation of a duplicate system, we direct that the RM-A5 system must be operable at all times during plant operation. (*See* Order, *infra.*)

TMIA was concerned that leak-rate measurements might be misleading because of a tendency for some leaks to be self-sealing by buildup of corrosion products. This could occur only for very small leakage pathways between the expanded portion of a tube and the tubesheet. Accordingly, we are satisfied that this effect will not be significant from a safety standpoint. TMIA also questioned whether the loss of pretension in certain tubes might cause the measured leak rates to be reduced, potentially masking the detection of a critical size circumferential crack. Testing showed that such cracks do not exist in the tube pressure boundary. If such a crack were to appear, it would propagate only when the tube was placed in axial tension, which would tend to offset the effect of loss of pretension. We are satisfied that the loss of pretension will not be significant from a safety standpoint.

Issue 1.b. Frequency of Eddy Current Tests (Fdgs. 21-25)

The Staff's proposed License Condition 3, as modified in Supplement 1 to the SER, reads as follows:

> The licensee shall conduct eddy-current examinations, consistent with the inspection plan defined in Table 3.3-1, either 90 calendar days after reaching full power, or 120 calendar days after exceeding 50% power operation whichever comes first.

The Board requested evidence on the above-captioned issue because TMIA alleged that the Staff changed its position without explanation. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

The Staff's early view was that eddy current tests (ECT) should be conducted 30-60 days after restart. This was later changed to either 90 or 120 days as reflected in the originally proposed license condition and in its modification.

Both Licensee and Staff testified that the change was justified in the light of extensive information about the condition of the steam generators that had become available in the meantime. Additional operational considerations and judgments about obtaining the maximum information from ECT were included in the decision. The Board accepts the explanations of the Licensee and Staff as sufficient rationale for the change in proposed timing of the ECT requirements.

The Board is concerned that the Staff's proposed license condition does not address the possibility of plant operation for an extended p[illegible] less than 50% power. In addition to the Staff's proposed license c[illegible]n, we direct the Staff to require an assessment by the Licensee at the end of 180 days of operation at power levels between 5% and 50%, such assessment to contain recommendations and supporting information as to the necessity of a special ECT shutdown before the end of the refueling cycle. Based on this assessment, the Staff shall determine the time of the next ECT, consistent with the other provisions of the license condition. In the absence of an assessment, a special ECT shutdown shall take place before an additional 30 days of operation at power above 5%. (*See* Order, *infra.*)

Issue 1.c. Power Ascension Limitations (Fdgs. 26-30)

In the SER, the Staff proposed license conditions, which read as follows:

> *License Condition 1.* The licensee shall complete its pre-critical test program in essential conformance with the program described in its Topical Report 008, Rev. 2, and shall submit the results of that test program and a summary of its management review, prior to initial criticality.
>
> *License Condition 2.* The licensee shall complete its post-critical test program at each power range (0-5%, 5%-<50%, 50%-100%) in essential conformance with the program described in Topical Report 008, Rev. 2, and shall have available the results of that test program and a summary of its management review, prior to ascension from that power range and prior to normal power operation.

The Board requested evidence on the above-captioned issue because TMIA questioned whether the proposed power ascension program is in accord with the recommendations of the Third Party Review (TPR) Group. This group was composed of consultants from the industry retained by the Licensee. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

The TPR Group recommended two hold periods at less than full power. The Licensee accepted this recommendation. The TPR Group suggested operation with one steam generator at a higher power than the other. The Licensee explained that this was not feasible, and the TPR Group accepted the explanation.

The Licensee either accepted the TPR Group recommendations or provided adequate explanations. Accordingly, we find that the objections by TMIA concerning the issue of power ascension limitations are without merit.

Issue 1.d. Long-Term Corrosion Tests (Fdgs. 31-43)

In the SER, the Staff proposed a license condition which reads as follows:

> *License Condition 6.* The licensee shall provide routine reporting of the long-term corrosion "lead tests" test results on a quarterly basis as well as more timely notification if adverse corrosion test results are discovered (SE Section 3.5).

The Board requested evidence on the above-captioned issue because TMIA asserted that accurate simulation of actual TMI-1 tube properties is virtually impossible in such tests. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

In its proposed findings, TMIA asserts that the long-term corrosion tests included a tube with a known defect but that there is no evidence with regard to the number of tube sections included in this test sequence. Although the exact number of samples was not stated, there is much evidence about the wide range of conditions simulated, and there is testimony that several samples had known defects. TMIA complains that other testing utilized archival tubes which had not been installed in a steam generator. However, this is not the case for the corrosion tests, and is relevant to a different issue (hardness tests).

TMIA asserts that Licensee has provided no assurance that tube rupture due to mechanical failure will not occur, although such assurance was outside the scope of the long-term corrosion tests and was, instead, the subject of the Licensee's and the Staff's motions for summary disposition that were granted. (Memorandum and Order, June 1, 1984).

Moreover, TMIA claims that Licensee has failed to account for the mechanical stresses present in the steam generators, and complains that Licensee has not introduced transient loads into the testing sequence.

TMIA asserts that because the Licensee failed to include stresses greater than 1100 pounds as part of the long-term corrosion program, the testing does not adequately predict operating conditions. However, the 1100-pound loads adequately simulated heatup, operation, and cold shutdown. The tests also took into consideration residual stresses produced by the kinetic expansion process. Furthermore, C-ring specimens were loaded to a stress level slightly below yield, which is significantly higher than the level seen by tubes in actual service. Consequently, the high stress on the C-rings bounds loads induced by accident transients (a maximum of 3140 pounds). We are therefore unable to follow the logic which TMIA uses to conclude that the maximum load that the tubes can tolerate is 1100 pounds.

Finally, we address the complaint that Licensee did not introduce transient loads into the long-term corrosion testing sequence. It is to be noted that the issue is "adequacy of simulation of operating conditions by long-term corrosion tests," and not the simulation of all operating conditions by every conceivable type of test. Thus, the complaint is irrelevant to the matter in issue.

We conclude that the questions raised on this issue have been adequately answered, and that the Licensee's long-term corrosion test program includes a wide variety of tests which, taken together, constitutes a reasonably accurate and valid simulation of steam generator operating conditions.

Issue 2. Inadvertent Initiation of Emergency Feedwater (Fdgs. 44-47)

The Board requested that evidence be presented on this issue because neither TMIA nor the Board felt that sufficient detail was presented in the motions for summary disposition. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

TMIA did not submit proposed findings of fact on this issue, although the Board had directed the parties to file, and ruled that they would be deemed in default if they did not file, proposed findings of fact, etc. (Tr. 684). Accordingly, TMIA is deemed to be in default on this issue. *Florida Power & Light Co.* (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-280, 2 NRC 3, 4 n.2 (1975).

However, the issue is addressed in this opinion because the Board had expressed an uncertainty about the maximum transient stresses associated with inadvertent initiation of emergency feedwater. Our uncertainty

The Board requested evidence on the above-captioned issue because TMIA questioned whether the proposed power ascension program is in accord with the recommendations of the Third Party Review (TPR) Group. This group was composed of consultants from the industry retained by the Licensee. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

The TPR Group recommended two hold periods at less than full power. The Licensee accepted this recommendation. The TPR Group suggested operation with one steam generator at a higher power than the other. The Licensee explained that this was not feasible, and the TPR Group accepted the explanation.

The Licensee either accepted the TPR Group recommendations or provided adequate explanations. Accordingly, we find that the objections by TMIA concerning the issue of power ascension limitations are without merit.

Issue 1.d. Long-Term Corrosion Tests (Fdgs. 31-43)

In the SER, the Staff proposed a license condition which reads as follows:

> *License Condition 6.* The licensee shall provide routine reporting of the long-term corrosion "lead tests" test results on a quarterly basis as well as more timely notification if adverse corrosion test results are discovered (SE Section 3.5).

The Board requested evidence on the above-captioned issue because TMIA asserted that accurate simulation of actual TMI-1 tube properties is virtually impossible in such tests. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

In its proposed findings, TMIA asserts that the long-term corrosion tests included a tube with a known defect but that there is no evidence with regard to the number of tube sections included in this test sequence. Although the exact number of samples was not stated, there is much evidence about the wide range of conditions simulated, and there is testimony that several samples had known defects. TMIA complains that other testing utilized archival tubes which had not been installed in a steam generator. However, this is not the case for the corrosion tests, and is relevant to a different issue (hardness tests).

TMIA asserts that Licensee has provided no assurance that tube rupture due to mechanical failure will not occur, although such assurance was outside the scope of the long-term corrosion tests and was, instead, the subject of the Licensee's and the Staff's motions for summary disposition that were granted. (Memorandum and Order, June 1, 1984).

has been resolved by the explanation that the high heat transfer rate from steam to subcooled water would cause the incoming water to be heated sufficiently that its effect on tube loads would be insignificant. Further, with respect to rapid cooldown following a loss-of-coolant accident, emergency feedwater injection was already included in calculating the maximum stress.

Issue 3. Hardness Tests on Repaired Tubes (Fdgs. 48-60)

The Board requested that evidence be presented on this issue because the absence of post-repair hardness tests on corroded tubes was not sufficiently explained by the Licensee. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

We are satisfied that hardness testing of repaired tubes in place is not feasible because of the size of the measuring equipment. We are also satisfied that removal of samples is impractical because of radiation exposure to workers.

Hardness testing was performed on archival tube samples that had undergone kinetic expansion. It was demonstrated in a reasonable number of tests that archival and actual tubes had the same mechanical properties, especially with regard to the key parameters of ductility and yield strength which are used to judge suitability for kinetic expansion. Hardness tests on the kinetically expanded archival tubing indicated less residual stress in the transition region than in the original as-fabricated rolled tubes.

In its proposed findings, TMIA asserted that the purpose of hardness tests is to determine the degree of embrittlement, and that embrittlement dictates loss of ductility and yield strength. Actually, hardness tests were conducted to assess the degree of "cold working" and the susceptibility to intergranular stress-assisted cracking (IGSAC). The small increase in hardness introduced by the expansion process produces essentially no change in ductility.

TMIA asserted that no meaningful conclusions can be drawn from a comparison of the results of tests conducted on different populations of tubing. While this may be true as a general principle, the three tests in question involved a prudent selection of archival tube samples. Other tests were performed on actual TMI-1 tubes.

TMIA tried to make an issue of the use of the words "identical" and "representative" in comparing various tube samples. It appears that responses to Board questions on different topics were taken out of context, and that no issue exists.

In response to other objections raised by TMIA, we find that the number of samples of actual tubes used for yield stress measurements was reasonable, and we find no safety significance in statistical variations among pull-out load tests using test samples under different test conditions.

We note that a number of these matters concern Licensee's qualification testing program, which was ruled to be outside the scope of Contention 1.a (Memorandum and Order, June 1, 1984, at 14). These matters are addressed here only because the Board asked some supplemental questions about how closely the archival tubes corresponded to the actual tubes in TMI-1. (Tr. 526-52.)

In our opinion, the Licensee has presented reasonable justification for not performing post-repair hardness testing on kinetically expanded TMI-1 steam generator tubes.

Issue 4. Industry Experience with Kinetic Expansion (Fdgs. 61-65)

The Board requested that evidence be presented on this issue solely because the Licensee's motion for summary disposition asserted that the use of kinetic expansions to seal heat exchanger tubes within tubesheets has a broad base of successful experience. Licensee did not state whether this experience includes nuclear plant components, or whether the experience includes repair of damaged heat exchangers, manufacture of new heat exchangers, or both. Information was requested about whether tube integrity during subsequent operation depends on whether the process is a repair, or a manufacturing process using new materials. The Licensee presented a witness from Foster Wheeler Development Corporation. The Staff presented a panel of witnesses.

There is no evidence before us that the kinetic expansion process has been used for repairing steam generator tubes in nuclear power plants. The industry has had considerable experience with this process in other types of heat exchangers, both in field repairs and in fabrication. This experience indicates that the integrity of kinetically expanded joints depends primarily on key parameters (yield strength and ductility) irrespective of whether the process is applied to new equipment during fabrication or the repair of existing equipment.

However, the extensive repairs to the TMI-1 steam generators is a new, large-scale application of the kinetic expansion process. Because there is no directly relevant experience, approval of these repairs must be based on the other issues discussed in this opinion. Accordingly, we conclude that this issue has little significance in the resolution of this contention.

B. Contention 1.b (Fdgs. 66-75)

TMIA's Contention 1.b, as originally admitted, alleged as follows:

> Because of the enormous number of tubes in both steam generators which have undergone this repair process, (1) the possibility of a simultaneous rupture in each steam generator, which would force the operator to accomplish cooldown and depressurization using at least one faulted steam generator, resulting in release of radiation into the environment beyond permissible levels, "isn't an incredible event," (see September 19, 1982 memorandum from Paul Shewmon, then Chairman of the ACRS), (2) and could lead to a sequence of events not encompassed by emergency procedures, (3) and in the course of a LOCA, such a scenario could create essentially uncoolable conditions.

As noted in Part I.A, above, in the unpublished Memorandum and Order of June 1, 1984, at page 32, the Board denied in part the Licensee's and the Staff's motions for summary disposition of Contention 1.b, and requested that evidence be presented at the hearing as to whether the kinetic expansion tube repair process increased the probability of simultaneous tube ruptures in both steam generators. The Board requested evidence on this one issue because it had been raised in an Advisory Committee on Reactor Safeguards (ACRS) memorandum concerning TMI-1 and because the Board wanted more information on which to base its decision. The Licensee and the Staff each presented a panel of witnesses to testify on this issue.

A steam generator tube rupture, as it is commonly understood in the industry, cannot take place at or in the vicinity of the repair joint. A break producing a large flow has no room to occur because the new joint is closely confined within the tubesheet hole. Moreover, the evidence justifies a conclusion that the repair did not significantly affect tube strength and ductility, so that the probability of tube ruptures has not been increased by the repair.

In its proposed findings, TMIA raises an issue for the first time, namely, that tube rupture caused by rubbing and wearing of adjacent bowed tubes could occur when compressive loads are applied to adjacent tubes that had lost preload. This seems very unlikely to cause a problem because contact between such tubes, even if possible, would not occur during steady operation, but only during heatup, which lasts about 8-10 hours.

TMIA would also have us rule that Licensee has not provided adequate assurance that the repair has significantly reduced the probability of simultaneous tube rupture. This is not the issue. The central issue is whether the repair process has increased the probability of such an accident. We find that reasonable assurance exists that the repair process

has not increased the probability of simultaneous tube ruptures in both of TMI-1's steam generators.

III. CONCLUSIONS

The Board concludes that the license conditions proposed by the Staff, as supplemented by the Board's two imposed conditions as discussed in § II, *supra*, and the Licensee's post-repair and plant performance testing and analysis provide reasonable assurance that the leaktight integrity of the repaired steam generator tube joints will be maintained. We further conclude that the uncertainties which led the Board to request the presentation of evidence on specific issues have been resolved, and that reasonable assurance exists that the repair process has not increased the probability of simultaneous tube ruptures.

Findings of Fact

A. Contention 1.a

TMIA Contention 1.a asserts the following:

> Neither Licensee nor the NRC Staff has demonstrated that the kinetic expansion steam generator tube repair technique, combined with selective tube plugging, provides reasonable assurance that the operation of TMI-1 with the as-repaired steam generator can be conducted without endangering the health and safety of the public, for the following reasons:
>
> a. Post repair and plant performance testing and analysis including the techniques used, empirical information collected, and data evaluation, and proposed license conditions are inadequate to provide sufficient assurance that tube ruptures, including but not limited to those which could result upon restart, a turbine trip at maximum power, thermal shock from inadvertent actuation of emergency feedwater at high power or following rapid cooldown after a LOCA, will be detected in time and prevented to avoid endangering the health and safety of the public through release of radiation into the environment beyond permissible limits.

1. The Board's Memorandum and Order of June 1, 1984 (unpublished), in partially denying the Licensee's and Staff's motions for summary disposition of TMIA's Contention 1.a, identified the following issues as to which evidence should be presented at the hearing:

> (1) The rationale underlying certain proposed license conditions should be addressed, with attention to:
>
> (a) Reliability of leak rate measurements.
>
> (b) Method of determining frequency of ECT tests.

(c) Method of determining power ascension limitations.
(d) Adequacy of simulation of operating conditions by long-term corrosion tests.

(2) The effect of inadvertent initiation of emergency feedwater flow at high power or following rapid cooldown after a LOCA should be addressed, with attention to calculation of maximum transient stresses in steam generator tubes.

(3) The reasons for not including hardness tests on repaired tubes in the post repair testing program should be addressed.

(4) Recalling Licensee's statement in ¶¶ 6-8 [of its Statement of Material Facts as to Which There Is No Genuine Issue to Be Heard] that the use of kinetic expansions to seal heat exchanger tubes within tubesheets has a broad base of successful experience, information is requested about whether tube integrity during subsequent operation depends on whether the process is a repair, or a manufacturing process using new materials.

(Our findings of fact with regard to Contention 1.a are captioned according to the preceding list of issues.)

Issue 1.a. Reliability of Leak Rate Measurements

2. Primary-to-secondary leak rate measurements during PWR operation are made to document the absolute value of leakage and to document any trends which may be cause for concern. The absolute value is required to assess performance of steam generators and to ensure that technical specification limits are not exceeded. Trends are monitored because increasing leakage may indicate ongoing chemical or mechanical degradation. Increasing leak rates are investigated further to identify leak locations and take appropriate corrective action. (Licensee's Test., fol. Tr. 224, at 5-6.)

3. Technical Specifications 3.1.6.3 and 4.1 address primary-to-secondary leakage through TMI-1 once-through steam generator (OTSG) tubes. Technical Specification 3.1.6.3 requires that if this leakage exceeds 1 gpm total for both steam generators, the reactor shall be placed in cold shutdown within 36 hours. Technical Specification 4.1 requires that leakage be evaluated daily. (Licensee's Test., fol. Tr. 224, at 3.)

4. The Staff's proposed License Condition 4, as modified in Supplement 1 to the SER, reads as follows:

The licensee shall confirm the baseline primary-to-secondary leakage rate established during the steam generator hot test program. If leakage exceeds the baseline leakage rate by more than 0.1 GPM, the plant shall be shut down and leak tested. If any increased leakage above baseline is due to defects in the tube free span, the

leaking tube(s) shall be removed from service. The baseline leakage shall be re-established, provided that the present Technical Specification limit of 1.0 GPM is not exceeded (SE Section 3.3).

(Board's Exhibit 2, at 27.)

5. Licensee determined the baseline primary-to-secondary leakage to be 0.02 gpm (1 gallon per hour (gph)) during the steam generator hot-test program. This means that the facility is to be shut down if the leak rate reaches 7 gph total for both steam generators, as compared to the existing limit of 60 gph in Technical Specification 3.1.6.3. (Licensee's Test., fol. Tr. 224, at 4.) Because of recently discovered leakage and associated repairs, the baseline leakage rate will be re-established on restart of the plant. (Tr. 327.)

6. The TMI-1 leakage limitations in Technical Specification 3.1.6.3 are comparable to those at most other pressurized water reactors in the United States. The proposed new limit of 0.1 gpm is the most restrictive limit implemented at any plant. (Licensee's Test., fol. Tr. 224, at 5; Tr. 240; Staff's Test., fol. Tr. 589, at 8; Tr. 611.)

7. The steam generator hot testing results indicate that a monitored leak rate statistical variation (twice the standard deviation from the mean value) of approximately ± 0.01 gpm (± 0.5 gph) can be expected during steady-state operation. (Licensee's Test., fol. Tr. 224, at 7.)

8. Primary-to-secondary leakage is indicated by several diverse methods at TMI-1. These methods include measuring radioactive noble gas concentrations on the secondary side, and measuring chemistry and radiochemistry in secondary-side OTSG water. The radionoble gas concentration measurement is the most sensitive method of quantifying the primary-to-secondary leakage rate. The leakage rate is calculated periodically by utilizing data from on-line continuous monitors and grab sample analysis. (Licensee's Test., fol. Tr. 224, at 8.)

9. Continuous leak rate monitoring during operation is provided by a flow rate instrument and by a radiation detector. The radiation detector is monitored in the control room and is alarmed. (Tr. 240-41.) The response time for the radiation detection system RM-A5L is of the order of a few minutes. (Tr. 274-75.) The sensitivity of this system is at least 0.001 gpm (0.07 gph) during power operation and 0.003 gpm (0.2 gph) during plant cooldown. (Licensee's Test., fol. Tr. 224, at 10.) There are additional radiation monitors which are less sensitive than RM-A5L. At least one of the other monitors would come on scale before the leak rate would reach the Technical Specification Limit. (Tr. 267-68.)

10. Regular measurements of radioactivity in grab samples of condenser off-gas provide leak rate information even if the on-line monitors

are not functioning. (Tr. 268.) Ordinarily, these samples are taken every 8 hours. (Tr. 624.) The plant could conceivably operate at full power for as much as 8 hours without detection of a small increase in leak rate. (Tr. 642.) Technical Specifications permit plant operation for 28 days with the on-line monitor RM-A5 inoperable, provided grab samples are being taken. (Tr. 646.) Licensee has an administrative limitation that if RM-A5 is determined to be out of service, a grab sample will be taken immediately and repeated every 4 hours. (Tr. 647.) The Staff considered but rejected a possible license condition that would require operability of the RM-A5 system at all times. (Tr. 643.)

11. Two cold leak tests are used, the bubble test and the drip test. The bubble test is the most sensitive cold leak test, having a leak rate sensitivity of 0.000005 gpm for an individual leak. The bubble test was used on the upper portions of the OTSG tubes which included all the new kinetic expansion joints. (Licensee's Test., fol. Tr. 224, at 10-11.)

12. The entire OTSG tube length is leak-tested by the drip test. Sensitivity depends on location, being 0.0002 gpm near the lower tubesheet and 0.002 gpm at the high ends of the tubes. (Licensee's Test., fol. Tr. 224, at 11.)

13. Leak rate measurements determine total primary-to-secondary leakage, including the contribution from leakage through the joints. (Licensee's Test., fol. Tr. 224, at 12.) Some leakage is to be expected, and small leakage through joints does not relate to their load-carrying capability. (Tr. 269.) If the observed leak rate should increase by 0.1 gpm, the plant will be shut down and the individual leaking tubes, plugs and/or joints will be identified by means of the bubble and drip tests. (Licensee's Test., fol. Tr. 224, at 12.)

14. There may be a tendency for some leaks to be self-sealing, but only for leakage pathways between the expanded portion of the tube and the tubesheet. The joint is formed between the inconel tube and the carbon steel tubesheet. Corrosion products tend to plug up leakage paths in the tight tube-to-tubesheet crevice and to stop or slow leakage. This was confirmed by a trend of decreasing leakage with time for joints tested in Licensee's qualification program. (Licensee's Test., fol. Tr. 224, at 12; Tr. 245-46, 271-72.)

15. To be self-sealing, a leak past the joint would have to have a very small flow through a pathway sufficiently tight to enable the buildup of corrosion products adequate to seal the leak. A leak of this size would not adversely affect the load-bearing capability of the joint, or increase the probability of rupture within the joint. (Licensee's Test., fol. Tr. 224, at 12-13; Tr. 260-64, 269.)

16. Leakage past a repaired joint is independent of the loss of pretension. Pretension, or preload, was placed on the tubes by thermal expansion during the manufacture of the steam generators. At TMI-1, some tubes with complete circumferential cracks were freed from the original joints. These tubes contracted slightly, relieving all or part of the pretension. After kinetic expansion, these tubes were again fixed at both ends, but without some or all of the original pretension. This resulted in a reduction of axial tube load of several hundred pounds. (Licensee's Test., fol. Tr. 224, at 13; Tr. 257-58.)

17. The kinetic expansion process relies on horizontal (radial) forces to expand tubes, while pretension is an axial (vertical) load. These load components are perpendicular to each other, and the loss of pretension does not affect the ability to expand the tube and form the new joint. Kinetically expanded joints in tubes with loss of pretension are as tight, and no more prone to leakage, than joints in tubes with preload. Monitoring of leakage through such a joint is unaffected by a loss of pretension. (Licensee's Test., fol. Tr. 224, at 13-14.)

18. A tube without pretension might theoretically exhibit a lower leak rate than a tube with pretension for a circumferential through-wall crack of a given size, hence potentially masking the detection of a critical size crack. Testing already conducted shows that such cracks do not exist in the tube pressure boundary. If such a crack were to exist, it would propagate due to intergranular stress-assisted cracking (IGSAC) only when the tube was placed in axial tension, which would tend to offset the effect of loss of pretension. (Licensee's Test., fol. Tr. 224, at 14; Tr. 273.)

19. During the steam generator hot testing program, transients placed axial tensile loads of at least several hundred pounds on every tube in the steam generators, including those which had lost preload. Measured leak rates were compared with calculations. The results confirmed the conclusion that no large cracks remain undetected. (Licensee's Test., fol. Tr. 224, at 15; Tr. 276-83.)

20. If future cracks were to form and propagate due to IGSAC at normal operating conditions, the principal direction of propagation will be axial (along the tube). IGSAC propagation is perpendicular to the direction of highest stress, which is circumferential (hoop stress) at normal operating conditions. Therefore, a loss of pretension would not affect measurements of leakage from axial tube cracks. (Licensee's Test., fol. Tr. 224, at 15.)

Issue 1.b. Frequency of Eddy Current Tests

21. The Staff's proposed License Condition 3, as modified in Supplement 1 to the SER, reads as follows:

> The licensee shall conduct eddy-current examinations, consistent with the inspection plan defined in Table 3.3-1, either 90 calendar days after reaching full power, or 120 calendar days after exceeding 50% power operation whichever comes first. (SE Section 3.3).

(Board's Exhibit 2, at 27.)

22. In recommending the change in eddy current test (ECT) frequency, which the Staff subsequently incorporated into the proposed license condition, the Licensee considered the condition of the generator, the type of repairs, the damage mechanism leading to the repairs, and the expectation that if any new damage were to occur, it would be at a slow rate. Additional considerations were plant accessibility, other operational sequences being conducted, and prudent operating practices which dictate that the opening of steam generators, with its attendant exposure to oxygen, should be minimized. (Licensee's Test., fol. Tr. 226, at 4-5.)

23. Since the ECT program is designed to characterize change, there is a need to allow reasonable operating time on the generators to allow any unforeseen mechanism to cause change. The full benefits of ECT can only be obtained after operation at some period of time to allow the system to approach chemical equilibrium. (Licensee's Test., fol. Tr. 226, at 7-8.)

24. The Staff recommended in May 1982 that the plant be operated for 30 to 60 days and then be shut down for eddy current tests to assess the progression of degradation. The Staff subsequently changed its position because a large amount of information on the rate of progression, the type of attacks, the corrosive species, etc., became available. (Tr. 606.)

25. The proposed license condition does not contain a requirement for a special shutdown for ECT in the event that the plant is operated for an extended period at less than 50% power. The Staff witness had not anticipated this possibility, but stated that if it were to occur he would be inclined, after approximately 180 or 200 days, to tell the Licensee that the Staff would like them to shut down and conduct eddy current tests, which he assumes they would be willing to do. (Tr. 672-73.)

Issue 1.c. Power Ascension Limitations

26. The subject of power ascension limitations is addressed in the Staff's proposed license conditions in the SER which read as follows:

> *License Condition 1:* The licensee shall complete its pre-critical test program in essential conformance with the program described in its Topical Report 008, Rev. 2, and shall submit the results of that test program and a summary of its management review, prior to initial criticality.
>
> *License Condition 2:* The licensee shall complete its post-critical test program at each power range (0-5%, 5%-< 50%, 50%-100%) in essential conformance with the program described in Topical Report 008, Rev. 2, and shall have available the results of that test program and a summary of its management review, prior to ascension from that power range and prior to normal power operation.

(Board's Exhibit 1, at 46.)

27. The initial power ascension program was developed prior to knowledge of the damage to the steam generators. In conjunction with the steam generator repair program, special precritical tests were developed to demonstrate steam generator operability. These tests have now been performed and evaluated. It was determined, however, that two 30-day hold periods should be added to the power ascension program. (Licensee's Test., fol. Tr. 229, at 4-5.)

28. Proposed License Conditions Nos. 1 and 2 are not intended to limit power ascension. Rather, they are intended to require that test results be made available to the Staff at each stage of the test program. (Staff's Test., fol. Tr. 589, at 10; Tr. 639-40.)

29. In its report of February 18, 1983, the Third Party Review (TPR) Group, which was composed of consultants from industry retained by the Licensee, recommended consideration of a "substantially extended operation at low power" and of a "hold period of perhaps a month or more at 40 percent power . . . followed by another month or more at 70 percent power . . . ." In accordance with the TPR recommendation, Licensee modified the power ascension program to add two 30-day hold periods, one at 48% power and one at 75%. In its report of May 16, 1983, the TPR Group stated that the GPU Nuclear response is satisfactory. (Licensee's Test., fol. Tr. 229, at 6-7; Staff's Exhibit 1, at 3.)

30. The TPR Group also recommended that Licensee "consider the possibility of deliberately running one steam generator at a higher power than the other during the first escalation hold periods." Licensee explained to the TPR Group that this suggestion was not feasible; in particular, it would involve mismatched reactor coolant flow, imbalanced feed flows, and different coolant levels in each generator. This could

mask changes in plant conditions, including any abnormalities in the plant response to transients. In its report of May 16, 1983, the TPR Group stated that the GPU Nuclear response is satisfactory. (Licensee's Test., fol. Tr. 229, at 7-8.)

Issue 1.d. Long-Term Corrosion Tests

31. Long-term corrosion tests are required in a license condition proposed by the Staff in the SER which reads as follows:

> *License Condition 6:* The licensee shall provide routine reporting of the long-term corrosion "lead tests" test results on a quarterly basis as well as more timely notification if adverse corrosion test results are discovered (SE Section 3.5).

(Board's Exhibit 1, at 46.)

32. The purpose of the long-term corrosion test program, the operations phase of which has now been completed, is to verify that sulfur-induced intergranular stress-assisted cracking (IGSAC) will not reinitiate or propagate in the TMI-1 steam generators under actual operating conditions. The tests were designed to confirm that metallurgical, environmental, geometric and surface conditions which exist after the repair of the tubes are not detrimental to tube integrity. From the test program it will be possible to conclude whether the proposed chemistry limits are acceptable, whether the peroxide cleaning was beneficial or damaging, and whether the changes in electrochemical potential during operations will cause reinitiation of corrosion. (Licensee's Test., fol. Tr. 231, at 2-3.)

33. The long-term corrosion tests are accordingly related to the kinetic expansion repair process, but only insofar as they verify that the repair did not render the steam generators susceptible to reinitiation of IGSAC. This is tested by including kinetically expanded tube samples in the test loops. Except in this one respect, the long-term corrosion tests have no relationship to the adequacy of the kinetically expanded joint. The tests were not designed to confirm assurance against the possibility of mechanically induced tube ruptures caused by various transients, and the tests provide no information on this subject. (Licensee's Test., fol. Tr. 231, at 3.)

34. The long-term corrosion test program includes tests which closely simulate the typical operating environment of the steam generator tubing during steady-state and transient conditions. The program also includes comparative tests which closely simulate steam generator operation, but using tubes with high residual sulfur levels (not peroxide-cleaned) exposed to thiosulfate. The tests reproduced all the parameters

which influence IGSAC, i.e., susceptible material, environment, and stress. (Licensee's Test., fol. Tr. 231, at 4-5.)

35. To assure that the influence of prior operation and layup on tubing was adequately represented, only tube sections removed from the TMI-1 steam generators were used as specimens. These specimens were selected from various regions of each steam generator, including tube sections which had known defects. (Licensee's Test., fol. Tr. 231, at 5; Staff's Test., fol. Tr. 589, at 12.)

36. The tube sections for the long-term corrosion tests were selected from tubes that had been previously removed from the steam generators for use in the failure analysis. Sections were selected to provide a maximum range of properties. Tests specimens were selected from representative heats of material removed from the generator in order to provide a range of typical chemistry. Yield strengths of the specimens spanned the range of tubes in the steam generators. Specimens were selected that displayed various levels of susceptibility to corrosion damage; some came from tubes with no defects and others from tubes with as many as eight indications. (Licensee's Test., fol. Tr. 231, at 5-6; Staff's Test., fol. Tr. 589, at 11-12; Tr. 353-55.)

37. The test samples were representative of tubes from various axial locations in each steam generator. The samples were also representative of various heats, and bounded the heats of the metal in the tubes. No correlation could be found between heat number and any propensity for cracking. (Licensee's Test., fol. Tr. 231, at 6; Tr. 353-56.)

38. Certain samples were subjected to the explosive expansion process using mockup tubesheets and then subjected to peroxide cleaning. Other samples were not peroxide-cleaned, in order to test what could occur if the cleaning process had not been undertaken. Some C-ring samples made from actual TMI-1 tubes were also included. These samples provided a means for metallographic examination to observe any microstructural changes or incipient cracking. (Licensee's Test., fol. Tr. 231, at 6.)

39. Environmental chemistry parameters were selected to either simulate, or be more aggressive than, the water chemistry which will be maintained in the reactor coolant system. Three of the four test loops had 100 parts per billion (ppb) of sulfate, the maximum permitted under operating chemistry specifications. The fourth loop had 100 ppb of thiosulfate. Maximum permitted levels of chloride and fluoride were also used. (Licensee's Test., fol. Tr. 231, at 6-7.)

40. The tests included typical temperature cycles. Temperatures were raised from ambient to normal operating temperature (approximately 600°F). Temperatures were held constant at operating level, and

also cycled between 500°F and 600°F to simulate unit load changes. The test loops were also subjected to cooldown cycles, some of which included the introduction of oxygen. Tests also simulated the atmospheric and temperature conditions present at the time of the original IGSAC damage. (Licensee's Test., fol. Tr. 231, at 7.)

41. During heatup, operation, and cooldown, tubes in the steam generators undergo changes in stress. A net axial tensile stress could exist during cold shutdown and steady-state operation. The stress is reduced during heatup and increased during cooldown due to differential thermal expansion effects. In order to simulate the changes in axial load, full tube specimens were loaded at a level corresponding to steady-state loads during heatup, cold shutdown, and operation. During cooldown, loads were increased to approximate the maximum allowed cooldown rate. Full tube specimens simulating repaired joints were kinetically expanded to ensure representative residual stresses and then exposed to the axial loads described above. (Licensee's Test., fol. Tr. 231, at 8; Tr. 359.)

42. The C-ring specimens were loaded to a level just slightly below yield, which is significantly higher than the load seen by tubes in actual service. This would make them more susceptible to IGSAC than are the actual steam generator tubes. This also bounds any load that would be experienced under accident transients. (Licensee's Test., fol. Tr. 231, at 8; Tr. 369-70, 540-42.)

43. The tests were not designed to simulate fatigue damage. Results of the tests simulating heatup and cooldown cycles were sufficient to predict the effect of stress on corrosion. (Tr. 345-46.)

Issue 2. Inadvertent Initiation of Emergency Feedwater

44. In the unlikely event of inadvertent actuation of the emergency feedwater (EFW) pumps in conjunction with inadvertent opening of the EFW valves, resulting in injection of emergency feedwater into steam generators at full power, the resulting thermally induced axial tube load would not be sufficient to cause rupture of steam generator tubes. (Licensee's Test., fol. Tr. 421, at 4; Staff's Test., fol. Tr. 589, at 13-14.)

45. Emergency feedwater is injected horizontally into the steam generator tube bundle steam space via six auxiliary feedwater nozzles located at approximately equal spacing around the circumference of the steam generator shell. The injection points are near the top of the tube bundle, with nozzle centerlines 2 feet 11 inches below the bottom surface of the upper tubesheet. (Licensee's Test., fol. Tr. 421, at 4.)

46. As the EFW is injected into the steam space, the high heat transfer rate from the steam quickly heats the incoming water. By the time the EFW reaches the tubes, it is approaching the same temperature as the steam. The affected tubes experience only a small temperature change in the small portion of the tube being sprayed, which results in an insignificant axial load change in the tube. (Licensee's Test., fol. Tr. 421, at 4-5.)

47. Conservative calculations, which do not take into account the high heat transfer rate from steam to subcooled water, predict that the maximum change in load of the affected tubes would be 70 pounds tension. This would be comparable to loads at full power and much less than the loads in cooldown or design basis accident conditions. The maximum transient loads on the tubes following a loss-of-coolant accident (LOCA) have been conservatively calculated to be 2641 pounds, including the effect of EFW injection. This load is less than the design basis load of 3140 pounds. (Licensee's Test., fol. Tr. 421, at 5-6; Tr. 433-35, 439-40.)

Issue 3. Hardness Tests on Repaired Tubes

48. Hardness is a metallurgical term which defines the resistance of metals or alloys to plastic deformation, usually by indentation. Sometimes it also refers to resistance to scratching, abrasion or cutting. (Staff's Test., fol. Tr. 589, at 16.)

49. Hardness of a metal or alloy increases when the material is subjected to "cold working" as in mechanical deformation. This can result in higher residual tensile stress, which can be indicative of increased susceptibility to intergranular stress-assisted cracking (IGSAC). (Licensee's Test., fol. Tr. 423, at 3.)

50. The kinetic expansion process resulted in cold working of the expanded portions of the tubes, which increased the hardness of the material. The roll expansion process used in the original tube-to-tubesheet joint also produced cold working and increased the material's hardness. (Licensee's Test., fol. Tr. 423, at 3.)

51. Hardness testing during the qualification program showed the kinetically expanded joints to be less hard, and therefore to have less cold working, than nonstress-relieved rolled joints. Less cold working results in lower residual stresses. This suggests that the kinetically expanded joints will be less susceptible to IGSAC than are nonstress-relieved rolled joints. (Licensee's Test., fol. Tr. 423, at 4; Staff's Test., fol. Tr. 589, at 17.)

52. Hardness was not considered a parameter indicative of the adequacy of the kinetic expansion joint. The joint was qualified for a range of material tensile strengths bracketing those of the TMI-1 steam generator tubes and a range of possible tubesheet annulus geometries and conditions. (Licensee's Test., fol. Tr. 423, at 4.)

53. Hardness tests were performed on TMI-1 archival tubes which had been kinetically expanded in the same manner as the actual tubes in the steam generator. Archival tubes are tubes which were set aside as a matter of record from the same manufacturing lot or heat as those used in the steam generators. (Tr. 384, 441-42, 464-65.)

54. In using archival tubes in the qualification program, including hardness testing, Licensee selected heats of archival tubes which bracketed the range of properties of heats present in the steam generators. Licensee also tested tubing removed from the steam generators to determine that the relevant properties were unchanged such that valid and representative conclusions could be drawn from tests conducted on archival tubing. The tensile strength and ductility were determined quantitatively for TMI-1 tube specimens of varied heats, and compared with preoperational mill specification testing results for the same heats of materials. The specimens which had been in operation at TMI-1 performed within the range of expected behavior for the heat as manufactured. (Tr. 461-64, 514-15, 527, 546-48.) Strip specimens bent around mandrels exhibited the high ductility expected for Inconel-600 and showed no incipient damage. (Tr. 515, 572-73.) An actual TMI-1 tube specimen containing a crack was kinetically expanded, and the crack did not grow. (Tr. 472-75, 515-16.) Retention of yield strength and ductility is expected behavior for Inconel-600 in steam generators. (Tr. 528-48, 634-35.)

55. Hardness testing is done with relatively large equipment, and cannot be performed on the repaired tubes within the steam generator. To measure hardness, tubes would have to be severed, sectioned, and removed from the repaired steam generators. This is an extensive effort which would result in radiation exposure to workers. (Licensee's Test., fol. Tr. 423, at 4; Staff's Test., fol. Tr. 589, at 17.)

56. Inconel-600 tubing maintains its mechanical strength and ductility even after extended service in steam generators, and the material does not become embrittled. Sensitization does not significantly alter the mechanical strength or ductility. (Staff's Test., fol. Tr. 652, at 2-4; Tr. 655-56.)

57. Hardness tests were done on samples within the transition region and the fully expanded region of a kinetic expansion, a rolled expansion, and an unexpanded tube. Archival tubes were used for these

tests. Other hardness tests were performed on actual TMI-1 tubes. (Tr. 441-42, 542-43.)

58. Licensee's witness agreed that archival and actual tube samples were "identical" as far as one could tell in testing. (Tr. 465.) Another witness for Licensee later used the word "identical" in describing samples removed from the steam generators that were characterized in Board questions as "typical" or "representative" of corroded tubes. (Tr. 531.)

59. Of the twenty-seven tubes removed from the steam generators for testing, three heats and at least three tubes were tested for yield stress. (Tr. 572.) These are representative of the tubes remaining in the steam generators. (Tr. 668-69.)

60. Statistically significant differences among results of pull-out load tests were explained as resulting from differences in test conditions, and do not indicate that the tests failed to meet their objectives. (Tr. 567-70.)

Issue 4. Industry Experience with Kinetic Expansion

61. The kinetic expansion seal is an effective means of sealing heat exchanger tubes within tubesheets, whether performed as a field repair or as part of the original fabrication. The industry has had considerable experience with this process in both situations. (Licensee's Test., fol. Tr. 379, at 2.)

62. For a power station (nuclear or fossil), there are different kinds of heat exchangers (e.g., feedwater heaters, moisture separator reheaters), most of which are of the shell and tube type. A TMI-1 steam generator is one type of shell and tube heat exchanger. (Licensee's Test., fol. Tr. 379, at 3.)

63. Foster Wheeler initially used kinetic expansion to support its shop fabrication. Foster Wheeler has expanded some five million tubes. Since 1967, Foster Wheeler has adopted kinetic expansion as the primary means of tube expansion for high-pressure feedwater heaters. Since the mid-Seventies, Foster Wheeler has also applied kinetic expansion routinely to field repairs, including expansions similar to what was done on the TMI-1 steam generators. (Licensee's Test., fol. Tr. 379, at 3-4.)

64. Other manufacturers have used kinetic expansion. (Tr. 490, 511, 620, 630.) Kinetic expansion has been used in Japan, both in manufacturing and as a means of closing crevices. (Tr. 630-32.)

65. The integrity of kinetically expanded joints depends primarily on key parameters (yield strength and ductility), irrespective of whether the process is applied to new equipment during fabrication or to the repair of existing equipment. (Licensee's Test., fol. Tr. 379, at 5.)

B. Contention 1.b

TMIA Contention 1.b asserts the following:

> Neither Licensee nor the NRC Staff has demonstrated that the kinetic expansion steam generator tube repair technique, combined with selective tube plugging, provides reasonable assurance that the operation of TMI-1 with the as-repaired steam generator can be conducted without endangering the health and safety of the public, for the following reasons:
>
> . . . . .
>
> b. Because of the enormous number of tubes in both steam generators which have undergone this repair process, (1) the possibility of a simultaneous rupture in each steam generator, which would force the operator to accomplish cooldown and depressurization using at least one faulted steam generator, resulting in release of radiation into the environment beyond permissible levels, "isn't an incredible event," (see, September 19, 1982 memorandum from Paul Shewmon, then Chairman of the ACRS), (2) and could lead to a sequence of events not encompassed by emergency procedures, (3) and in the course of a LOCA, such a scenario could create essentially uncoolable conditions.

66. The Board's Memorandum and Order of June 1, 1984 (unpublished), in partially denying the Licensee's and the Staff's motions for summary disposition of TMIA's Contention 1.b, requested that evidence be presented at the hearing upon whether the kinetic expansion tube repair process increased the probability of simultaneous tube ruptures in both steam generators.

67. A steam generator tube rupture, as it is commonly understood in the industry, cannot take place at or in the vicinity of the repair joint. A break producing a large flow has no room to occur because the new joint is closely confined within the tubesheet hole. Moreover, any leakage would be significantly restricted by the tight crevice formed by the tubesheet hole and the outside of the tube. (Tr. 476-77, 508-10.)

68. Inconel retains its strength and ductility despite previous operation of the steam generators. Test results indicate that the repair itself did not affect strength and ductility. The probability of simultaneous tube ruptures involving both steam generators is not significantly greater now than it was at the time of the original licensing. (Staff's Test., fol. Tr. 652, at 5.)

69. The design basis transients specified for the original design tube-to-tubesheet joint were specified as applicable to the repaired steam generator tube-to-tubesheet joint. The repair joint was qualified by testing and analysis for transients in a postulated main steam line break load of 3140 pounds tension, the maximum design basis loading of the tube-to-tubesheet joint. All other normal operating or postulated accident loadings are enveloped by this loading. Moreover, the only conceivable

failure of the kinetic expansion joint would be by slippage under applied axial load, rather than by tube rupture. (Licensee's Test., fol. Tr. 425, at 3-4; Tr. 509-10.)

70. The kinetic expansion repair produces a new transition zone between the expanded and nonexpanded portions of the tube. A similar transition zone existed previously at the original roll expansion. However, the transition for the kinetic expansion was carefully developed to be more gradual than that of the original shop roll expansion, and, in general, the kinetic expansion process tends to result in less cold working than the roll expansion process. While the residual stresses in the kinetic expansion transition may be slightly higher than those in roll expansions which have experienced the fabrication stress relief heat treatment, residual stresses and the amount of cold working in the kinetic expansion are both less than in nonstress-relieved roll expansion transitions for which there is a considerable body of satisfactory operating experience in nuclear power plants. (Licensee's Test., fol. Tr. 425, at 5; Tr. 410-13, 465-68, 489-97, 506, 634.)

71. The residual stresses within the transition zone are not a concern from a static or fatigue stress standpoint, but could affect the susceptibility of the material to intergranular stress-assisted cracking (IGSAC). The resistance of the kinetic expansion transition zone to IGSAC is demonstrated by operating experience of once-through steam generators containing nonstress-relieved roll expansions, and by Licensee's accelerated and long-term corrosion testing. (Licensee's Test., fol. Tr. 425, at 5; Tr. 497.)

72. To date, there have been no failures, by cracking in the transition zone, of tubes with nonstress-relieved roll expansions in B&W once-through steam generators in service. Short-term (accelerated) corrosion testing, which was performed as part of the TMI-1 qualification program, showed no evidence of cracking in either kinetic or nonstress-relieved roll expansion transitions during the simulated life of the repair when exposed to a caustic (10% NaOH at constant potential) environment. Thus, the likelihood of tube rupture of the new transition due either to loading or IGSAC is no greater than that for tubes currently operating in other once-through steam generators. (Licensee's Test., fol. Tr. 425, at 5-6.)

73. The potential effects of the kinetic expansion process on the balance of the tube were also carefully evaluated. The only effect warranting further analysis was the change in tube preload. The kinetic expansion repair process produces less than a 30-pound decrease in tube preload for normal steam generator tubes. A small percentage of the tubes in

the steam generators may have lost all preload due to the IGSAC completely severing the tube in or near the original roll expansion at the top of the tube. This allowed the tube to slip down slightly and relieve the existing preload in the tube. In some cases, vibrations from nearby kinetic expansions may have contributed to the slipping process. (Licensee's Test., fol. Tr. 425, at 6; Tr. 477-78.)

74. The increase in the compressive load due to loss of any or all of the tube preload when added to the maximum compressive load (which occurs during a normal heatup transient of 100°F/hr) is less than the compressive load required to cause contact between adjacent tubes. Accordingly, there is no increased potential for tube ruptures due to increased wear. Furthermore, the loss of the tube preload does not increase the likelihood of fatigue failure because preload, being a constant load, is not a factor in the fatigue load range and does not reduce natural frequency to a level which would be of concern. Total loss of tube preload reduces the tube natural frequency by approximately 15% which is less than the variation in natural frequency within some individual steam generators. Another plant with similar steam generators operates with tube natural frequencies 15% lower than those expected for TMI-1. Thus, the kinetic expansion repair process does nothing to the balance of the tube to increase the likelihood of tube ruptures. (Licensee's Test., fol. Tr. 425, at 6-7; Tr. 482-83, 499-502.)

75. Even if adjacent bowed tubes could come into contact because of compressive loads, such contact could not occur during steady-state operation because compressive loads adequate to produce bowing would exist only during heatup, which lasts about 8-10 hours. (Tr. 602-03.)

Conclusions of Law

The Board has considered all of the evidence presented by the parties. Based upon a review of the entire record in this proceeding and the foregoing Findings of Fact, the Board concludes that, pursuant to 10 C.F.R. §§ 2.760a and 50.92, the Director of Nuclear Reactor Regulation should be authorized to issue to the Licensee, upon making requisite findings with respect to matters not embraced in this Initial Decision, and subject to the satisfaction of the conditions identified in the Order, *infra*, an amendment to the operating license which revises the technical specifications to recognize steam generator tube repair techniques, other than plugging, specifically the kinetic expansion tube repair technique.

Order

WHEREFORE, IT IS ORDERED, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's rules and regulations, that the Director of Nuclear Reactor Regulation is authorized to issue to the Licensee an amendment to its operating license which revises the technical specifications to recognize steam generator tube repair techniques, other than plugging, specifically the kinetic expansion tube repair technique, upon making requisite findings with respect to matters not embraced in this Initial Decision. Further, this authorization is subject to the satisfaction of Conditions 1, 2 and 6 as set forth in the Safety Evaluation Report, subject to the satisfaction of Conditions 3 and 4, as modified in Supplement 1 to the SER, and subject also to the satisfaction of the following conditions imposed by the Board in this Order:

1. A duplicate RM-A5 system or suitable equivalent of comparable sensitivity and response time for monitoring radioactive gas in the secondary system shall be installed. The Technical Specifications shall be modified to permit plant operation for a maximum of 28 days with one of these duplicate systems inoperable, and to require plant shutdown if both of these systems are inoperable. As an alternative to the installation of a duplicate system, we direct that the RM-A5 system must be operable at all times during plant operation.
2. In the event of plant operation for an extended period at less than 50% power, the Staff shall require an assessment by the Licensee at the end of 180 days of operation at power levels between 5% and 50%, such assessment to contain recommendations and supporting information as to the necessity of a special eddy current testing (ECT) shutdown before the end of the refueling cycle. Based on this assessment, the Staff shall determine the time of the next ECT, consistent with the other provisions of the license conditions. In the absence of an assessment, a special ECT shutdown shall take place before an additional 30 days of operation at power above 5%.

Pursuant to 10 C.F.R. § 2.760 of the Commission's Rules of Practice, this Initial Decision shall become effective immediately. It will constitute the final decision of the Commission forty-five (45) days from the date of issuance, unless an appeal is taken in accordance with 10 C.F.R. § 2.762 or the Commission directs otherwise. (*See also* 10 C.F.R. §§ 2.764, 2.785 and 2.786.)

Any party may take an appeal from this Decision by filing a Notice of Appeal within ten (10) days after service of this Initial Decision. Each

appellant must file a brief supporting its position on appeal within thirty (30) days after filing its Notice of Appeal (forty (40) days if the Staff is the appellant). Within thirty (30) days after the period has expired for the filing and service of the briefs of all appellants (forty (40) days in the case of the Staff), a party who is not an appellant may file a brief in support of or in opposition to the appeal of any other party. A responding party shall file a single, responsive brief *only* regardless of the number of appellants' briefs filed. (*See* 10 C.F.R. § 2.762.)

THE ATOMIC SAFETY AND
LICENSING BOARD

David L. Hetrick
ADMINISTRATIVE JUDGE

James C. Lamb, III
ADMINISTRATIVE JUDGE

Sheldon J. Wolfe, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 31st day of October 1984.