NUREG-0750
Vol. 25, No. 5
Pages 417-873

NUCLEAR REGULATORY COMMISSION ISSUANCES

May 1987

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 Publications Services
Office of Administration and Resources Management
U.S. Nuclear Regulatory Commission
Washington, DC 20555
(301/492-8925)

COMMISSIONERS

Lando W. Zech, Jr., Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Kenneth M. Carr

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

CONTENTS

Issuances of the Atomic Safety and Licensing Appeal Boards

Issuances of the Atomic Safety and Licensing Boards

Issuance of the Administrative Law Judge

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
Howard A. Wilber

APPEAL BOARDS

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 Nos. 50-443-OL
50-444-OL
(Offsite Emergency Planning)

PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, *et al.*
(Seabrook Station, Units 1
and 2)

May 1, 1987

The Appeal Board in the offsite emergency planning phase of this operating license proceeding grants intervenors' joint motion for directed certification of a Licensing Board's scheduling order. The Appeal Board concludes that the hearing schedule in question did not provide the intervenors with a fair opportunity to prepare for trial and orders adjustments in the schedule.

RULES OF PRACTICE: INTERLOCUTORY APPEALS

Except as specifically provided, the Commission's Rules of Practice prohibit appeals from interlocutory licensing board rulings. 10 C.F.R. 2.730(f).

RULES OF PRACTICE: INTERLOCUTORY REVIEW

It is well-settled that the Appeal Board will exercise its discretionary power to review an interlocutory ruling by way of directed certification only if that ruling

either (a) threatens the party adversely affected with immediate and serious irreparable harm that could not be remedied by later appeal, or (b) affects the basic structure of the proceeding in a pervasive or unusual manner. ALAB-858, 25 NRC 17, 20-21 (1987).

RULES OF PRACTICE: INTERLOCUTORY REVIEW (SCHEDULING ORDER)

The Appeal Board ordinarily will review a licensing board scheduling order only upon a showing that the schedule deprives the complaining party of its right to procedural due process. ALAB-858, 25 NRC at 21.

RULES OF PRACTICE: DUE PROCESS

Fundamental fairness is at the root of procedural due process.

RULES OF PRACTICE: DUE PROCESS

There is no litmus paper test for determining whether, in a particular case, the fundamental fairness standard of due process is satisfied. *Palmer v. Columbia Gas of Ohio, Inc.*, 479 F.2d 153, 165 (6th Cir. 1973).

RULES OF PRACTICE: DUE PROCESS

Assessment of whether the fundamental fairness standard of due process has been met must be made on the basis of the totality of the relevant circumstances disclosed by the record. *See Goldberg v. Kelly*, 397 U.S. 254 (1970).

RULES OF PRACTICE: DUE PROCESS

Among the factors to be considered in determining if a hearing scheduling order meets the fundamental fairness test are: (1) the amount of time allotted for prehearing activity; (2) the number, scope and complexity of the issue(s) to be tried; and (3) any established need for expedition. Expediency, however, cannot serve to justify a hearing schedule that is so abbreviated as to make adequate trial preparation a practical impossibility. *Fitzgerald v. Hampton*, 467 F.2d 755, 767 (D.C. Cir. 1972).

RULES OF PRACTICE: DUE PROCESS

Due process in administrative hearings does not yield to administrative "convenience or expediency, or because of a natural desire to be rid of harassing delay." *Id.* at 767, *quoting Ohio Bell Telephone Co. v. Public Utilities Commission of Ohio*, 301 U.S. 292, 305 (1937).

EMERGENCY PLANNING: FEMA FINDING (REBUTTABLE PRESUMPTION)

A rebuttable presumption of correctness attaches to FEMA findings on questions of the adequacy and implementation capability of emergency response plans. 10 C.F.R. 50.47(a)(2).

APPEARANCES

Donald S. Bronstein, Boston, Massachusetts, for James M. Shannon, Attorney General of the Commonwealth of Massachusetts.

Robert A. Backus, Manchester, New Hampshire, for the Seacoast Anti-Pollution League.

Diane Curran, Washington, D.C., for the New England Coalition on Nuclear Pollution.

Paul McEachern, Portsmouth, New Hampshire, for the Town of Hampton, New Hampshire.

Thomas G. Dignan, Jr., Boston, Massachusetts (with whom **George H. Lewald** and **Kathryn A. Selleck,** Boston, Massachusetts, were on the brief), for the applicants Public Service Company of New Hampshire, *et al.*

Gregory Alan Berry for the Nuclear Regulatory Commission staff.

William S. Lord, Amesbury, Massachusetts, filed a memorandum on behalf of the Town of Amesbury.

MEMORANDUM AND ORDER

Before us is the joint motion of several intervenors[1] for directed certification of the Licensing Board's March 20, 1987 memorandum and order (unpublished) in the offsite emergency planning phase of this operating license proceeding involving the Seabrook nuclear facility located on the New Hampshire seacoast.[2] In that order, the Board below reaffirmed in its entirety the schedule, established in its January 9, 1987 memorandum and order, for the hearing on the New Hampshire Radiological Emergency Response Plan (hereafter the "New Hampshire Plan").[3] According to the intervenors, that "schedule is so compressed that it will deny the parties to this proceeding a fair hearing," contrary to both 10 C.F.R. 2.718[4] and the constitutional requirement of due process.[5] Thus, intervenors maintain, our "prompt intercession is essential to assure" that the parties "are provided with the minimum opportunity to prepare for and to participate at a hearing in a complex area in a manner consistent with the Commission's rules and due process."[6]

For the reasons set forth below, we conclude that (1) the schedule in question did not provide the intervenors with a fair opportunity to prepare for trial; and (2) neither the history of the litigation of New Hampshire emergency planning issues nor current circumstances justify such severe curtailment of the intervenors' procedural rights. Accordingly, we grant directed certification and order adjustments in the schedule.

A. The Commission's Rules of Practice prohibit appeals from interlocutory licensing board rulings of the type involved here.[7] And, as we recently had occasion to observe anew in this proceeding, it is well-settled that we will exercise our discretionary power to review an interlocutory ruling by way of directed certification only if that ruling either (a) threatens the party adversely affected with immediate and serious irreparable harm that could not be remedied by a later appeal, or (b) affects the basic structure of the proceeding in a pervasive or unusual manner.[8] We went on to stress that "[w]here a scheduling

---

[1] The Attorney General of Massachusetts on behalf of that Commonwealth; the Town of Hampton; the Seacoast Anti-Pollution League (SAPL); and the New England Coalition on Nuclear Pollution (Coalition).

[2] *See* 10 C.F.R. 2.718(i); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-271, 1 NRC 478, 482-83 (1975).

[3] Unless otherwise indicated, this term embraces New Hampshire state and local plans.

[4] Intervenors refer to the provision in section 2.718 to the effect that "[a] presiding officer [e.g., a licensing board] has the duty to conduct a fair and impartial hearing according to law."

[5] Joint Intervenor Appeal by Motion for Directed Certification (March 27, 1987) at 2.

[6] *Ibid.*,

[7] *See* 10 C.F.R. 2.730(f).

[8] ALAB-858, 25 NRC 17, 20-21 (1987) (*citing Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-405, 5 NRC 1190, 1192 (1977)).

order is involved, that standard ordinarily requires a showing that the schedule deprives the complaining party of its right to procedural due process.'"[9]

Thus, the question at hand is whether, as intervenors insist but the applicants and NRC staff dispute, the challenged hearing schedule on the New Hampshire Plan was so abbreviated as to deny intervenors a fair opportunity to be heard on their contentions admitted for litigation. For, as implicitly, if not explicitly, recognized by the Commission both in its Rules of Practice and elsewhere, fundamental fairness is at the root of procedural due process.[10]

There is, of course, no litmus paper test for determining whether, in a particular case, the fundamental fairness standard is satisfied.[11] As the courts have stressed, that assessment must be made on the basis of the totality of the relevant circumstances disclosed by the record.[12] Among the factors to be considered are the amount of time that has been allotted for prehearing activity and the number, scope and complexity of the issues to be tried. In addition, any established need for expedition can be taken into account, although that factor cannot serve to justify a hearing schedule that is so abbreviated as to make adequate trial preparation a practical impossibility.[13]

---

[9] *Id.* at 21 (*citing Houston Lighting & Power Co.* (South Texas Project, Units 1 and 2), ALAB-637, 13 NRC 367, 370-71 (1981)). *See also Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), ALAB-863, 25 NRC 273, 277 (1987); *Wisconsin Electric Power Co.* (Point Beach Nuclear Plant, Unit 1), ALAB-719, 17 NRC 387, 391 (1983); *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-468, 7 NRC 465, 468 (1978); *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-459, 7 NRC 179, 188 (1978); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-295, 2 NRC 668, 670 n.2 (1975); *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-212, 7 AEC 986, 991 (1974). In the *San Onofre* case, we overturned a Licensing Board scheduling determination on the ground that it violated procedural due process; i.e., because it deprived a party "of a fair chance to prepare and present its case on all of the issues ripe for adjudication." 7 AEC at 994.

[10] Beyond the duty specifically imposed by section 2.718 to conduct a fair hearing (*see supra* note 4), the Commission had this to say in its 1981 *Statement of Policy on Conduct of Licensing Proceedings*, CLI-81-8, 13 NRC 452, 453:

> Individual adjudicatory boards are encouraged to expedite the hearing process by using those management methods already contained in [10 C.F.R.] Part 2 of the Commission's Rules and Regulations. The Commission wishes to emphasize though that, in expediting the hearings, the board should ensure that the hearings are fair, and produce a record which leads to high quality decisions that adequately protect the public health and safety and the environment.
>
> * * * *
>
> The Commission's Rules of Practice provide the board with substantial authority to regulate hearing procedures. In the final analysis, the actions, consistent with applicable rules, which may be taken to conduct an efficient hearing are limited primarily by the good sense, judgment, and managerial skills of a presiding board which is dedicated to seeing that the process moves along at an expeditious pace, consistent with the demands of fairness.

[11] *Palmer v. Columbia Gas of Ohio, Inc.*, 479 F.2d 153, 165 (6th Cir. 1973) ("due process varies with the subject matter and the requirement of each situation," *citing Fuentes v. Shevin*, 407 U.S. 67, 82 (1972), and "[t]here is no table of weights and measures for ascertaining what constitutes due process," *quoting Burns v. Wilson*, 346 U.S. 137, 149 (1953)). *See also Fitzgerald v. Hampton*, 467 F.2d 755, 764 (D.C. Cir. 1972) ("'due process' cannot be imprisoned within the treacherous limits of any formula").

[12] *See Goldberg v. Kelly*, 397 U.S. 254 (1970).

[13] *Fitzgerald v. Hampton*, 467 F.2d at 767 ("due process in administrative hearings does not yield to administrative 'convenience or expediency, or because of a natural desire to be rid of harassing delay,'" *quoting Ohio Bell Telephone Co. v. Public Utilities Commission of Ohio*, 301 U.S. 292, 305 (1937)). As just seen, *supra* note 10, the

(Continued)

B.1. With these principles in mind, we turn to the challenged hearing schedule on the New Hampshire Plan. So that the schedule may be viewed in proper perspective, it is necessary first to refer briefly to events preceding its adoption.

This operating license proceeding began in late 1981 — more than five years ago. Some nineteen months later, in May 1983, the NRC staff forwarded copies of a New Hampshire state plan to the Licensing Board and the parties.[14] Several intervenors submitted contentions addressed to that plan and, on August 30, 1983, the Licensing Board ruled on their admissibility. Additionally during 1983, local plans surfaced for all but one of the New Hampshire municipalities within the ten-mile Seabrook plume exposure pathway emergency planning zone (EPZ). These plans also were the subject of intervenor contentions.

None of the contentions on either the state or local plans reached the hearing stage in 1983 — or for that matter, in 1984, 1985 or 1986.[15] This was not due, however, to any foot-dragging on the part of the intervenors. We need not set forth at great length the tortuous path that the litigation regarding New Hampshire offsite emergency planning for Seabrook took during the period between the summer of 1983 and early 1987. Suffice it to say that the intervenors were not responsible for it.

As acknowledged by applicants' counsel at oral argument, the emergency planning contentions submitted on the state and local New Hampshire plans given in 1983 to the Federal Emergency Management Agency (FEMA) were not promptly litigated because the applicants' financial problems brought about a halt in plant construction.[16] In December 1985, however, a replacement New Hampshire Plan — covering both state and local participation — was submitted to FEMA and, the following month, obtained by the staff and the other parties to the proceeding. Given this development, the applicants asked the Licensing Board to call for fresh contentions. As they pointed out, by taking this step and dismissing as moot all prior contentions offered with respect to the superseded plans, the Board would eliminate any need to compare one plan with another.[17]

The Board in essence adopted the applicants' suggestion and established a litigation schedule that provided for the commencement of the hearing on any admitted new contentions on July 21, 1986.[18] Thereafter, the start of the

---

Commission itself has emphasized that expedition in the hearing process must be "consistent with the demands of fairness." *See also Limerick*, 25 NRC at 286 (Kohl, concurring).

[14] The staff apparently transmitted the copies shortly after its receipt of the plan from the Federal Emergency Management Agency.

[15] Contentions dealing with a previous study performed by the applicants of evacuation time estimates (ETE) were litigated in August 1983 but no decision was rendered by the Licensing Board.

[16] App. Tr. 207-08.

[17] Applicants' motion (January 14, 1986) at 2-3.

[18] January 17, 1986 memorandum and order at 2-3.

hearing was postponed first until August 4,[19] and then indefinitely.[20] Although the Board did not assign a reason for the indefinite postponement, it was apparently prompted by FEMA's statement that its review of the December 1985 New Hampshire Plan would not be completed before October 1986.

On September 8, 1986, New Hampshire submitted a second revision to its December 1985 Plan. (The first revision had been supplied on June 3.) Revision 2 made numerous, significant changes in the Plan.[21] On November 4, the Licensing Board set December 1 as the deadline for the submission of contentions arising out of Revision 2.[22]

On December 4, 1986, the Board announced that it would rule on the admissibility of the newly submitted contentions by January 16, 1987, at which time discovery would commence. The Board went on to direct that discovery be concluded by February 3, with the hearing to start on or after April 27. Two weeks after that schedule was established, however, the applicants filed a petition with the Licensing Board under 10 C.F.R. 2.758(b), seeking to be relieved of the requirement in 10 C.F.R. 50.47(c)(2) that it plan for an EPZ of approximately ten miles in radius.[23] This development led the Licensing Board to enter the January 9, 1987 order later ratified in the March 20 order under present attack. In the January 9 order, the Board provided this revised schedule for the litigation of Revision 2 of the New Hampshire Plan:

Date	Deadlines
February 13, 1987	Board Order ruling on contentions, discovery commences.
March 6, 1987	Discovery closed (last discovery request due).
March 19, 1987	Answers to last interrogatories due within 14 days after the close of discovery.
March 26, 1987	Deadline for motions for summary disposition on late-filed Rev. 2 Contentions admitted or for other con-

[19] April 29, 1986 memorandum and order at 101.

[20] July 11, 1986 order at 2.

[21] The portion of Revision 2 that pertains to Seabrook (rather than to the Vermont Yankee facility located across the Connecticut River from New Hampshire) consists of 29 volumes containing over 8000 pages (including text, procedures, figures, and tables.) A cursory examination reveals that the portion of this revision directed to state undertakings has effected changes in such areas as public alerting methods; evacuation and sheltering criteria and procedures; allocation of responsibilities between state and local police authorities; and transportation requirements. Perhaps the most notable change relates to the evacuation time estimates. As applicants conceded at oral argument, the ETE study embraced in Revision 2 is essentially new. App. Tr. 205-06.

The portion of Revision 2 directed to the functions of the local governments reflects alterations in the treatment of such subjects as public alerting, emergency communications, protective response, radiological exposure control, recovery/re-entry, and the training of emergency response personnel.

[22] November 4, 1986 memorandum and order at 37.

[23] According to the applicants, a one-mile EPZ would adequately ensure the protection of the public health and safety. As will be seen, the Licensing Board has just denied the petition.

Date	Deadlines
	tentions as to which circumstances have changed such that summary disposition is now appropriate.
April 16, 1987	Response opposing or supporting motions due within 20 days.
April 27, 1987	Opposing parties may file responses to new facts and arguments presented in statements supporting motions for summary disposition.
May 11, 1987	Board Order ruling on motions for summary disposition.
May 21, 1987	Prefiled testimony due 10 days after Board ruling on motions for summary disposition.
No sooner than May 28, 1987	Hearings commence. (Date depends on arrangements for space and location.)

Subsequently, the Board advised the parties that the hearing would start on June 1 in the courtroom of the United States District Court in Concord, New Hampshire, and would continue for that week and the week of June 22-26.[24]

As it turned out, the Licensing Board did not meet its self-imposed February 13 deadline for ruling on the intervenors' contentions on Revision 2 of the New Hampshire Plan. Rather, the Board's order admitting twenty-one such contentions and rejecting numerous others was not rendered until February 18.[25] It was not received by the intervenors until February 23.[26] As a consequence, the period for seeking discovery was cut almost in half, to a mere eleven days (i.e., February 23 to March 6).

On February 25, the intervenors filed a motion with the Licensing Board seeking an amendment of the hearing schedule to enlarge the discovery period to four months and to adjust the other portions of the schedule accordingly. While subscribing to that motion, on March 2 the Massachusetts Attorney General submitted a separate request for a schedule adjustment that focussed upon the

---

[24] February 18, 1987 memorandum and order at 6. On April 2, the week of July 20-24, at the same location, was added to the hearing schedule.

[25] Seventeen of the admitted contentions were sponsored by the Coalition, SAPL or Hampton; the other four were advanced by the Town of Kensington, New Hampshire (which has not joined in the motion for directed certification). Although the Massachusetts Attorney General, who is participating in the proceeding as the representative of an interested state under the provisions of 10 C.F.R. 2.715(c), did not submit any contentions of his own respecting Revision 2 of the New Hampshire Plan, he intends to be an active participant in the litigation of eleven of the admitted contentions concerned with sheltering, evacuation time estimates and compensatory plans. App. Tr. 145. All of those contentions were sponsored by the Coalition, SAPL or Hampton. *See* Attorney General Shannon's Notice of Intention to Participate (March 2, 1987) at 1.

It should be further noted that the Licensing Board also has before it for trial twelve contentions directed to the December 1985 version of the New Hampshire Plan that were admitted to the proceeding in April 1986 and not superseded by Revision 2. Three of these contentions were sponsored by the Coalition. The remaining nine were presented by the Towns of Kensington, Rye, Hampton Falls, and South Hampton, New Hampshire.

[26] *See* App. Tr. 111.

assertedly inadequate period between the filing of prepared testimony and the June 1 date for the commencement of the hearing.

In its March 20 order, the Board denied both motions, prompting the request now before us for interlocutory review.

2. The short of the matter is that, after several years during which the litigation of New Hampshire emergency response planning issues was held in abeyance for reasons not attributable to the intervenors, the Licensing Board imposed upon them a hearing schedule of extreme tightness. Beyond that, the Board manifested an arbitrary unwillingness to make any adjustments in that schedule even when its own failure to meet the established deadline for ruling on contentions had the effect of reducing the period for the submission of discovery requests to eleven days.[27]

a. *Discovery.* Given the number and scope of the Revision 2 contentions admitted by the Licensing Board, we deem totally unreasonable the limited opportunity provided the intervenors to invoke the discovery procedures specified in the Commission's Rules of Practice.[28] This is particularly so in light of the Board's lack of an explanation respecting why it has now become necessary to conduct prehearing activities at a breakneck pace. Nor is any possible explanation readily discernible. To be sure, Unit 1 of the Seabrook facility is fully built and the applicants are understandably eager to obtain a full-power operating license for it. But it is equally apparent that, even if all New Hampshire emergency response planning issues are resolved in the applicants' favor, formidable obstacles remain in the path of the achievement of that objective.

A substantial portion of the ten-mile EPZ is located within the Commonwealth of Massachusetts and its governor has made clear that that state will not participate in emergency planning activities. Although a grant of the applicants' pending petition seeking a reduction of the EPZ to one mile would leave Massachusetts outside of its boundaries, the Licensing Board recently concluded that the requisite *prima facie* showing that such relief is warranted had not been made.[29] As matters currently stand, then, before Seabrook can be licensed for

---

[27] We note in passing that the Licensing Board's February 18, 1987 order ruling on the contentions directed to Revision 2 of the New Hampshire Plan did not explain why particular contentions were admitted or rejected. Consequently, the Board was required to state in the order (at 1) that it would "not accept any motion concerning these rulings prior to [the issuance of] the [m]emorandum explaining the bases of its rulings."

As of this writing, the memorandum has not been issued. Thus, the five-day period provided by 10 C.F.R. 2.752(c) for the filing of objections to the rejection of certain contentions has still not begun to run. Yet, until the objections are received and ruled upon, neither the parties nor the Licensing Board will know for certain precisely what issues pertaining to the New Hampshire Plan are to be tried.

[28] *See* 10 C.F.R. 2.740 et seq.

[29] LBP-87-12, 25 NRC 324 (1987). *See also* 10 C.F.R. 2.758(c). Although the Licensing Board may not have known on March 20 that it would reach that conclusion, it was then aware that the staff would not complete its review of the applicants' proposed EPZ reduction until late this year. *See* Staff Response (January 28, 1987) at

(Continued)

full-power operation there must be acceptable emergency planning for the several Massachusetts communities within the ten-mile EPZ.

Accordingly, barring a change in position on the part of the Massachusetts governor, it would appear that the applicants must count on the Commission's adoption of a proposed amendment to its emergency planning regulations. More specifically, a subsection (e) would be added to 10 C.F.R. 50.47 providing that:

> The Commission may issue a full power operating license for a facility notwithstanding non-compliance with other requirements of this section and 10 CFR Part 50, Appendix E if non-compliance arises substantially from a lack of participation in the development or implementation of offsite emergency planning by a State or local government, and if the applicant demonstrates to the Commission's satisfaction that: (1) The non-compliance could be remedied, or adequately compensated for by reasonable State or local governmental cooperation; (2) Applicant has made a good faith and sustained effort to obtain the cooperation of the necessary governments; (3) Applicant's offsite emergency plan includes effective measures to compensate for the lack of cooperation which are reasonable and achievable under the circumstances and which take into account a likely State or local response to an actual emergency; and (4) Applicant has provided copies of the offsite plan to all governments which would have otherwise participated in its preparation or implementation and has assured them that it stands ready to cooperate should they change their position.[30]

Whether the Commission will promulgate subsection (e) after its evaluation of the plethora of public comments it has received remains to be seen.[31] Even if it does, however, the applicants will still have the burden of demonstrating, *inter alia*, that their offsite emergency plan "includes effective measures to compensate for the lack of cooperation which are reasonable and achievable under the circumstances and which take into account a likely State or local response to an actual emergency." It is fair to assume that the applicants' endeavor to satisfy this burden will not go unchallenged and that substantial time and effort will be required to resolve such issues.

It does not necessarily follow from these considerations that a protracted schedule for the hearing of the New Hampshire emergency planning issues would be justified. But, once again, we are not presented with such a schedule here but, rather, with one that is the precise opposite. Insofar as discovery requests are concerned, for example, the question is whether, in the totality of circumstances, there was any *practical* reason why this important phase of pretrial activity had to be compressed into such a fleeting period. We think that question must be answered in the negative. Moreover, in contrast to the situation

---

5; Staff Response (February 27, 1987), Affidavit of Scott Newberry at 8. At the time of the entry of the March 20 order, the Board thus must have appreciated that in no event would an early grant of the applicants' petition be likely.

[30] *See* 52 Fed. Reg. 6980, 6984 (1987).

[31] As extended in an April 27 notice, the period for public comments on the proposal will expire on June 4, 1987. To date, over 2100 such comments have reached the Commission.

addressed in the recent *Limerick* decision,[32] we are additionally satisfied from their uncontroverted representations at the oral argument that the intervenors have suffered serious prejudice by reason of the failure of the Licensing Board to establish a more reasonable discovery period.

b. *Prepared testimony and start of hearing.* We find equally, if not more, troubling the portion of the Licensing Board's schedule calling for the submission of all prepared testimony within ten days of its ruling on the pending motions for summary disposition and the commencement of the evidentiary hearing five business days thereafter (the period between May 21 and June 1 includes two weekends and the Memorial Day holiday). In the absence of the most dire necessity, and none was or could have been demonstrated here, such compression is simply unacceptable.[33]

Perhaps most disturbing of all was the Licensing Board's explicit decision not to provide an opportunity for prepared rebuttal testimony. In denying reconsideration of its schedule, the Board opined that the proceeding would not be benefitted by allowing such testimony. Rather, according to the Board, "[t]he filing of testimony simultaneously serves to promote fairness for all parties."[34] We believe that exactly the converse is the reality: in the circumstances of this case at least, the lack of an opportunity for prepared rebuttal testimony patently and seriously intrudes upon the intervenors' hearing rights.

This point is readily illustrated by a single example. Revision 2 is now before FEMA for its consideration and evaluation. According to staff counsel, FEMA has given assurance that it will meet the May 21 deadline for the submission of its prepared testimony.[35] When that testimony is filed, the intervenors will learn for the first time whether FEMA finds Revision 2 acceptable and, if so, the reasons for its finding.

By virtue of 10 C.F.R. 50.47(a)(2), a *rebuttable* presumption of correctness attaches to FEMA findings on questions of the adequacy and implementation capability of emergency response plans. Under the Licensing Board's schedule, however, how will intervenors be able to attempt to rebut through *affirmative evidence of their own* any FEMA finding(s) with which they disagree? The short answer is that, as staff counsel ultimately conceded,[36] that opportunity will be entirely denied to them because, by the time they obtain the FEMA testimony, the period for the filing of their own prepared testimony will have

---

[32] *See Limerick*, 25 NRC at 277-78.

[33] We recognize that, in telephone conferences with the parties on April 13 and 14, the Licensing Board announced that it was summarily denying the applicants' motion for summary disposition on seven of the Revision 2 contentions. *See* April 15, 1987 memorandum and order. But the applicants had moved for summary disposition on all thirty-three admitted contentions (*see* supra note 25 and App. Tr. 189) and presumably the parties will not know until May 11 whether they need to prepare for trial on the remaining twenty-six.

[34] March 20, 1987 memorandum and order at 2 n.2.

[35] App. Tr. 209.

[36] App. Tr. 209-16.

expired. Inasmuch as prefiled testimony is a precondition to a witness taking the stand, the Licensing Board has effectively precluded the intervenors from attacking the presumptively correct FEMA finding other than through cross-examination. If anything more than lip service is to be accorded the principle that every litigant is entitled to a fair hearing — in the context of the matter before us, a fair opportunity to present its case — that result cannot be tolerated.

C. For the foregoing reasons, we conclude that, without sufficient assigned or apparent justification, the challenged hearing schedule was so grossly abbreviated in several respects as to impinge upon the intervenors' hearing rights and thus to be violative of due process. That schedule must therefore be modified by the Licensing Board to cure the infirmity. That modification shall be consistent with the following:

1. The parties are to be given an opportunity for further discovery on the admitted Revision 2 contentions of SAPL, Hampton, and the Coalition. A period of at least fifteen days shall be provided for the submission of additional discovery requests and a period of at least like duration provided for responses to those requests.
2. On the assumption that FEMA will furnish to the parties a *full* statement of its position on the New Hampshire Plan prior to June 1, 1987 (either through prefiled testimony or in response to a discovery request),[37] the prefiled testimony of all parties to the proceeding on the SAPL, Hampton, and Coalition contentions shall be due on or after July 1, 1987, as the Licensing Board may specify. In the event that a full statement of the FEMA position is not furnished to the parties by June 1, the deadline specified for the filing of the parties' prefiled testimony on those contentions shall be no less than thirty days after the statement becomes available.
3. The hearing on the SAPL, Hampton, and Coalition contentions shall not be scheduled to commence on a date less than fifteen days after the filing and service of the prepared testimony.[38]

Inasmuch as the Towns of Kensington, Rye, Hampton Falls, and South Hampton did not join in the directed certification motion, the Licensing Board remains free to apply the schedule set forth in the January 9 order to the contentions of those intervenors. The Board may conclude, however, that it is preferable to have prehearing activity on all New Hampshire emergency planning issues proceed on the same timetable. If so, the Board may decide to make the above-required modifications in the January 9 schedule applicable to the totality of the contentions before it.

---

[37] In light of staff counsel's representation that FEMA has given its assurance that its prepared testimony can be available by May 21, this assumption seems fully justified.

[38] *See* 10 C.F.R. 2.743(b).

Motion for directed certification *granted;* cause *remanded* to the Licensing Board for further proceedings in conformity with this opinion. It is so ORDERED.

FOR THE APPEAL BOARD

Barbara A. Tompkins
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 Nos. 50-443-OL-1
50-444-OL-1
(Onsite Emergency Planning
and Safety Issues)

PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, *et al.*
(Seabrook Station, Units 1
and 2)

May 8, 1987

The Appeal Board in this operating license proceeding denies the requests of the intervenors and the Massachusetts Attorney General for a stay *pendente lite* of a Licensing Board partial initial decision authorizing the issuance of a license for low-power operation at the Seabrook nuclear facility.

RULES OF PRACTICE: STAY OF AGENCY ACTION (CRITERIA)

The four factors to be considered in deciding whether to grant a stay, as set forth in 10 C.F.R. § 2.788(e), are: (1) whether the moving party has made a strong showing that it is likely to prevail on the merits; (2) whether the party will be irreparably injured unless a stay is granted; (3) whether the granting of a stay would harm other parties; and (4) where the public interest lies.

RULES OF PRACTICE: STAY OF AGENCY ACTION (CRITERIA)

Although none of the factors to be considered in granting a stay is necessarily dispositive, the potential for irreparable injury and the likelihood of prevailing on the merits generally get primary attention.

RULES OF PRACTICE: STAY OF AGENCY ACTION (CRITERIA)

The strength of a movant's showing on one of the four stay factors determines how strong the showing must be on other factors. *Cuomo v. NRC*, 772 F.2d 972, 974 (D.C. Cir. 1985).

RULES OF PRACTICE: STAY OF AGENCY ACTION (IRREPARABLE INJURY)

The most significant factor as well as the first question often turned to in deciding whether to grant a stay request is "whether the party requesting a stay has shown that it will be irreparably injured unless the stay is granted."

RULES OF PRACTICE: STAY OF AGENCY ACTION (IRREPARABLE INJURY)

The risk of harm to the general public or the environment flowing from an accident during low-power testing is insufficient to constitute irreparable injury.

RULES OF PRACTICE: STAY OF AGENCY ACTION (IRREPARABLE INJURY)

Mere injuries, however substantial, in terms of money, time and energy expended in the absence of a stay, are not enough to establish irreparable injury. *Toledo Edison Co.* (Davis-Besse Nuclear Power Station, Units 1, 2 and 3), ALAB-385, 5 NRC 621, 628 (1977).

RULES OF PRACTICE: STAY OF AGENCY ACTION (IRREPARABLE INJURY)

Change in the environmental status quo as a result of low-power testing does not constitute irreparable injury. *Cuomo*, 772 F.2d at 976.

RULES OF PRACTICE: STAY OF AGENCY ACTION (BURDEN OF PROOF)

To justify the granting of a stay, a movant need not always establish a high probability of success on the merits. Probability of success is inversely proportional to the degree of irreparable injury evidenced. A stay may be granted with either a high probability of success and some injury, or vice versa. *Cuomo*, 772 F.2d at 974.

RULES OF PRACTICE: CHALLENGE TO COMMISSION REGULATION

When Commission regulations are believed to violate the hearing requirements of the Atomic Energy Act, any issues raised must be directed to the Commission; the regulations are not subject to challenge before the Appeal Board. 10 C.F.R. 2.758(a).

RULES OF PRACTICE: REOPENING OF PROCEEDINGS

To prevail on a motion to reopen an evidentiary record, a movant must show that: (1) the motion is timely, although an exceptionally grave issue may be considered in the discretion of the presiding officer even if not timely presented; (2) the motion addresses a significant safety or environmental issue; and (3) a materially different result would be or would have been likely had the newly proffered evidence been considered. 51 Fed. Reg. 19,535, 19,539 (1986).

RULES OF PRACTICE: NONTIMELY SUBMISSION OF CONTENTIONS

When reviewing a Licensing Board determination declining to admit a late-filed contention, the Appeal Board accords it wide latitude.

TECHNICAL ISSUE DISCUSSED

Safety Parameter Display System (SPDS).

APPEARANCES

Diane Curran, Washington, D.C. (with whom **Andrea Ferster** and **Ellyn R. Weiss**, Washington, D.C., were on the brief) for the New England Coalition on Nuclear Pollution.

Paul McEachern, Portsmouth, New Hampshire (with whom **Matthew T. Brock,** Portsmouth, New Hampshire, was on the brief) for the Town of Hampton, New Hampshire.

Robert A. Backus, Manchester, New Hampshire, for the Seacoast Anti-Pollution League.

Donald S. Bronstein, Boston, Massachusetts (with whom **Carol S. Sneider,** Boston, Massachusetts, was on the brief) for Massachusetts Attorney General James M. Shannon.

Thomas A. Dignan, Boston, Massachusetts (with whom **George H. Lewald** and **Kathryn A. Selleck,** Boston, Massachusetts, were on the brief) for the Public Service Company of New Hampshire, *et al.*

Sherwin E. Turk for the Nuclear Regulatory Commission staff.

United States Senator Gordon J. Humphrey of New Hampshire, Washington, D.C., filed a brief amicus curiae pro se.

MEMORANDUM AND ORDER

The New England Coalition on Nuclear Pollution (the Coalition), the Town of Hampton, New Hampshire, the Seacoast Anti-Pollution League (SAPL), and Massachusetts Attorney General James M. Shannon each seek a stay *pendente lite* of the Licensing Board's March 25, 1987 partial initial decision[1] authorizing the issuance of a license for low-power operation (up to five percent of rated power) of the Seabrook nuclear facility.[2] United States Senator Gordon J. Humphrey of New Hampshire (the state within which the facility is located) has submitted a brief amicus curiae in support of the requests for a stay. The applicants Public Service Company of New Hampshire, *et al.* and the Nuclear

---

[1] LBP-87-10, 25 NRC 177.

[2] SAPL, the Attorney General, and the Town of Hampton seek a stay only pending resolution of issues they plan to raise on appeal of LBP-87-10. The Coalition asks us to stay the Licensing Board's decision until the Commission has reached a determination as well on the application for a full-power license. Motion for Stay on Behalf of the Seacoast Anti-Pollution League (April 8, 1987) [hereafter SAPL Stay Motion]; Attorney General James M. Shannon's Application for a Stay of Licensing Board's Order (April 6, 1987) [hereafter Attorney General's Motion for Stay]; Town of Hampton Notice of Appeal and Application for a Stay (April 8, 1987), and New England Coalition on Nuclear Pollution's Motion for a Stay of a Low Power Operation Pending Full Power Decision or Appellate Review (April 8, 1987) [hereafter Coalition's Motion for Stay]. In a document dated May 5, 1987, and received by us on May 7, the Town of Hampton seemingly modified its stay request to embrace the relief sought by the Coalition.

Regulatory Commission staff oppose the motions. As explained below, we deny all stay applications.

I.

As we recently had occasion to observe, this operating license proceeding has been in litigation since 1981.[3] Although the State of New Hampshire has tendered a radiological emergency response plan for that portion of the ten-mile plume exposure pathway emergency planning zone (EPZ) that falls within its borders, the Commonwealth of Massachusetts has declined to submit a plan covering its portion of the zone or otherwise to cooperate in emergency planning matters. The effect of that refusal was the subject of earlier appeals by SAPL and the Attorney General.

Late last year, they sought reversal of the Licensing Board's October 7, 1986 memorandum and order (LBP-86-34, 24 NRC 549) authorizing the issuance of an operating license allowing fuel loading and precriticality testing at Seabrook. The Attorney General argued that the Commission's regulations[4] require the submission of an emergency response plan for the entire EPZ before any license may be issued. SAPL joined in that argument but raised other issues as well. In ALAB-853 and ALAB-854, we rejected those assertions.[5] In particular, we found, in ALAB-853, that an applicant need not submit an offsite emergency response plan as a condition precedent to issuance of a license authorizing fuel loading and precriticality testing.

In an unpublished order issued on January 9, 1987, the Commission announced its intention to review ALAB-853. It decided to consider whether the applicants must submit a governmental or utility radiological emergency plan before issuance of *any* operating license, including one limited to fuel loading or low-power operation. The Commission did not alter the schedule for fuel loading or precriticality testing. But, anticipating that the Licensing Board was about to issue a decision addressing the applicants' request for issuance of a low-power license, the Commission stayed the authority of the Director of Nuclear Reactor Regulation to issue such license until its review was completed.

In an opinion issued on April 9, 1987, the Commission decided that special policy considerations favored requiring the filing of a state, local, or utility plan for Seabrook before any license could be issued.[6] Shortly before the announcement of the Commission's decision, however, the utility filed its own offsite emergency plan for that portion of the EPZ located in Massachusetts. It

---

[3] *See* ALAB-864, 25 NRC 417, 422 (1987).
[4] 10 C.F.R. 50.33(g).
[5] ALAB-853, 24 NRC 711 (1986); ALAB-854, 24 NRC 783 (1986).
[6] CLI-87-2, 25 NRC 267.

also filed a motion suggesting that the issues before the Commission were now moot and urging that the stay be lifted. In the circumstances, the Commission is now considering whether the filing of that plan satisfies the requirement imposed in its April 9 decision. Until it reaches a decision on that issue, its stay remains in effect.[7]

II.

Consideration of stay applications requires us to apply the traditional stay criteria enunciated by the courts and incorporated into the Commission's regulations.[8] Those criteria are (1) whether the moving party has made a strong showing that it is likely to prevail on the merits; (2) whether the party will be irreparably injured unless a stay is granted; (3) whether the granting of a stay would harm other parties; and (4) where the public interest lies. None of these factors is necessarily dispositive, but the potential for irreparable injury and the likelihood that a movant will prevail on the merits generally get primary attention. Moreover, the strength of a movant's showing on one of these factors determines how strong the showing must be on other factors to justify a stay.[9]

When reviewing requests to stay licensing board decisions authorizing only low-power operation, we do not write on a clean slate. The Commission, this Board, and the courts have evaluated issues bearing on the four stay criteria in connection with similar proceedings, particularly the *Shoreham* litigation.[10] In that case, as here, intervenors argued that a stay was proper to preserve the status quo until appellate review could be completed because there was a possibility that full-power operations would never be authorized or conducted. That argument was rejected.

The Massachusetts Attorney General presses the point that this case can be distinguished from *Shoreham*.[11] In particular, he asserts that the degree of uncertainty that Seabrook will ever operate is greater than at Shoreham. He notes

---

[7] The Attorney General urges us to defer ruling on his stay petition until the Commission lifts the stay now in effect (assuming it does so) or, in the event we conclude that a stay is not warranted, to delay the effect of our ruling to permit the filing of a stay request with the Commission or the court. We eschew either course but issue our decision promptly in order to accord parties an opportunity to seek further relief from the Commission. Our action is intended to permit the Commission to review any additional stay applications at the same time it considers the issues already pending before it.

[8] *See* 10 C.F.R. 2.788(e). *See generally Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 1), CLI-86-4, 23 NRC 113, 121-22 (1986) (*citing Virginia Petroleum Jobbers Ass'n v. FPC*, 259 F.2d 921, 925 (D.C. Cir. 1958), and *Washington Metropolitan Area Transit Comm'n v. Holiday Tours, Inc.*, 559 F.2d 841 (D.C. Cir. 1977)).

[9] *Cuomo v. NRC*, 772 F.2d 972, 974 (D.C. Cir. 1985).

[10] *See, e.g., ibid.; Long Island Lighting Co.* (Shoreham Nuclear Power Station), CLI-85-12, 21 NRC 1587 (1985); *id.*, CLI-85-1, 21 NRC 275 (1985); *id.*, CLI-84-9, 19 NRC 1323 (1984); *id.*, CLI-83-17, 17 NRC 1032 (1983); and ALAB-810, 21 NRC 1616 (1985).

[11] *See* App. Tr. 14-20, 25, 98-102.

that it is two years since the stay decisions were made in the *Shoreham* litigation, and it seems no more likely today that either Shoreham or Seabrook will eventually receive a full-power license. But the gist of the *Shoreham* opinions is that, assuming there are no other impediments, low-power operation should be authorized unless the uncertainties surrounding offsite emergency planning make it relatively clear that full-power operation will never be authorized. In explaining an earlier *Shoreham* decision, the Commission recently indicated in this proceeding that

> [it] did not discount the possibility that a license for fuel loading and low-power testing could be held up if it were established, beyond significant doubt, that there were truly insuperable obstacles to issuance of a license for operation at any substantial power level.[12]

That high level of certainty — "beyond significant doubt" that there are "truly insuperable barriers" — concerning Seabrook's eventual operation is simply not present on the facts before us. In our view, assessing any differences in the likelihood of full-power operation in the context of the current *Seabrook* litigation as compared with the *Shoreham* case of two years ago is simply a guessing game and not decisionally relevant.[13]

III.

A. Irreparable Harm

The Commission has observed that the most significant factor in deciding whether to grant a stay request is whether irreparable injury will result in the absence of a stay.[14] As a consequence, we often turn first to that question.[15] The movants assert that a variety of injuries will result from low-power testing. They observe, for example, that there is the potential for harm to the public in the event of an accident during low-power testing. However, the Commission has found that certain factors contribute to a "substantial reduction in risk and potential accident consequences for low-power testing as compared to the

---

[12] CLI-87-2, 25 NRC at 271.

[13] The court in the *Shoreham* litigation characterized the likelihood of full-power operation at Shoreham as "a matter for speculation." *Cuomo*, 772 F.2d at 977. We believe the same can be said for Seabrook. Counsel for the applicants, in fact, argues that Seabrook is a somewhat more promising candidate for licensure. Among other things, unlike Shoreham, Seabrook is located within a state which has filed an offsite emergency plan and is, to some extent at least, cooperating with the applicants. The opposition from governmental parties comes largely, although not exclusively, from neighboring Massachusetts. App. Tr. 65-69.

[14] *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), CLI-84-17, 20 NRC 801, 804 (1984).

[15] *See Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), ALAB-820, 22 NRC 743, 746 (1985); *United States Dep't of Energy* (Clinch River Breeder Reactor Plant), ALAB-721, 17 NRC 539, 543 (1983).

higher risks in continuous full-power operation."[16] First, the fission product inventory generated during low-power testing is much less than during full-power operation. Moreover, there is a reduction in the required capacity of systems designated to mitigate any consequences of an abnormal occurrence when a reactor operates at low power. Finally, there is more time available to take actions to identify accident causes and to mitigate accident consequences.[17] Even the movants acknowledge that the potential for an accident with serious consequences during low-power operation is considered extremely small.[18] Simply stated, the risk of harm to the general public or the environment flowing from an accident during low-power testing is insufficient to constitute irreparable injury.

The intervenors point to other forms of injury that allegedly will also result if a stay is not granted. Among other things, they claim that irradiation of the reactor will result in a change in the status quo, that they will effectively lose their appellate rights if the reactor is allowed to operate before their claims are fully considered on appeal, and that workers may be exposed to radiation during testing. These assertions were expressly evaluated by the court in the *Shoreham* litigation and either rejected or found insufficient to justify grant of a stay. We have considered them in the context of this case and can find no basis on which to distinguish the arguments from those resolved in the *Shoreham* proceeding.

The movants assert that one argument they now present was not explicitly raised in the *Shoreham* litigation — i.e., that the critical transition from fuel loading to low-power operation contaminates much of the plant and reduces the range of options available to the utility for use of the facility in the event full-power operation is eventually precluded. Among other things, the salvage value of the fuel and plant component parts is reduced and arrangements will need to be made for the storage of the irradiated fuel.[19] In *Shoreham*, however, the Commission weighed the environmental effects of low-power testing, including, expressly, "moderate irradiation of the core and contamination of the remainder of the primary coolant system."[20] One might reasonably infer from this that the Commission was aware of — although it did not expressly discuss — both the reduction in salvage value and the need to store irradiated fuel.

In any event, these drawbacks are largely economic. The courts and the Commission have long held that economic effects are not generally sufficient to

---

[16] 46 Fed. Reg. 61,132 (1981).

[17] *Id.* at 61,132-33. *See also* 47 Fed. Reg. 30,232-33 (1982).

[18] *See* Coalition Motion for Stay at 9 n.11 (the risk of an accident exists, although the Commission considers it "insignificant"); SAPL Stay Motion at 6 ("nuclear operation presents the risk of an accident, however remote").

[19] The Attorney General "primarily relie[s]" on this argument in support of his claim of irreparable injury. App. Tr. 98-99.

[20] CLI-85-12, 21 NRC at 1590.

establish irreparable injury.[21] To be sure, some economic costs could eventually be borne by the ratepayers, but that is far from certain. An allocation of burdens in the event that the Seabrook plant is unable to operate at full power will be meted out in due course by the state agencies with responsibility in this area.[22] Thus, any economic injury that may result generally to ratepayers, including the intervenors, is in no sense irreparable.

We fully appreciate that the storage of the waste generated by low-power operation is not entirely a matter of economics. There are potential safety and environmental consequences that might not result if low-power testing were simply foreclosed at this juncture. But the problem of waste disposal is generic to nuclear power plant operation and is being addressed on a nationwide basis.[23] While we cannot entirely discount the possibility that some radioactive waste may have to be stored at the Seabrook site, the movants have not shown that waste generated during low-power testing at Seabrook must inevitably be housed there indefinitely or that, if so housed, it would pose serious health or safety problems to the facility's neighbors.

The Attorney General concedes that the waste storage problem will be small but argues that irreparable injury occurs because there is no justification for *any* contamination of the plant and the consequent need for waste storage, given the uncertainty that Seabrook will ever be licensed.[24] In *Shoreham*, however, the Commission rejected the notion that no changes in the environmental status quo should be permitted simply because there is uncertainty as to whether a full-power license will ever be issued.[25] Similarly, the court acknowledged that low-power testing represents "an irreversible change from the status quo," but nonetheless declined to conclude that the significance of the change amounted to irreparable harm.[26] In our view, the question of whether waste storage rises to the level of irreparable injury is properly resolved on the basis of these earlier Commission and court decisions. Given those decisions, we cannot conclude that the contamination of the plant and the possibility that waste may need to be stored at Seabrook constitute irreparable injury.

---

[21] *See Toledo Edison Co.* (Davis-Besse Nuclear Power Station, Units 1, 2 and 3), ALAB-385, 5 NRC 621, 628 (1977) (*quoting Virginia Petroleum Jobbers Ass'n v. FPC*, 259 F.2d at 925) ("[m]ere injuries, however substantial, in terms of money, time and energy expended in the absence of a stay, are not enough").

[22] *See generally Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), ALAB-789, 20 NRC 1443, 1447 (1984) (*citing Public Service Co. of New Hampshire* (Seabrook Station, Unit 2), CLI-84-6, 19 NRC 975 (1984)).

[23] *See Baltimore Gas & Elec. Co. v. Natural Resources Defense Council, Inc.*, 462 U.S. 87 (1983).

[24] App. Tr. 100.

[25] CLI-83-17, 17 NRC 1032.

[26] *Cuomo*, 772 F.2d at 976.

B. Likelihood of Success on the Merits

Because the movants have been unable to demonstrate that they will be irreparably harmed if the stay is denied, they bear a heavy burden of showing that they are likely to succeed on the merits of their appeal. As the U.S. Court of Appeals for the District of Columbia Circuit has explained:

> To justify the granting of a stay, a movant need not always establish a high probability of success on the merits. Probability of success is inversely proportional to the degree of irreparable injury evidenced. A stay may be granted with either a high probability of success and some injury, or *vice versa*.[27]

The movants here have not met that burden.

A number of the legal arguments advanced in support of the stay request have already been addressed and rejected in the *Shoreham* proceeding or earlier phases of this case. As an example, the Attorney General and the Coalition assert that the Licensing Board erred in failing to require the preparation of a supplemental environmental impact statement to assess the costs and benefits of low-power testing where it appears that no full-power license may issue.[28] The Commission and the court expressly rejected this claim in the *Shoreham* proceeding.[29]

The Attorney General and the Coalition also argue that issuance of a low-power license pursuant to 10 C.F.R. 50.47(d) and 50.57(c) prior to resolution of offsite emergency planning issues deprives them of their right to a hearing under section 189(a) of the Atomic Energy Act. But section 50.47(d) gives applicants an unqualified right to a low-power license if certain prerequisites are met even if the Commission has yet to resolve all offsite emergency planning issues.[30] To the extent that the movants believe that the Commission's regulations themselves violate the hearing requirements of the Atomic Energy Act, they must raise that issue with the Commission; the regulations are not subject to challenge before us.[31]

The Attorney General and the Coalition also maintain that a low-power license cannot be issued until offsite emergency plans have been submitted for the Massachusetts portion of the EPZ in accordance with 10 C.F.R. 50.33(g). As

---

[27] *Id.* at 974.

[28] SAPL joins in arguments presented by the Attorney General. *See* SAPL Stay Motion at 2.

[29] CLI-85-12, 21 NRC at 1589; CLI-84-9, 19 NRC at 1326; *Cuomo*, 772 F.2d at 974-76.

[30] CLI-85-1, 21 NRC at 278. *Cf.* ALAB-854, 24 NRC at 790-91, where we approved the issuance of a license authorizing fuel loading and preciticality testing despite the pendency of full-power issues.

[31] 10 C.F.R. 2.758(a); *Duke Power Co.* (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-669, 15 NRC 453, 464 (1982). *See also American Nuclear Corp.*, CLI-86-23, 24 NRC 704, 707 (1986). The Coalition claims that the requirement in section 50.47(d) of a finding concerning certain aspects of offsite emergency planning has not been satisfied. As we explained in ALAB-854, however, all necessary requirements in this regard have been fulfilled. *See* 24 NRC at 790-91.

noted at the outset of this opinion, we concluded in ALAB-853 that section 50.33(g) does not impose any such requirement. Although the Commission did not reject our legal analysis and construction of the regulations, it nevertheless decided that special policy considerations, "which ultimately [the Commission] alone should decide," warrant the filing of a state, local or utility plan before issuance of *any* operating license for the Seabrook reactor.[32] The applicants have tendered a utility offsite emergency plan and the Commission is now actively considering whether its policy requirements have been satisfied. This matter, therefore, now rests exclusively in the Commission's hands.

Certain arguments advanced in support of the stay requests have not been the subject of earlier determinations. But we find them unavailing as well. First, the Attorney General claims that the Licensing Board improperly granted the applicants' motion for summary disposition of SAPL Contention 3, which claimed that the requirements of the Commission's Policy Statement on the consideration of accidents under the National Environmental Policy Act of 1969 have not been met. Specifically, he asserts:

> The [environmental impact statement] for Seabrook did not include any analysis of consequences of a Class 9 accident; did not consider site-specific data; included no discussion of external events, such as sabotage, which could affect the risks; and did not quantify the uncertainty bounds.[33]

We find no support for the Attorney General's attack on the staff's analysis. Contrary to his assertion, the environmental statement does contain a lengthy evaluation of severe, or so-called Class 9, accidents.[34] That evaluation includes an examination of site-specific data,[35] makes reference to external events and explains why they are not separately analyzed,[36] and makes an effort to quantify analytical uncertainties.[37] As a consequence, we are satisfied that the Attorney General is not likely to succeed with his claim that the staff failed to include an analysis of Class 9 issues. We take no position on the adequacy of the staff's analysis or the overall propriety of the Licensing Board's summary disposition determination — matters not pressed by the Attorney General at this stage of the litigation.

The Attorney General next argues that the Licensing Board improperly rejected two late-filed contentions concerning the adequacy of siren sound levels in certain portions of the EPZ. The Board first refused to admit a contention that

---

[32] CLI-87-2, 25 NRC at 271.
[33] *See* Attorney General's Motion for Stay at 6.
[34] *See* NUREG-0895, Final Environmental Statement Related to the Operation of Seabrook Station, Units 1 and 2 (December 1982) at 5-47 to 5-71.
[35] *Id.* at 5-43, 5-44.
[36] *Id.* at 5-48.
[37] *Id.* at 5-70, 5-71.

only two sirens, rather than three, had been installed in the Town of Merrimac, Massachusetts, and that the two sirens were not operational.[38] The Board then declined to entertain a contention alleging that a test of sirens in the Town of East Kingston, New Hampshire, called into question the reliability of the siren system.[39] Finally, it rejected a second effort by the Attorney General to introduce the Merrimac contention, this time to show that the sirens did not comply with applicable regulations.[40] In reaching its conclusion on both contentions, the Licensing Board evaluated the three criteria for reopening a record set out in 10 C.F.R. 2.734 and balanced the five factors contained in 10 C.F.R. 2.714(a) against which late contentions must be measured. To convince us that he is likely to prevail on the merits, the Attorney General must persuasively demonstrate that both the Board's decision not to reopen the record and its determination not to admit the late-filed contentions were wrong. We do not believe that he has done so.

To prevail on a motion to reopen the record a movant must show that (i) its motion is timely, although an exceptionally grave issue may be considered in the discretion of the presiding officer even if not timely presented; (ii) the motion addresses a significant safety or environmental issue; and (iii) a materially different result would be or would have been likely had the newly proffered evidence been considered.[41] Insofar as the East Kingston sirens are concerned, the Board concluded that the motion was timely filed but that the movant had not shown that a significant safety issue was involved. Although the motion alleged that the East Kingston sirens did not perform as expected, the Board (relying on an affidavit submitted by the NRC staff) concluded that the "test" of the sirens did not conform to the approved Seabrook test procedure (among other things, the sirens were activated for only 15, rather than 30, seconds and thus did not complete a full rotation). As a consequence, the Board was unprepared to rely on the test as a demonstration that a significant safety issue was present so as to warrant a reopening of the record. The Board went on to note that the NRC staff gave assurances that the sirens would be retested in accordance with proper procedure and any needed corrections would be made. In the circumstances, the Attorney General has failed to show that he is likely to prevail on the merits of his claim that the Board acted unreasonably in declining to reopen the record.

Insofar as the Merrimac sirens are concerned, the Board found, first of all, that the Attorney General had not demonstrated good cause for failing to raise the matter in a timely manner. In the Board's view, the Commonwealth should have been aware for more than six months that the Town of Merrimac had refused

---

[38] LBP-87-3, 25 NRC 71 (1987).
[39] Licensing Board March 23, 1987 Memorandum and Order (unpublished).
[40] Licensing Board March 25, 1987 Memorandum and Order (unpublished).
[41] 51 Fed. Reg. 19,535, 19,539 (1986).

to permit the electric connection of the sirens and had ordered the immediate cessation of all work on the sirens.[42] Equally important, the Board (again relying on a staff affidavit) indicated that two of the three sirens would be equipped with batteries and that those sirens can produce noise levels sufficient to meet or exceed standards accepted by the NRC and the Federal Emergency Management Agency (FEMA). The Board thus found that no significant safety issue had been raised.[43]

The Attorney General thereafter resubmitted his request to reopen the record and late-file the same Merrimac siren contention, this time asserting as its basis that the sound levels produced by the sirens did not satisfy NRC/FEMA standards (the Attorney General apparently abandoned the earlier bases for his late-filed contention). The Board again found that the request was not timely submitted. In this regard, it rejected the assertion that the Commonwealth was "lulled into inaction" because the applicants had installed two sirens and publicly announced that they would be operational before initial criticality.[44] After reviewing various arguments and affidavits, the Board also found that the siren design coverage in the Merrimac area met NRC/FEMA requirements.[45]

The Attorney General objects that, in reaching its decision, the Board improperly resolved factual disputes purportedly raised in conflicting affidavits. As we read the Board's opinion, it recognized that compliance with NRC/FEMA criteria may be demonstrated by showing either that the expected sound level coverage is at least 60 dBC, or that the expected sound pressure level exceeds the average measured summer daytime ambient sound pressure levels by 10 dB.[46] Everyone agrees that the applicants did not satisfy the first criterion. The Board went on to conclude, however, that there are two alternative means of taking measurements to fulfill the second criterion. To satisfy regulatory requirements, the ambient background noise level should be measured in the full *or* one-third octave band containing the predominant tone of the sirens used. The Attorney General's consultant utilized the full octave band. But the applicants applied the one-third octave band and demonstrated that the criterion was met. The Board relied on that latter demonstration.[47] In the circumstances, we cannot conclude that there is a factual dispute or that there is a substantial likelihood that the At-

---

[42] LBP-87-3, 25 NRC at 75.

[43] *Id.* at 75 n.5, 77.

[44] Licensing Board March 25, 1987 Memorandum and Order at 7-9.

[45] *Id.* at 14-16.

[46] The pressure level of sound is measured relative to a small reference pressure and is reported in units called decibels (dB). These measurements can be weighted by different filter circuits in the measuring equipment. One such measurement is weighted by so-called "filter C" and is referred to as decibels C, or dBC. *See, e.g.*, A. Parrish, *Mechanical Engineer's Reference Book*, pp. 15-19 to 21 (11th ed. 1973).

[47] March 25, 1987 Memorandum and Order at 14-16.

torney General will prevail on the merits of his claim that the Board improperly declined to reopen the record.[48]

We also believe that the Attorney General has a difficult challenge in seeking to overturn the Board's judgment that a proper balance of the five lateness factors weighed against the movants. When reviewing a Board determination declining to admit a late-filed contention, we accord it wide latitude. We will not overturn its decision absent a showing of abuse of discretion.[49] We need not at this juncture finally determine whether the Board properly weighed all five factors in 10 C.F.R. 2.714. Indeed the parties are entitled to amplify their presentations in this regard in their briefs on appeal. For the present, we are satisfied that the Attorney General has not pointed to any glaring deficiencies in the Board's analyses so as to justify a conclusion of a strong likelihood that he will succeed on the merits.

Finally, SAPL complains that the Board improperly failed to require a "fully compliant" Safety Parameter Display System (SPDS) as a condition to issuance of the low-power license. Basically, an SPDS is designed to provide a concise display in the control room of all critical safety parameters. Although all the information available on the SPDS is displayed elsewhere in the control room as well, the SPDS provides control room operators with a central display of critical plant variables to aid them in rapidly and reliably determining the safety status of the plant.[50] The key purpose of the SPDS is to aid control room personnel during abnormal or emergency conditions.[51]

Supplement 1 of NUREG-0737 sets out various requirements for the SPDS. Among other things, it must display critical plant variables, be located in a place that is convenient to control room operators, be isolated from safety-related systems, and be designed to incorporate accepted human factors principles.[52] Supplement 1 to NUREG-0737 also provides that SPDS requirements be implemented on a schedule to be negotiated between a licensee or applicant and the NRC staff.[53] As far as Seabrook is concerned, the SPDS is not in total compliance with each of the requirements set out in the Supplement. To bring it into full compliance, the staff proposed a schedule to remedy identified deficiencies

---

[48] The Attorney General concedes that use of the one-third octave band is acceptable but argues that his measurements using the full octave band create enough uncertainty to justify evidentiary exploration. We disagree. There are no facts in dispute and the Board reasonably concluded that the applicants had satisfied applicable regulatory requirements.

[49] *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), ALAB-806, 21 NRC 1183, 1190 (1985).

[50] Eckenrode, fol. Tr. 822 at 2; Tr. 931. *See generally* LBP-87-10, 25 NRC at 197.

[51] *See* NUREG-0737, Clarification of TMI Action Plan Requirements (November 1980) at I.D.2-1; *id.*, Supplement 1 (December 1982) at 7.

[52] Eckenrode, fol. Tr. 822 at 2-3.

[53] *Id.* at 3.

which, in the main, would require completion of outstanding items by the end of the first refueling outage.[54]

During the course of the proceeding below, the Board decided that all such corrections could not be deferred until the first refueling outage. At the same time, it rejected SAPL's assertion that all items have to be corrected before a low-power license is issued. Instead, it mandated certain actions concerning three deficiencies before plant operations exceed five percent of rated power and found that, with such actions, the public will be adequately protected. The bases for the Board's conclusions are fully explained in its partial initial decision.[55] SAPL challenges the reasonableness of the Board's determination but fails to address the Board's specific findings. Instead, it continues to assert that NUREG-0737 requires that all elements of the SPDS be in place before any license is issued.

We disagree. Section 50.57(a)(1) provides generally that an operating license may be issued if construction of the facility has been substantially completed in accordance with statutory and regulatory requirements. Supplement 1, which sets out the requirements applicable to the SPDS, does not impose any fixed schedule for implementation of the SPDS. Rather, the schedule is left essentially to the staff's discretion. Contrary to SAPL's assertion, we find no requirement that all elements of the SPDS must be completed before low-power operation is authorized. Thus, SAPL has failed to satisfy its heavy burden of demonstrating that the Licensing Board's determinations concerning the SPDS are wrong.[56]

The foregoing conclusions do not mean that the intervenors' appeals from the March 25 partial initial decision are necessarily doomed to failure. To begin with, even on the issues raised in the stay applications, it is possible that a full briefing will persuade us that the intervenors should prevail. All that we now decide is that the stay papers do not themselves demonstrate the requisite high probability of such success. Moreover, we do not consider on a stay application any possible Licensing Board error not asserted by the movants. Presumably, the intervenors will advance in their appellate briefs claims of error that, perhaps because of the ten-page limit imposed by 10 C.F.R. 2.788(b), were not included in their stay applications.

---

[54] *Id.* at 4-5. *See also* Safety Evaluation Report Related to the Operation of Seabrook Station Units 1 and 2, Supplement No. 6 (October 1986) at 18-5 to 18-6.

[55] *See* LBP-87-10, 25 NRC at 183-87, 199-205.

[56] SAPL also alleges that the Board erred in failing to direct the staff to produce a witness who would explain why an earlier schedule agreed to by the applicants had not been enforced. Although testimony by such a witness may have a bearing on the reasonableness of the schedule ultimately established, and the safety implications, if any, of such schedule, it would not affect our rejection of SAPL's argument that NUREG-0737 requires a "fully compliant" SPDS before a low-power license may be issued. Thus, it does not bear on our disposition of SAPL's stay request. SAPL, of course, is entitled to particularize its objection to the reasonableness of the Board's decision as part of its appeal on the merits.

C. Harm to Other Parties

The applicants argue generally that the loss of the ability to conduct low-power testing at the earliest time possible constitutes a genuine deprivation. Relying on an affidavit by his consultant, Dale G. Bridenbaugh, the Attorney General contends that low-power testing requires only three to four months and that there is little or no advantage to such testing where, as here, there is likely to be a lengthy delay between completion of such testing and the commencement of full-power operation. Indeed, in Mr. Bridenbaugh's view, "the initial operating phase at a new nuclear unit can be most efficiently performed if a smooth transition is made from fuel loading to low power operation and on to the power testing above 5%."[57]

The Commission has indicated that the primary benefit of prompt low-power testing is "the early discovery and correction of unforeseen but possible problems which may prevent or delay full-power operation at an enormous expense to [the utility] and/or its customers."[58] In the typical case, we would be inclined to weigh this factor in an applicant's favor. In this instance, however, all issues related to a low-power license were litigated in 1983, yet the Licensing Board did not issue its decision for almost four years. Had it issued its decision in a more timely fashion, appellate review of pertinent issues would undoubtedly have long been concluded, obviating any stay request. At oral argument, counsel for the applicants pointed out that financial difficulties led to a temporary halt in the Seabrook project and, as a consequence, the applicants did not press the Board to move promptly to resolve the pending matters.[59] Thus, the applicants bear some responsibility for the urgency they now attach to the need for immediate low-power testing. Although we do not question the reasonableness or necessity of the applicants' decision not to have urged earlier resolution of issues related to the low-power license, we find that any harm to the applicants would be to some extent attributable to their own inaction.

D. Public Interest

The Coalition asserts that the issues raised are important and novel and that the "balance of equities" favors issuance of a stay to preserve the status quo "pending a decision on the full power license or further review."[60] The

---

[57] Attorney General's Motion for Stay, Exhibit 1 at 4.

[58] CLI-85-12, 21 NRC at 1590.

[59] App. Tr. 194-95 ("Nobody was pushing that Board for a decision at that point. Certainly I was not."). It was not until June 1986 that the applicants tendered a motion requesting issuance of a low-power license. *See* Applicants' Motion for Incorporation of Certain Materials in Record; for Closing of Record; and for Issuance of Partial Initial Decision Authorizing Issuance of Operating License for Operation Not in Excess of 5% of Rated Power (June 17, 1986).

[60] Coalition Motion for Stay at 10.

other movants raise similar arguments. The applicants contest the movants' assertions and claim, instead, that there is an affirmative public interest in testing the readiness of the plant for operation as quickly as possible. The NRC staff believes that the Commission recently addressed the public interest issue implicitly when it decided in CLI-87-2 to stay issuance of a low-power license pending the submission of emergency plans for Massachusetts.[61] The staff urges us to await the Commission's resolution of the applicants' motion to vacate that stay before reaching any overall public interest conclusions.

We have decided not to defer ruling on the public interest question until the Commission completes its review of issues raised in CLI-87-2. The staff argues that, if the Commission lifts the stay, we should be governed by its judgment that the public interest favors issuance of a low-power license. But the Commission's determination will be limited to the single issue concerning the filing of an emergency plan for Massachusetts. It will not represent a judgment on the overall balance of public interest considerations. Thus, we see no reason to delay disposition of the stay requests before us.

Turning therefore to the merits, we note that the Commission in the *Shoreham* case provided an analysis of the public interest costs and benefits of low-power testing in circumstances where it is unclear whether full-power operation will ever be authorized. The Commission observed:

> So long as an applicant is willing to invest the substantial effort and money necessary to attempt to obtain a full-power license, the possibility of full-power operation at a future date gives substantial value to low-power testing. Moreover, whenever a low-power motion has been filed where full-power issues are also pending (a common occurrence), there is always uncertainty over the outcome of the full-power proceeding. Delaying the low-power license until that uncertainty is eliminated irretrievably deprives the applicant and its customers of the substantial benefits of early low-power testing.[62]

The Commission observed that section 50.57(c) of its regulations, authorizing the issuance of a low-power license, is premised on the idea that "the inherent benefits of early low-power testing outweigh the uncertainty that a full-power license may be denied."[63] We are bound by that determination absent, at least, some demonstration that circumstances unique to Seabrook warrant a different result.[64] There has been no such demonstration.

---

[61] *See* 25 NRC 267.

[62] *See* CLI-85-12, 21 NRC at 1590.

[63] *Id.* at 1591.

[64] The Court of Appeals in *Shoreham* was of the view that the public interest did not either strongly favor or disfavor the grant of a stay. *See Cuomo*, 772 F.2d at 978. Significantly, the court did not conclude that the public interest required a maintenance of the status quo.

The applications for stay of LBP-87-10 are *denied*.
It is so ORDERED.

FOR THE APPEAL BOARD

Barbara A. Tompkins
Secretary to the
Appeal Board

Atomic Safety and Licensing Boards Issuances

LICENSING BOARDS

ATOMIC SAFETY AND LICENSING BOARD PANEL

B. Paul Cotter, **Chairman*
Robert M. Lazo, **Vice Chairman (Executive)*
Frederick J. Shon, **Vice Chairman (Technical)*

Members

Dr. George C. Anderson
Charles Bechhoefer*
Peter B. Bloch*
Glenn O. Bright*
Dr. A. Dixon Callihan
James H. Carpenter*
Hugh K. Clark
Dr. Richard F. Cole*
Dr. Michael A. Duggan
Dr. George A. Ferguson
Dr. Harry Foreman
Richard F. Foster
John H. Frye III*
James P. Gleason
Herbert Grossman*
Dr. Cadet H. Hand, Jr.
Jerry Harbour*
Dr. David L. Hetrick
Ernest E. Hill
Dr. Frank F. Hooper
Helen F. Hoyt*
Elizabeth B. Johnson
Dr. Walter H. Jordan
James L. Kelley*
Jerry R. Kline*
Dr. James C. Lamb III
Gustave A. Linenberger*
Dr. Linda W. Little
Dr. Emmeth A. Luebke*
Dr. Kenneth A. McCollom
Morton B. Margulies*
Gary L. Milhollin
Marshall E. Miller
Dr. Peter A. Morris*
Dr. Oscar H. Paris*
Dr. David R. Schink
Ivan W. Smith*
Dr. Martin J. Steindler
Dr. Quentin J. Stober
Seymour Wenner
Sheldon J. Wolfe*

**Permanent panel members*

Cite as 25 NRC 449 (1987) LBP-87-13

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Herbert Grossman, Chairman
Richard F. Cole
A. Dixon Callihan

In the Matter of **Docket Nos. 50-456-OL**
50-457-OL
(ASLBP No. 79-410-03-OL)

COMMONWEALTH EDISON
COMPANY
(Braidwood Nuclear Power Station,
Units 1 and 2)

May 13, 1987

In this Partial Initial Decision, the Board rules on all outstanding emergency planning issues, finding in favor of the Applicant, provided that certain conditions are met concerning information to be provided to the public in Applicant's emergency planning booklet.

RULES OF PRACTICE: PROPOSED FINDINGS

When a board requires proposed findings to be filed, the failure of a party to file findings on an issue may be deemed a default by the party, and the board may refuse to rule on the issue.

EMERGENCY PLANNING

An applicant does not have to prove that every individual within the planning area will be covered by the emergency plan under every conceivable set of

circumstances. The Commission requires not perfection but rather prudent planning calculated to meet the needs of the affected population.

APPEARANCES

On behalf of the Applicant: **George L. Edgar, Esq., Thomas Schmutz, Esq.,** and **Donald J. Silverman, Esq.,** Newman & Holtzinger, P.C., 1615 L St., NW, Suite 1000, Washington, DC 20036.

On behalf of the Nuclear Regulatory Commission Staff: **Stuart Treby, Esq.,** and **Elaine I. Chan, Esq.,** U.S. Nuclear Regulatory Commission, 7335 Old Georgetown Rd., Bethesda, MD 20014.

H. Joseph Flynn, Esq., Federal Emergency Management Agency, Washington, DC.

On behalf of the Intervenor: **Ms. Bridget Little Rorem,** 117 North Linden St., P.O. Box 208, Essex, IL 60935.

PARTIAL INITIAL DECISION ON EMERGENCY PLANNING ISSUES

In this Partial Initial Decision, the Board resolves all outstanding issues concerning offsite emergency planning favorably to the Applicant, Commonwealth Edison Company (CECo), subject to the condition that certain information specified by the Board be included in the next annual revision of Applicant's emergency information booklet.

PROCEDURAL HISTORY

As finally refined for hearing, Intervenor Bridget Little Rorem's single, two-part[1] contention concerning emergency planning stated:

> 1. Intervenor contends that an adequate emergency plan for the Braidwood Station should include the following:

[1] A third part of the original contention, 1(c), was dismissed by the Board. Prehearing Conference Order, August 1, 1985 (unpublished), at 2-3.

(a) a program for informing the public within 10 miles of the Station of the means for obtaining instructions for evacuation or other protective measures in the event of a radiological emergency originating at the station;

(b) assurance that institutions within 10 miles of the Station, such as nursing homes, can be evacuated or adequately protected in the event of a radiological emergency.

In August of 1985, Applicant moved to particularize the first part of this contention (referred to as Contention 1(a)), pointing out that the language could be construed as referring to a public information program to be implemented prior to an accident; or to notification of the public at the time of an accident; or to both. A period of negotiations among the parties followed. When it became apparent that a stipulated particularization of Contention 1(a) could not be agreed upon, Applicant renewed its motion.

By Memorandum and Order dated October 18, 1985 (unpublished), the Board restricted Contention 1(a) to preaccident public education programs only. However, taking into account Intervenor's unfamiliarity with legal requirements concerning the full disclosure of her case, the Board made its ruling expressly subject to reconsideration if Ms. Rorem could present significant issues concerning public information programs other than at the preaccident stage. Ms. Rorem timely filed her request for reconsideration in the form of an offer of proof encompassing seven specific issues which were denominated Offer of Proof Issues 2-8.

When it became clear that Intervenor was unfamiliar with much of the factual background to these issues, as contained in Applicant's emergency plan, the Board directed the parties to embark on a schedule of filings and conferences aimed at resolving or clarifying the Offer of Proof issues for hearing. As a result of those efforts, Intervenor withdrew Offer of Proof issues 5, 7, and 8, and the remaining four issues were much more specifically defined and focused. By Memorandum and Order dated January 31, 1986 (unpublished), the Board accepted Offer of Proof Issues 2, 3, 4, and 6 for litigation.

Hearings on emergency planning issues were held on October 29, 1985, and March 11 and 12, 1986. The record was closed at the end of the third day's session. At the October 29, 1985 hearing, Applicant presented the testimony of Lawrence D. Butterfield, Jr. Mr. Butterfield is the manager of Applicant's Nuclear Technical Services Department; has been employed by Applicant for about 19 years; and has been involved in emergency planning for at least the last 6 years. Testimony of Lawrence D. Butterfield, Jr., Concerning Contention 1(a), ff. Tr. 465-B (hereafter Butterfield) and Supplemental Testimony of Lawrence D. Butterfield, Jr., on Rorem Contention 1(a), ff. Tr. 465-B (hereafter Butterfield Supp.). Staff presented the testimony of Gordon Wenger. Mr. Wenger is an Emergency Planning Specialist at FEMA Region V and has held that position for the last six years. He is the Federal Team Leader for Radiological Emergency

Preparedness Planning for Illinois and Indiana. Testimony of Gordon Wenger Regarding Rorem Contention 1(a), ff. Tr. 518 (hereafter Wenger, ff. Tr. 518).

At the hearings in March 1986, Applicant presented the joint testimony of Mr. Butterfield and Jana Fairow, the Radiological Emergency Planning Supervisor of the Illinois Emergency Services and Disaster Agency. Ms. Fairow is responsible for developing, maintaining, and supervising the Illinois Plan for Radiological Accidents (IPRA) for all seven nuclear power stations in Illinois. Testimony of Lawrence D. Butterfield, Jr., and Jana S. Fairow Regarding Contentions 1(a) and 1(b) (Emergency Planning), ff. Tr. 690 (hereafter Butterfield/Fairow). Staff presented additional testimony by Mr. Wenger (hereafter Wenger, ff. Tr. 931). Intervenor sponsored no witnesses of her own, electing to develop her case through cross-examination.

Proposed findings on all issues were filed by the Applicant and Staff. Intervenor submitted findings only on Contention 1(a) and Offer of Proof Issue 2. Applicant, supported by the Staff, has moved for dismissal of Contention 1(b) and Offer of Proof Issues 3, 4, and 6.

RULING ON CONTENTION 1(b) AND OFFER OF PROOF ISSUES 3, 4, AND 6

At the close of the prehearing conference conducted on July 23, 1985, the Board advised the parties that

> Proposed findings pursuant to 10 C.F.R. section 2.754 are indeed required by this Board, and . . . failure to file proposed findings is a default on any issue.

Tr. 272. Again, at the close of the hearings on March 12, 1986, at the urging of the Staff, we reminded the parties of their obligation to file such findings, and we specifically put Intervenor on notice that a failure to do so would result in penalties. Tr. 1055.

As indicated in our discussion above of the procedural background to the adoption of the pending emergency planning issues, the Board has been fully aware of the difficulties faced by a *pro se* intervenor not fully conversant with our proceedings. We have endeavored to assure that Ms. Rorem has been advised of her obligations and has had ample opportunity to comply with them. In light of our repeated instructions concerning the filing of proposed findings, we must assume that Intervenor intentionally omitted findings on Contention 1(b) and Offer of Proof Issues 3, 4, and 6, and that those issues have now been abandoned. Under such circumstances, the Commission's *Statement of Policy on Conduct of Licensing Proceedings*, CLI-81-8, 13 NRC 452, 457 (1981), authorizes us to refuse to rule on the abandoned issues, and 10 C.F.R. § 2.754(b)

permits a finding that on those issues Intervenor is in default. Accordingly, we hold that Contention 1(b) and Offer of Proof Issues 3, 4, and 6 need not be further considered by this Board, and Applicant's motion to dismiss those issues is *granted*.

STANDARD FOR DECISION

Applicant has the burden of proving that its offsite emergency plan complies with the Commission's rules and guidance. *Consumers Power Co.* (Big Rock Point Plant), LBP-82-77, 16 NRC 1096 (1982). The regulations governing emergency planning are set forth in 10 C.F.R. § 50.47 and 10 C.F.R. Part 50, Appendix E. Guidance for compliance with those rules is contained in NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (November 1980). Applicant does not have to prove that every individual within the planning area will be covered by the plan under every conceivable set of circumstances. *See Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), LBP-85-12, 21 NRC 644, 653 (1985). The Commission requires not perfection but rather prudent planning calculated to meet the needs of the affected population.

With this standard in mind, we consider the remaining issues requiring decision.

CONTENTION 1(a)

Contention 1(a), as restricted by the Board, focuses on the adequacy of Applicant's plans for informing the public within the Emergency Planning Zone (EPZ), *prior* to the occurrence of an accident, of the proper steps to be taken in the event of an emergency originating at the Braidwood Station. Reduced to a syllogism, Intervenor's case on this contention can be stated as follows:

> The only vehicle planned for the preaccident dissemination of information to the public within the EPZ is the booklet entitled "Emergency Information — Braidwood."[2] "Intervenor's Proposed Findings on Emergency Planning Issues," Finding 1.[3] The booklet is inadequate because (a) it is inaccessible to those who are illiterate or visually impaired (*id.*, Finding 2); (b) it does not address the nature of the danger of a

---

[2] Applicant's Emergency Planning Exhibit No. 1, admitted at Tr. 465-B, referred to hereafter as "the booklet," and cited as "Booklet at ___"

[3] Intervenor filed 13 proposed findings numbered 1 through 12, with two findings numbered "9." The first Finding 9 relates to Contention 1(a); the second to Offer of Proof Issue 2.

radiological accident (*id.*, Finding 3); (c) it does not provide adequate information concerning the nature of a radioactive plume (*id.*, Findings 4-7); (d) it contains misleading language concerning the provision of information and instructions over the radio in the event of a sounding of the Public Notification System sirens (*id.*, Finding 8); and (e) the plan for its distribution does not cover all possible EPZ residents (*id.*, Finding 9). Therefore, Applicant's preaccident public information program is inadequate.

Our first observation is that Intervenor's major premise is overstated. Witnesses for both the Applicant and Staff testified that the overall public information program required by the Illinois Plan for Radiological Accidents includes provision for annual press briefings and the posting of signs giving information concerning the appropriate Emergency Broadcast Frequencies to be tuned to in the event of a sounding of sirens.[4] These additional elements of the program both supplement and draw attention to the material provided in the booklet. The booklet itself is not the only means for preaccident education of EPZ residents.

Nevertheless, the same witnesses make it clear that the booklet is the cornerstone of the public information program.[5] If it were seriously deficient, the program itself would almost certainly be inadequate as Intervenor asserts. The Board finds, however, that the booklet is adequate to meet the requirements of 10 C.F.R. § 50.47(b)(7).

Visually Impaired and Reading-Handicapped Adults

Intervenor questions whether individuals who are visually impaired or illiterate, and therefore unable to read the booklet directly, will receive the preaccident information they need. A number of provisions in the Applicant's plan for information dissemination suggest that they will; no evidence in the record indicates that they will not.

Applicant's program clearly does depend on some degree of cooperation among friends, relatives, and co-workers that is beyond CECo's ability to control but there is nothing in the record to suggest such reliance is unreasonable. Mr. Butterfield testified that he expected neighbors and members of the same household would share the information contained in the booklet with others needing help. Tr. 478, 482. The preface to the booklet itself encourages members of households to share and discuss the information provided, and also encourages employers to advise their employees of its contents. Booklet at 3. The distribution plan for the booklet calls for multiple copies to be delivered an-

---

[4] Butterfield Supp. at 5-A to 6-A; Wenger, ff. Tr. 518, at 7.

[5] *See, e.g.*, Butterfield at 7-8.

nually to major employers, schools, health care facilities, and senior citizen centers. Butterfield at 13.

We find that these measures provide reasonable assurance that EPZ residents who are visually impaired or reading handicapped will receive adequate preaccident information concerning measures to be taken in the event of a radiological emergency at Braidwood.

Explanation of the Danger of a Radiological Accident

Section 7 of the booklet explains that waste products resulting from the production of energy by a nuclear power plant "could be hazardous and must be kept sealed away from the environment." Booklet at 14. If they were to escape the plant's containment, they would emit radiation into the environment. *Ibid.*

Section 8 warns that "scientists believe that any amount of radiation, no matter how small, carries some risk" and "very large radiation doses . . . may be directly harmful or even deadly." If a nuclear plant accident were serious, it advises, "state plans call for protection of the public by taking shelter indoors or by evacuation." Booklet at 15.

We find this to be a reasonably balanced discussion of the danger of radiation resulting from an accident. Mr. Wenger testified that the information provided was sufficient to meet the requirements of NUREG-0654. Wenger, ff. Tr. 518, at 3. We agree.

Information Concerning a Radioactive Plume

At the hearing on March 12, 1986, Mr. Butterfield testified that he had developed language concerning the potential for radioactivity to move off site in the form of a plume or cloud, and that he proposed to include this information in the final paragraph of § 8 of the booklet. Tr. 1026-27. In her proposed findings, Ms. Rorem asserts that this information is so important that it ought to have a paragraph of its own (Finding 5); that it should be cross-referenced to other sections (Finding 7) and that additional information describing the physical characteristics of the plume should be added (Finding 6).

The Board strongly agrees that inclusion in the booklet of more complete information concerning the nature and movement of a radioactive plume is essential, and will serve to maximize the likelihood of public compliance with emergency instructions. For example, despite the fact that § 8 of the booklet warns that radiation is "invisible, silent, tasteless and odorless," the terms "plume" and "cloud" ordinarily connote visible phenomena. It is conceivable, therefore, that some individuals considering disregarding evacuation instructions (such as parents with children in nearby schools or recreation areas) (*see*

Tr. 1016) might be tempted to do so by the absence of any sign of a "radiation cloud."

Mr. Butterfield testified that plume movement is dependent on wind direction and that weather is the primary factor in deciding upon appropriate evacuation routes. Tr. 488-89. Unless this nexus is explained in the booklet, logically selected routes may appear totally irrational to the members of the public expected to abide by them. Some reference to the manner in which evacuation routes are chosen should be included in § 3 of the booklet where evacuation instructions are given.

Applicant has committed to include in the next revision of the booklet additional information concerning the potential for movement of radiation in the form of a cloud or plume and the importance of wind direction in determining that movement. Tr. 1026-27. The Board will require as a condition to its ruling on this issue that Applicant abide by that commitment; that additional language be included to explain the possible characteristics of the plume; and that information about the relationship between weather and evacuation routes be included specifically in the section of the booklet dealing with evacuation (currently § 3).

Misleading Language Concerning Emergency Broadcasts

In her Finding 8, Intervenor argues that because Mr. Wenger testified that there would be no case in which the Public Notification System sirens would be sounded without followup information being broadcast over the Emergency Broadcast System (EBS) (Tr. 536), the statement in § 1 of the booklet that instructions will be broadcast "if there is a real call for concern" is misleading. In the context of the full line of questioning in which this comment occurs, however, it appears that Mr. Wenger is talking about a deliberate initiation of the sirens in response to an occurrence that might require emergency action (*see, e.g.* Tr. 533). The "real call for concern" language, on the other hand, when read in the context of the entire § 1 of the booklet, seems intended to differentiate between an emergency activation of the system and a test or other nonemergency sounding. Since only activation of the system for a genuine emergency would be a "real call for concern," and only such emergency siren soundings would be accompanied by information broadcast over EBS stations, the booklet is not misleading.

In fact, the real problem with the language complained of by Intervenor is that it is accurate. If sirens are activated deliberately for test purposes or inadvertently because of human error or equipment malfunction, no information will necessarily be broadcast over EBS stations because there is no "real call for concern." This is unfortunate. The Public Notification System is intended to convey a sense of emergency. Such a message necessarily creates

anxiety. The public deserves relief from that anxiety, when possible, just as it deserves assistance when the emergency is real. Moreover, repeated soundings without followup might well have a "cry wolf" effect, eventually diminishing the effectiveness of the system.

Nevertheless, because the system is the responsibility of the State of Illinois and not the Applicant, and because there is no basis in the record for our concluding that the information dissemination policy as presented is contrary to Commission regulations or otherwise inimical to safety, we can order no change. We do, though, strongly urge the Applicant as a user of the system to seek to modify that policy.

Distribution of the Booklet

Despite extensive cross-examination on this issue, Intervenor identified only one situation in which an individual might not receive a mail-distributed booklet: if the owner of a property were subletting, and still paying the electric bill, and were having all mail to the property forwarded, and were not disposed to advise the subtenant of the booklet, then the subtenant might never receive a copy. Tr. 512-13. This unlikely possibility becomes even more implausible when the person's opportunity to obtain the booklet through his or her employer, school, or health care facility is taken into account. Butterfield at 13. We find that the Applicant's plan provides reasonable assurance that individuals within the EPZ will receive copies of the booklet.

OFFER OF PROOF ISSUE 2

As admitted for hearing, Offer of Proof Issue 2 reads:

> Applicant must develop and demonstrate its capability to provide through scripts and/or other media information, substantive emergency information to adequately inform the public of emergency information in the event of an accident at the Braidwood Station through all radio, TV or EBS stations in the ingestion pathway zone, so as to enable the public to effectively evacuate in the event of an emergency and to effectively re-enter the affected zone in the event of an emergency.

Intervenor's Proposed Findings 9-12[6] focus on the adequacy of warnings contained in the booklet and in pre-scripted broadcasts to deter individuals responsible for schoolchildren or persons in hospitals, nursing homes, or recreational areas from attempting to pick them up when instructions to evacuate are given. Ms. Fairow, on cross-examination, acknowledged that despite these

[6] This reference is to the second of the two findings numbered "9."

warnings, it was not unreasonable to assume that some parents might attempt to pick up their children at school or recreational areas. Tr. 851, 1016.

As we stated above, the Commission's regulations require the formulation of a plan providing *reasonable* assurance that appropriate protective measures can and will be taken in the event of a radiological emergency. They cannot and do not require contingencies to accommodate every conceivable set of circumstances. In this case, the warning language used in the booklet, and mimicked in the pre-scripted broadcasts, directs parents not to attempt to pick up their children; warns them that they will probably miss connections if they do try; and assures them that the children are being cared for by trained personnel. Booklet at 7. Intervenor suggests that the danger of noncompliance with instructions might be emphasized, but there is no record evidence that this approach would be more effective, and it is at least as plausible that an emphasis on danger would exacerbate parental fears and provoke irrational action.

Regardless, the language in question has been drafted by individuals experienced in emergency planning and has been found to be appropriate by FEMA (Wenger, ff. Tr. 580, at 3). We find no basis in the record for requiring that it be modified.

CONCLUSION

The Board concludes that with respect to all matters in controversy, the offsite emergency response plan for the Braidwood Station complies with the applicable provisions of 10 C.F.R. § 50.47 and 10 C.F.R. Part 50, Appendix E, and provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency; *provided*, that Applicant shall include in the next annual revision of its booklet, "Emergency Information — Braidwood" a discussion of (a) the physical characteristics of a radioactive plume; (b) the significance of wind speed and direction in the movement of the plume; and (c) the relationship between weather conditions and the selection of optimum evacuation routes, the latter topic to be covered in the section of the booklet dealing with evacuation.

Pursuant to 10 C.F.R. § 2.760 of the Commission's Rules of Practice, this Partial 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 Partial Initial Decision. Each appellant must file a brief supporting its position on appeal within thirty (30) days after filing its Notice of Appeal (forty (40) days if the Staff is the appellant). Within

thirty (30) days after the period has expired for the filing and service of the briefs of all appellants (forty (40) days in the case of the Staff), a party who is not an appellant may file a brief in support of or in opposition to 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

Herbert Grossman, Chairman
ADMINISTRATIVE JUDGE

Richard F. Cole
ADMINISTRATIVE JUDGE

A. Dixon Callihan
ADMINISTRATIVE JUDGE

Bethesda, Maryland,
May 13, 1987.

APPENDIX A

APPLICANT'S EXHIBIT LIST

Exhibit No.	Title	Marked for ID	Offered	Admitted
1	Emergency Information Brochure, Braidwood Station	465A	465A	465B
2	Testimony of Lawrence D. Butterfield, Jr., and Jana S. Fairow Regarding Contentions 1(a) and 1(b) (Emergency Planning)	683	689	690
3	Illinois Plan for Radiological Accidents (IPRA), Volume 1, State General Plan, Rev. 2, June 1985	683	693	693
4	IPRA, Volume VII, Preminary Rev. 0, August 1985	684	693	693
5	IPRA, Volume VII, Standard Operating Procedures, Preliminary Rev. 0, August 1985	684	693	693
6	Commonwealth Edison Co., Generating Stations Emergency Plan (GSEP), Rev. 5, July 1985	685	693	693
7	GSEP, Braidwood Annex, Rev. 0, October 1984	685	693	693
8	GSEP, Braidwood Annex, Rev. 1, March 1986	685	693	693

INTERVENOR'S EXHIBIT LIST

	NUREG-1026, "Braidwood Final Environmental Statement," June 1984, at 5-58 and Appendix F	750	Not offered Tr. 1058	

STAFF'S EXHIBIT LIST (None)

Cite as 25 NRC 461 (1987) LBP-87-14

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Herbert Grossman, Chairman
Dr. A. Dixon Callihan
Dr. Richard F. Cole

In the Matter of

Docket Nos. 50-456-OL
50-457-OL
(ASLBP No. 79-410-03-OL)

COMMONWEALTH EDISON COMPANY
(Braidwood Nuclear Power Station, Units 1 and 2)

May 19, 1987

In this Concluding Partial Initial Decision, the Board finds in favor of the Applicant with respect to a single remaining contention involving allegations of harassment and intimidation of quality control inspectors.

QUALITY ASSURANCE

The quality assurance process is no more immune from error than the underlying construction program. Quality assurance failures should be considered grounds for denial of an operating license only if they are so pervasive as to require a finding that there has been a breakdown in quality assurance procedures of such dimensions as to raise legitimate doubt as to the overall integrity of the facility and its safety-related components and structures.

QUALITY ASSURANCE

In considering whether or not quality assurance personnel are restrained in the performance of their duties by cost and schedule considerations, the question is not whether they are absolutely free from such considerations, but whether they have sufficient independence from cost and schedule when opposed to safety considerations.

APPEARANCES

On behalf of Applicant, Commonwealth Edison Company: **Michael I. Miller, Joseph Gallo, Elena Z. Kezelis, Phillip P. Steptoe III, Michael Gill, Peter Thornton, and Dean Issacs, Esquires.**

On behalf of the Nuclear Regulatory Commission: **Elaine I. Chan, Gregory Alan Berry, and Stuart Treby, Esquires.**

On behalf of Bridget Little Rorem, *et al.*: **Robert Guild, Douglas W. Cassell, Jr., and Timothy Wright, Esquires.**

TABLE OF CONTENTS

CONCLUDING PARTIAL INITIAL DECISION

I. INTRODUCTION AND PROCEDURAL HISTORY

Commonwealth Edison Company ("Applicant" or "CECo" or "Edison") is the Applicant for operating licenses for Braidwood Station, which is located at Braidwood, Illinois, approximately 60 miles southwest of Chicago. The Station consists of two Westinghouse pressurized water nuclear reactors, each designed to generate a net electrical output of approximately 1120 megawatts. Permits to construct the Station were issued in 1975.[1]

In December of 1978, the Commission published in the *Federal Register* (43 Fed. Reg. 58,659) a notice of opportunity for hearing in connection with the application for operating licenses for Braidwood Station. The notice provided that any person whose interest may be affected by this proceeding may file a petition to intervene. In response to that notice, petitions to intervene were filed by Bridget Little Rorem *et al.* and Bob Neiner Farms, Inc. The petitions and requests for hearing were granted with respect to certain contentions. The Neiner Farms' contentions were ultimately disposed of in August 1985; one was settled with the Board's approval, and the other was dismissed upon Applicant's motion for summary disposition.[2]

Hearings in the Braidwood proceeding dealt with two contentions sponsored by Ms. Rorem each involving a number of subissues. The first of these, Contention 1(a) concerned emergency planning and was the subject of our Partial Initial Decision issued May 13, 1987 (LBP-87-13, 25 NRC 449). The second,

---

[1] LBP-75-74, 2 NRC 972 (1975).

[2] Order Approving Settlement of Neiner Farms Contention 4 (Railroad Explosion), August 12, 1985 (unpublished); Order Granting Commonwealth Edison's Motion for Summary Disposition of Neiner Farms Contention 1, August 12, 1985 (unpublished).

Contention 2.C, deals with issues of harassment and intimidation of quality control inspectors, and is the subject of this Decision.

On March 8, 1985, long after the deadline for filing of contentions had passed, Intervenors filed a substantial, multipart contention alleging deficiencies in the Braidwood quality assurance (QA) program. In a Special Prehearing Conference Order dated April 17, 1985 (LBP-85-11, 21 NRC 609), the Board rejected the contention but granted Intervenors leave to file an amended version meeting certain stated requirements for specificity and basis.

An amended QA contention was submitted on May 24, 1985, and, except for two parts that were rejected outright and Part 2.C on which the Board deferred its ruling, the contention was admitted as revised.[3] Subsequently, Contention 2.C was also admitted by the Board pursuant to stipulation of the parties.[4]

In April of 1986, the Commission reversed the Board, ordering all of Intervenors' QA contentions except Part 2.C to be dismissed for failure to meet the late-filing requirements of 10 C.F.R. § 2.714(a)(1).[5] The Commission also held that § 2.714(a)(1) should have been applied to Contention 2.C, notwithstanding the parties' stipulation, and it returned the issue to the Board to perform the five-factor balancing test required by that section.[6] Upon remand, the Board found that those factors favored admission,[7] and Contention 2.C was admitted in the following form:

QC INSPECTOR HARASSMENT CONTENTION

> Contrary to Criterion I, "Organization" of 10 C.F.R. Part 50, Appendix B, and 10 C.F.R. Section 50.7, Commonwealth Edison Company and its electrical contractor, L.K. Comstock Engineering Company have failed to provide sufficient authority and organizational freedom and independence from cost and schedule as opposed to safety considerations to permit the effective identification of and correction of quality and safety significant deficiencies. Systematic and widespread harassment, intimidation, retaliation and other discrimination has [sic] been directed against Comstock QC inspectors and other employees who express safety and quality concerns by Comstock management. Such misconduct discourages the identification and correction of deficiencies in safety related components and systems at the Braidwood Station.
>
> Instances of harassment and intimidation include at least the following:
>
> 1. At various times since at least August 1984, including in March 1985, more than twenty-five (25) Comstock QC inspectors have complained to the NRC about harassment and intimidation by Comstock supervisors. Such harassment and intimidation has been carried

[3] Memorandum and Order Admitting Rorem *et al.* Amended Quality Assurance Contention, LBP-85-20, 21 NRC 1732 (1985).

[4] Prehearing Conference Order, August 1, 1985 (unpublished) (confirming rulings made July 28, 1985).

[5] CLI-86-8, 23 NRC 241 (1986).

[6] *Id.* at 250-51.

[7] Memorandum and Order (Admitting Harassment and Intimidation Issues on Five-Factor Balance), May 2, 1986 (unpublished).

out or participated in by QC Manager Irv DeWald, Assistant QC Manager Larry Seese, QA Manager Bob Seltmann and QC Supervisor R.M. Saklak.

Such harassment included widespread pressure to approve deficient work, to sacrifice quality for production and cost considerations and to knowingly violate established quality procedures. Harassment and retaliatory treatment included threats of violence, verbal abuse, termination of employment, transfer to undesirable jobs or work in areas where quality deficiencies could not be noted, assignments to perform burdensome or menial "special projects" and other adverse treatment. Such discriminatory action was taken because of the victim's expression of quality or safety concerns. Former Level II QC inspector John D. Seeders has knowledge of these widespread instances of harassment. By letter of August 17, 1984, Seeders complained to the NRC, Edison and Comstock management regarding instances of harassment directed against him. Subsequently, Mr. Seeders was involuntarily transferred to the position of Engineering Clerk in retaliation for his expression of quality concerns. Such assignment was intended by Comstock to keep Mr. Seeders away from sensitive work areas. Although QC Supervisor R.M. Saklak was finally terminated in 1985 for his mistreatment of QC inspectors and other misconduct, the effects of his harassment remain uncorrected and systematic harassment continues at Comstock to the present. The existence of widespread harassment impugns the integrity and effectiveness of on-going corrective action programs designed only to address other widespread QA failures at Comstock.

2. Comstock management, including QC Manager Irv DeWald and Corporate QA Manager Bob Marino harassed, discriminated and retaliated against, and ultimately terminated Level III QC Inspector Worley O. Puckett because Mr. Puckett made numerous complaints about safety and quality deficiencies which he identified in the course of his duties at Braidwood.

Mr. Puckett was hired by Comstock in May 1984 in the newly created position of Level III QC Inspector whose duties included conducting a review of Comstock procedures, tests requirements for the more than 50 Level II QC Inspectors, review of the Level II's inspection work, and the resolution of inspection disputes. Mr. Puckett was highly qualified with 20 years' nuclear Navy and nine years' nuclear power experience. *See*, Resume, Exhibit B. During the course of his employment with Comstock Mr. Puckett was shocked by the widespread deficiencies in procedures, qualifications and workmanship. He identified numerous instances of improper construction procedures, improper qualification of welders, and material traceability deficiencies. He ultimately recommended a complete stop work order for all welding activity to permit effective corrective action. *See*, Memos of August 10 and August 17, 1984, Exhibits C and D.

Finally, he warned QC Manager Irv DeWald that "we are approaching a complete breakdown in our QC program." August 22, 1984 Memo, Exhibit E. Puckett was subjected to harassment and retaliation because he raised these safety and quality concerns and was terminated on August 27, 1984 by DeWald on the pretext that he should have scored higher than his 86% on a qualification test. He filed a complaint with the U.S. Department of Labor, alleging violation of the employee protection provisions of the Energy Reorganization Act, 42 USC 5851. Letter, September 5, 1984, Exhibit F. The U.S. Department of Labor Area Director sustained Mr. Puckett's complaint finding unlawful discrimination by Comstock against Puckett and ordered relief. Notes of Decision, November 6, 1984, Exhibit G. Mr. Puckett presented his case at a hearing before an Administrative Law Judge on Comstock's appeal. *See*, Complainants' Prehearing Exchange, Exhibit H. Comstock settled Mr. Puckett's claim before putting on its case. The terms of settlement are subject to a non-disclosure agreement between Comstock and Mr. Puckett.

The evidentiary hearings on Contention 2.C began on May 6, 1986, required almost 100 hearing days, and concluded on December 17, 1986. Sessions were conducted in Kankakee, Markham, Joliet, and Chicago, Illinois (all within 50 miles of the Braidwood Station). The oral testimony of some sixty witnesses occupies approximately 18,000 pages and the record includes over 500 exhibits.

II. LEGAL STANDARDS

The task of the Board is to determine, with respect to the issues placed in controversy in this proceeding, whether the Braidwood Station has been constructed and will be operated in conformity with the rules and regulations of the Commission; and whether there is reasonable assurance that the activities authorized by an operating license can be conducted without endangering the health and safety of the public. 10 C.F.R. § 50.57(a). This is not an enforcement action. We are not charged with meting out punishment for alleged past violations of Commission regulations. We are concerned with specific instances of improper conduct only insofar as they may influence the primary determination we must make — the present existence or not of a "reasonable assurance" of safety.

The Commission has long recognized that a major construction project such as a nuclear power plant cannot be completed free from error. *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343 (1983). That is why NRC regulations require the establishment and implementation of quality assurance programs designed to provide "adequate confidence that a structure, system, or component will perform satisfactorily in service." 10 C.F.R. Part 50, Appendix B. But the quality assurance program itself is a major undertaking involving large numbers of personnel making inspections, reporting findings, developing solutions to problems identified, and ensuring that those problems are corrected. This complex process is no more immune from error than the underlying construction program. As the Appeal Board has stated, "there inevitably will be some construction defects tied to quality assurance lapses," but such quality assurance failures should be considered grounds for denial of an operating license only if they are so pervasive as to require a finding that "there has been a breakdown in quality assurance procedures of sufficient dimensions to raise legitimate doubt as to the overall integrity of the facility and its safety-related structures and components." *See Callaway*, ALAB-740, *supra*, 18 NRC at 346.

In light of the foregoing, the Board will consider whether allegations of violations of Commission regulations raised by Contention 2.C have been proven, and if proven, whether they demonstrate a pervasive breakdown of the Applicant's quality assurance program such as to warrant denial of an operating

license, or whether notwithstanding such violations there is now reasonable assurance that the activities authorized by such a license can be conducted without endangering the public health and safety.

III. SUMMARY OF THE DECISION

The issue in the proceeding concerns the administration of quality assurance and quality control programs of one of the Applicant's contractors and the effect of those practices on the eventual safe operation of the Station. The Intervenors state that the Applicant is in violation of the provisions of 10 C.F.R. Part 50, Appendix B, Criterion I, and 10 C.F.R. § 50.7. These NRC regulations pertain to quality assurance criteria for nuclear power plants and employee protection, respectively. The allegations upon which these charges are based deal with both general and specific instances of harassment, intimidation, threats, and pressure to increase the quantity of inspections allegedly at the expense of inspection quality. In the nearly 100 days of evidentiary hearing, both sides of the story were told. Our findings can best be summarized by response to several questions which we believe thrust to the heart of the matter. With respect to Appendix B, the questions are:

1. Did the Commonwealth Edison Company intentionally and unreasonably pressure Comstock's quality control managers to increase inspection productivity?
2. As a result of this pressure, or for whatever reason, did Comstock quality control managers systematically engage in conduct intended to pressure quality control inspectors to overlook deficiencies and accept discrepant work?
3. Assuming production pressure was imposed, did the inspectors succumb to the pressure?

A fourth question brings us to the ultimate issue as to whether there was a sufficiently large breakdown in quality assurance procedures that there is no "reasonable assurance" provided that the safety systems at Braidwood will perform their functions and the public health and safety will be protected.

To each of the first three questions, we respond with a qualified no. The evidence indicates that there was production pressure, but it was not undue pressure and there was adequate justification which was related to the overall goal of a well-constructed and safe plant. We found considerable evidence that the inspectors even under production pressure would strongly resist any management attempts to circumvent procedures. In every instance, the Quality Control inspector's testimony regarding their overall approach to their job was consistent with their denial of any effect of management pressure on job performance. That is, each seemed conscientious, proud of his work and well

aware of the corporate and regulatory mechanisms that protect employees at nuclear power plants from unlawful production pressure or retaliation for raising safety concerns.

With respect to the fourth question, we find that there is reasonable assurance that the Braidwood plant has been properly constructed and can be operated without endangering the public health and safety. Our finding is buttressed by the results of two large and independent reinspection programs which statistically confirm the adequacy of the performance of Comstock's Quality Control inspectors and provide statistical backup to statements attesting to the ability of the Braidwood plant to operate safely.

Evidence concerning inspector transfers and terminations occupy a considerable portion of the record. While we found that certain of the actions of Comstock Quality Control management indicated poor judgment and a lack of appropriate communicative skills, there seemed to be at least the semblance of a reasonable justification for the actions discussed in the hearing. We find none of the indiscretions to be of sufficient severity to warrant license denial or a recommendation for civil penalty. We find no violation of 10 C.F.R. § 50.7. We find in favor of Applicant and authorize the Director of Nuclear Reactor Regulation to issue the requested licenses.

IV. ORGANIZATIONAL INDEPENDENCE

Under the Commission's regulations, an Applicant for an operating license bears the burden of proving that there is "reasonable assurance" that the nuclear facility for which a license is sought has been properly constructed and can be operated without endangering the public health and safety. 10 C.F.R. § 50.57. The Commission's regulations require all applicants to establish and carry out a quality assurance program designed to provide "adequate confidence" that those systems, structures, and components having safety-related functions "will perform satisfactorily in service." 10 C.F.R. Part 50, Appendix B (Introduction). Although an owner of a nuclear facility bears the ultimate responsibility that a quality assurance program is established and implemented, it "may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program." Part 50, Appendix B (Criterion I). The regulations also require that the persons performing quality assurance functions be able to perform their duties free from the pressure of cost and schedule. *Id.* Quality assurance functions include identifying and reporting quality problems; initiating, recommending, and providing solutions; and verifying that appropriate solutions are implemented. *Id.* To ensure that QA/QC individuals are not restrained improperly in the performance of their duties by cost and schedule considerations, Criterion I does not permit such

individuals to be supervised by those only concerned with cost and schedule matters. *Id.* The question is not whether the Applicant's quality assurance personnel are absolutely free from cost and schedule considerations, but whether they have "*sufficient* independence from cost and schedule *when opposed to safety considerations*." *Id.* (emphasis added).

Daniel Shamblin, Applicant's Construction Superintendent, administers the Comstock contract as well as those of the other major onsite contractors. He oversees the production, engineering, and quality departments in Comstock and other contractors. The issue of organizational independence arose in the hearing as a result of Mr. Shamblin's involvement with the Comstock Quality Control Department at Braidwood.

The oversight of Comstock Quality Control by CECo's construction superintendent is, according to Intervenors, contrary to the requirements of Criterion I. We disagree.

The contractor performing electrical construction at Braidwood is L.K. Comstock & Co., Inc. (LKC). In order to ensure organizational freedom and independence from cost and schedule concerns, the QA/QC functions are performed by Comstock Engineering, Inc. (Comstock), a corporation organized separately from and independent of the construction activities conducted by the Production Department of L.K Comstock & Co., Inc.

Neither Mr. DeWald, Comstock's Quality Control Manager, nor Mr. Seltmann, Comstock's QA Manager on site, report to Mr. Rolan, LKC's Project Manager and top onsite production person. Comstock's QA and QC managers report to Comstock's Regional Manager, QA/QC Services, who is located in Chicago. The Regional Manager reports to the head of Comstock Engineering, Inc. Seltmann, ff. Tr. 1960, at 4; DeWald, ff. Tr. 1700, at 3; Shamblin, ff. Tr. 16,274, at 6; Int. Exhs. 4, 7. None of these individuals is subordinate to, or directed by, anyone on the "production" side. Comstock's Quality Control Department is responsible for identifying and reporting conditions adverse to quality and is also responsible for verifying that such conditions have been corrected. Shamblin, ff. Tr. 16,274, Attach. 4. These responsibilities have never been delegated to LKC *production* personnel.

Within the Comstock QA/QC organization at Braidwood, the chain of command is such that there exists the required "sufficient independence" from cost and schedule to provide comportment with the requirements of 10 C.F.R. Part 50, Appendix B. *See Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), ALAB-788, 20 NRC 1102, 1150 (1984).

CECo site QA and CECo corporate QA conduct audits of the contractor QC departments and also of Construction Superintendent Shamblin's department. CECo site QA does not report to Mr. Shamblin's department but to CECo corporate QA, which reports directly to Edison's Chairman and President. Shamblin, ff. Tr. 16,274, at 6.

Intervenors do not argue strongly that the QA/QC organizational structure is contrary to Appendix B but that Mr. Shamblin's instructions in June 1984 directing Mr. DeWald to report to him weekly on the activities of the Comstock Quality Control Department, and Mr. Shamblin's other actions, such as ratifying the Puckett termination and the Mr. Seeders transfer, and directing the investigation of the complaints by the twenty-four Comstock inspectors to the NRC, all added up, in Intervenors' view, to exercising day-to-day control over the performance of Comstock's quality control functions. Intervenors further allege that Mr. Shamblin took advantage of his position to apply regular and direct production pressure on Comstock Quality Control supervisors, who in turn transmitted those pressures to Quality Control inspectors in the field. They allege that this production pressure emphasized quantity of inspections over thoroughness and quality of inspections. We disagree.

While it is true that Mr. Shamblin took an active interest in the affairs of Comstock's Quality Control Department, neither Applicant nor Staff agree that his actions constitute a violation of Criterion I of Part 50, Appendix B. To ensure that the required freedom is maintained, an applicant is required to make sure that quality assurance personnel not be subordinate to construction or production personnel.

It is also true that Mr. Shamblin directed Mr. DeWald to report to him weekly on the status of certain activities within his jurisdiction. Mr. Shamblin's weekly status meetings with Mr. DeWald were a direct result of Applicant's commitment made to the NRC that its Project Construction Department would monitor Comstock's progress in eliminating the inspection backlog as well as its ability to perform the other responsibilities within its scope of work. The Board finds Mr. Shamblin's actions consistent with, not contrary to, regulatory requirements of Part 50, Appendix B (Criterion II). Shamblin, ff. Tr. 16,274, at 10, 15.

The elimination of the backlog was of great importance because an expanding volume of installed work of indeterminate quality was being created and because adverse quality trends in ongoing work might not be identified soon enough to be corrected in a timely fashion. *Id.* at 8-9. Mr. Shamblin took a number of steps to assist the Quality Control workforce in eliminating the backlog. With Mr. DeWald's assistance, he developed a list of inspection priorities and took measures to reduce the pressure on Comstock's Quality Control Department by reallocating and reducing its workload. He monitored quality by reviewing audits and by consulting with CECo QA to ensure that the quality of inspections remained high during the backlog reduction effort. *Id.* at 9-14, 20-21; Int. Exh. 7. As a result of the Comstock reduction effort, and with Mr. Shamblin's cooperation, the inspection backlog was eliminated in September 1984. Shamblin, ff. Tr. 16,274, at 16-17. There is no doubt that considerable pressure was put on Mr. DeWald by Mr. Shamblin, including the possibility of a

work shutdown if progress on reducing the backlog was not made. In the Board's opinion, this was a necessary action considering the potential consequences of not reducing the backlog. Consideration of this circumstance leads us to conclude that there was no unreasonable pressure on Comstock management or Quality Control inspectors nor is there any evidence in the record of any denial of the necessary resources to carry out the work. In fact, on more than one occasion, Applicant extended the target date for completion of the backlog and approved Comstock's request to hire additional inspectors. *Id.* at 15-17.

V. PRODUCTION PRESSURE, HARASSMENT, AND DISCRIMINATION

This section deals principally with four Comstock Quality Control inspectors chosen from the group to which at least passing reference has been made in these proceeedings. Their experiences are recounted in some detail in this section. They, Worley Puckett, John Seeders, Richard Martin, and Gregory Archambeault, have figured rather prominently in the contention and particularly in the hearing itself. We consider them to be representative of the dozen or so who did appear as witnesses and of the group of twice that many who publicly raised concerns about their employment. Reference is made, of course, to additional inspectors in the extent that it is fitting to discuss their interface with other principals of the case.

A. Worley O. Puckett

Intervenors contend that Level III Welding Inspector Worley O. Puckett was fired for raising numerous safety and quality complaints regarding Comstock's welding and weld inspection programs. Intervenors further contend that the alleged retaliatory dismissal operated to discourage other quality control inspectors from identifying and reporting safety concerns.

Applicant contends and NRC Staff agrees that Comstock had legitimate reason for firing Mr. Puckett. Based on the evidence in this record the Board agrees that while it may not have been the best course of action, a case has been made that justifies dismissing Mr. Puckett from his post as a Level III welding inspector. The Board further finds the firing has no implications as regards the safety of operation of the Braidwood plant.

Considerable hearing time was spent on the Puckett issue and each of Mr. Puckett's allegations was discussed. None of the allegations remain as safety issues. The items raised to the NRC by Mr. Puckett were either resolved

or determined not to be a violation of NRC regulations. Puckett, Tr. 6663; Schapker, ff. Tr. 10,954, at 5-45; Tr. 11,425; Appl. Exh. 51.

It is undisputed that Puckett identified quality problems and recommended that welding be stopped and that thereafter he was fired. The determination that must be made is whether he was fired because of those actions. The following is a summary of the main points surrounding the termination of Mr. Puckett.

Early in 1984, as a result of NRC concerns about their weld inspection program, Comstock corporate officials reviewed their Braidwood weld procedures and identified inconsistencies which required correction. Following that review, Comstock decided to hire a Level III welding inspector to resolve these problems. Level III is the highest level of certification attainable, and candidates must have considerable experience and expertise. DeWald, ff. Tr. 1700, at 41. The new inspector was to devote full time to the welding program, identify additional problems and correct them, and interpret procedures, codes, and contractual specifications. *Id.* at 40-41; Tr. 1763-64. Puckett was hired for this job on May 15, 1984. DeWald, ff. Tr. 1700, at 42. The evidence presented demonstrates that Mr. Puckett did quite well at identifying potential problems, but it was his reluctance or inability to correct them, and his limited ability to interpret codes and procedures that caused his fall from grace and ultimate dismissal.

On the surface it would appear that Mr. Puckett had the necessary credentials. His resume reflected that he had 20 years' experience as a welder in the nuclear navy and approximately 9 years in progressively responsible positions in the civilian nuclear industry. Int. Exh. 26. Comstock did not contact any of Mr. Puckett's previous supervisors to provide assurance that they were selecting the right man. Mr. Puckett's experience at the Zimmer Nuclear Plant is of some interest in an evaluation of Puckett's capabilities to run a welding program. Had Comstock taken the time to contact Mr. Puckett's supervisors at Zimmer it would have obtained information that cast considerable doubt as to Mr. Puckett's ability to interpret and apply correctly the AWS D1.1 Code, the applicable welding code at Braidwood. Kostal, ff. Tr. 12,881, at 4; Kurtz, ff. Tr. 12,881, at 6-9; Appl. Exhs. 43 through 47; Appl. Exh. 187 at 37, 101-05. DeWald, Tr. 1772. Manfred Goedecke, Mr. Puckett's supervisor at Zimmer, flatly stated that Mr. Puckett was not qualified for the position at Braidwood. Appl. Exh. 187 (Goedecke Deposition) at 103. In discussing Mr. Puckett's abilities, he stated that while his practical experience as a welder would unquestionably qualify Puckett to make judgmental calls of acceptance or rejection on visual examination of weldments, he was not qualified to perform the functions of a Level III Weld Inspector in that he was not able to make decisions on his own and did not have full knowledge of code requirements or the ability to interpret codes. *Id.* at 37, 102-05. Mr. Goedecke was brought in at Zimmer to manage the welding program which up to that time was being handled by Mr. Puckett as Chief Welding Engineer. Early on at Zimmer, Mr. Goedecke observed how Mr. Puckett ran the

welding department, and he appointed a task force which determined that all of the welding procedures had to be rewritten because none of them satisfied applicable code requirements. *Id.* at 33, 34, 41, 42. The NRC had identified serious deficiencies in the welding program at Zimmer during Puckett's tenure. In fact, Goedecke was brought in to resolve problems identified in an NRC survey that resulted in civil penalty. *Id.* at 32. For other comments on Puckett at Zimmer, see Shamblin, Tr. 16,338.

Mr. Puckett worked at Braidwood for 90 days. As with any newly hired quality control inspector, Mr. Puckett's initial task was to get certified in the discipline he would be inspecting. DeWald, Tr. 1651; Puckett, Tr. 6418-31. This entailed attending orientation lectures, attending classes relating to the welding inspection program, reviewing inspection procedures, receiving on-the-job training, and passing written and practical examinations. Mr. Puckett successfully completed everything except the practical exam. *Id.*; DeWald, ff. Tr. 1700, at 41; Tr. 1551; Puckett, Tr. 6421. He never became certified as a Level III inspector because he failed to pass the practical exam, which consisted of evaluating the quality of actual welds. Mr. Puckett took the required practical examination for Level III inspector at least three times. He apparently passed the exam once but it was invalidated because none of the items he inspected was rejectable. Puckett, Tr. 6428; DeWald, ff. Tr. 1700, at 44; Tr. 1673. Mr. Puckett claims to have taken an additional practical test administered in the field and graded by Joseph Hii, then a Level II welding inspector. Puckett, Tr. 6442-47. Mr. Hii denied knowledge of any such exam. Hii, ff. Tr. 16,608, at 7. Puckett was fired on August 27, 1984. The stated reason was poor performance on his certification tests. Puckett, Tr. 6455. This was, however, only part of the reason why Mr. Puckett was terminated.

During the course of his brief tenure at Braidwood, Mr. Puckett identified a number of problems and inconsistencies, or what he regarded as such, in the Comstock welding program. The majority of Mr. Puckett's concerns were not documented, but Mr. Puckett claims he mentioned them to Quality Control Manager Irving DeWald as he discovered them. Puckett, Tr. 5567, 5577, 5660, 6201-12, 6223. It is Applicant's position that the manner in which Mr. Puckett handled these concerns caused both Applicant and Comstock management to lose confidence in his ability to manage the welding program. Gieseker, ff. Tr. 2771, at 23, 24; Tr. 2867, 2895-96; DeWald, ff. Tr. 1700, at 50; Shamblin, ff. Tr. 16,274, at 32-34. We will discuss a few of these concerns because they serve as the real basis for firing Mr. Puckett. The A-36/A-446 issue will be discussed first since it is the issue that seems to be of prime significance.

1. Stop Work on Welding of A-36 Steel to A-446 Sheet Steel

On August 9, 1984, Mr. Puckett recommended that all welding of A-36 steel to A-446 sheet steel be stopped pending completion of a procedure qualification test. Mr. DeWald authorized the work stoppage. Appl. Exh. 52. Mr. Puckett had NCR 3099 issued to document the discrepancy. *Id.* Subsequent to the work stoppage, James Gieseker, a CECo electrical engineer with responsibility for working with Comstock's Quality Control Department, determined that the problem might be solved by revising the weld procedure. He reviewed the AWS Code D1.1-1975 and concluded that under ¶ 5.5.1.1, a Procedure Qualification Record ("PQR") which qualified the welding of A-500 steel to A-446 steel also qualified the welding of A-36 to A-446. Attachments H and O to Comstock Procedure 4.3.3 had qualified the welding of A-500 to A-446 but did not list A-36 as a qualified metal as required by the Comstock procedure. Mr. Gieseker concluded that all that was required to correct the problem was to revise the procedure attachments to include reference to the qualification of A-36 material. Gieseker, ff. Tr. 2771, at 2, 21-22; Tr. 2934.

Because Mr. Gieseker did not consider himself an expert on welding codes, he reviewed the matter with CECo QA and Sargent & Lundy. Both agreed with his interpretation. Mr. Gieseker arranged a meeting on August 22, 1984, to resolve the concerns documented in NCR 3099 so that the Stop-Work Order could be lifted. Gieseker, ff. Tr. 2771, at 22. Present were representatives of Comstock, CECo, and Sargent & Lundy. *Id.* Mr. Gieseker chaired the meeting and proposed his solution to the problem. Mr. Gieseker's position was consistent with that of Louden, an expert in welding metallurgy with Sargent & Lundy. All the other participants, including Mr. Puckett, agreed that the appropriate corrective action was to add A-36 to the applicable list of materials under Attachments H and O to the welding procedure. Mr. Louden indicated that while it would not be proper to list A-36 steel on the PQR, it would be appropriate and proper to add A-36 to the list of materials on the welding procedure because it was qualified through the A-500 to A-446 PQR. *Id.* at 21, 22; Louden, ff. Tr. 2984, at 3-4; Tr. 3040.

Mr. Puckett stated that he would agree with Mr. Gieseker's resolution if CECo were to put that resolution in writing. Mr. Gieseker agreed to do so and later that day issued a "speed memo" authorizing Comstock to continue welding A-36 and A-446 pending revision of Procedure 4.3.3 (Rev. C). Selmann, ff. Tr. 1960, at 19; Gieseker, Tr. 2912.

Although no testimony indicates that Mr. Puckett raised concern about Attachment O at the August 22, 1984 meeting, the ultimate disposition of NCR 3099, made the following day, appears to have taken account of it. The disposition concerned only Attachment H and lifted the Stop Work only on welds larger than 3/8 inch. Appl. Exh. 55. At the hearing, Puckett testified that

his true concern when he recommended that welding of A-36 and A-446 be stopped was that the revised Attachment O had not been approved by Sargent & Lundy, and therefore welds under 3/8 inch were not qualified. Puckett, Tr. 5463-64. That this was his main concern at the time of the Stop-Work Order does not appear to be borne out by the evidence. The two memos Mr. Puckett wrote concerning Stop Work on A-36/A-446 and NCR 3099 do not limit his concern to smaller welds but refer to *all* welding, and those who talked to Puckett about his concern did not understand it to be limited to smaller welds. The common understanding was that Puckett believed that it was improper to have qualified welding under the AWS D1.1 Code rather than AWS D1.3. Appl. Exh. 52, 53, 54; Louden, ff. Tr. 2984, at 5; Gieseker, ff. Tr. 2771, at 22; Tr. 2863, 2866-67; Simile, ff. Tr. 3305, at 8; Schapker, Tr. 10,962-67, 10,972, 10,979, 10,982, 11,311; Weil, ff. Tr. 11,948, at 7.

The record also indicates that Attachment O was an acceptable procedure at the time of the meeting. One of Puckett's first assignments at Braidwood was to review Sargent & Lundy's "status 2" comments to Comstock Welding Procedure 4.3.3 (Rev. C). Status 2 is a term used when a Sargent & Lundy evaluation is conditional but work using that procedure *with* the Sargent & Lundy condition is allowed. The conditionally approved procedure is accompanied by "Status 2 Comments." These comments accompany and become part of the procedure, and LKC has 30 days within which to revise the proposed revision to officially incorporate Sargent & Lundy's comments. Seltmann, ff. Tr. 1960, at 9-10. With respect to Comstock Procedure 4.3.3 (Rev. C), Sargent & Lundy determined, *inter alia*, that Attachments O1, O2, O3, and O4 to Attachment O needed to be revised because the procedure authorized the making of 1/8-inch welds in the field, but the test data set forth in Attachments O1 through O4 limited the minimum weld size to 3/8 inch. Sargent & Lundy gave Comstock 30 days, or until July 6, 1984, to act upon this comment. The responsibility for taking the necessary actions to address this comment was given to Mr. Puckett. DeWald, Tr. 1828. On July 5, 1984, Mr. Puckett resubmitted Attachment O to PTL for approval. The revised Attachment O indicates that it was approved by PTL on July 6, 1984. Puckett, Tr. 5368-69, 6717-18; Appl. Exh. 77.

On August 22, 1984, following the meeting, Mr. DeWald received from Mr. Puckett a memo that recommended that all welding, including A-36 to A-446, be stopped because Comstock was "dangerously approaching a complete breakdown" in its Quality Control Program. In this memo Mr. Puckett stated that procedures involving A-446 "were qualified using the cryteria [sic] of AWS D1.1-1975 and it should never have been done." The memo further stated that AWS D1.1 was never intended to be used to weld materials less than 1/8-inch thick and that "all of our procedures that involve A-446 should have been qualified using the cryteria [sic] of D1.3 which has a completely different set of test requirements and a completely different set of essential

varaibles [sic]." Appl. Exh. 56; DeWald, ff. Tr. 1700, at 49; Tr. 1751-52. Among other things, this memo made it clear to Mr. DeWald that Puckett had not understood the discussion at the meeting that day. In particular, Mr. Puckett had not understood that AWS D1.3 did not exist when work began at Braidwood and that Comstock followed AWS D1.1-1975 as allowed. DeWald, Tr. at 4950.

At the hearing, Mr. Puckett stated that he did not intend to imply that it was wrong for Comstock to use the AWS D1.1-1975 Code, only that it would be "better" to use the more recent AWS D1.3 Code. The AWS D1.3 Code did not exist prior to 1978. Louden, ff. Tr. 2984, at 5. The Comstock welding procedures are governed by Sargent & Lundy specifications which in turn were based on AWS D1.1-1975, the only appropriate code in existence when Sargent & Lundy developed the designs and specifications for Braidwood. Comstock's adherence to that code for the duration of the project was acceptable, since it is the contractor's option to adopt subsequent codes or to adhere to the code in effect when the original contract was issued. *Id.* In May 1984, Comstock considered using the AWS D1.3 Code but declined because welders would have had to be requalified under its requirements. DeWald, Tr. 1824-25. Also on August 1, 1984, the American Welding Society (AWS) issued an interpretation confirming that the code in effect at the time contractual agreement is reached is the applicable code. *Id.*; Board Exhs. 3, 4, and 5. Thus, to switch from the AWS D1.1-1975 to the AWS D1.3 would entail a substantial and needless expenditure of time and resources.

On August 23, at a meeting of the Procedure Review Board, Mr. Puckett reasserted his opinion that the A-36/A-446 weld combination had not been properly qualified. According to Mr. Gieseker and others who attended the meeting, Mr. Puckett acted as if the previous day's meeting had never taken place. This behavior caused Mr. Gieseker to lose even more confidence in Mr. Puckett's technical ability to manage the welding program. Gieseker, ff. Tr. 2771, at 23, 24; Tr. 2867, 2895-96.

A Stop-Work Order is appropriate where continued work would impair the ability of a safety-related system, structure, or component to perform satisfactorily in service. Based upon expert testimony, there was apparently no need for Mr. Puckett to recommend that welding of A-36 to A-446 be stopped. Louden, ff. Tr. 2984, at 8; Schapker Supplemental Testimony, ff. Tr. 10,960, at 3; Tr. 2906-07. Since the acceptability of the A-36/A-446 weld combination under AWS D1.1 was demonstrated, there was no threat to any safety system, structure, or component. It was a matter of having the Comstock welding procedure reflect what was already permitted under the umbrella welding specification — AWS D 1.1-1975. As the Level III Weld Inspector, it was Mr. Puckett's responsibility to evaluate the severity of procedural violations and recommend appropriate remedies. Recommending that work be stopped, thus idling hundreds of workers, pending a minor technical correction of a procedural violation that has

no adverse effect on the quality of the work being performed in the field is a remedy wholly disproportionate to the problem and is not a recommendation or judgment one reasonably is entitled to expect from someone reputed to be a welding and welding code expert.

2. Weld Rod Issue

On July 6, 1984, Mr. DeWald asked Mr. Puckett to review weld rod withdrawal slips for a certain time period to determine whether heat numbers were traceble to material receipt requests and to certification of filler metal. DeWald, ff. Tr. 1700, at 45-46; Puckett, Tr. 5594; Appl. Exh. 64. On August 15, Mr. Puckett documented his review in a memo. He found a violation of Comstock procedures by the clerk issuing the weld rods and stated that an NCR should be issued. Mr. Puckett made no attempt to issue an NCR nor did he take any steps to revise the relevant procedure to prevent repetition. Mr. DeWald regarded the issuance of a Nonconformance Report (NCR) and the resolution of the problem by revising the appropriate procedure to be Mr. Puckett's responsibility. DeWald, ff. Tr. 1700, at 46; Tr. 1721-23; Puckett, Tr. 5632-33; Appl. Exh. 65. Both of these steps were taken by Mr. Puckett's replacement after it was discovered that Puckett had not issued an NCR. DeWald, ff. Tr. 1700, at 46, 51; Simile, Tr. 3376-77, 3381.

3. Stop Work on Stainless Steel Welding

On August 10, 1984, the day after his Stop-Work recommendation on A-36/A-446 welding, Mr. Puckett recommended a Stop Work on all stainless steel welding because the weld procedure had not been qualified in all of the welding positions that could be used in the field. Simile, ff. Tr. 3305, Group Exh. 1 at 1. Comstock Procedure 4.3.14 governs stainless steel welding at Braidwood. The procedure was qualified in the "5G" position. Under the AWS D1.1 Code, qualification in the "5G" (fixed horizontal) position also qualifies a welder to weld in the "1G" (flat), "3G" (vertical), and "4G" (overhead) positions. It does not, however, qualify a welder to weld in the "2G" (horizontal) position. Not only did Mr. Puckett recommend that stainless steel welding in the "2G" position be stopped but that *all* stainless steel welding performed under Comstock Procedure 4.3.14 be stopped immediately. The day after he received this Stop-Work recommendation, Mr. DeWald sent Mr. Puckett a memorandum in which he expressed exasperation at Puckett's failure to offer a solution to the problems that had been brought to his attention. Int. Exh. 31 at 12. Mr. DeWald asked of Mr. Puckett: "What is your solution to the problem?" Mr. DeWald informed Mr. Puckett that it "is your responsibility to find these problems,

find solutions, and get them resolved." Mr. DeWald then issued the Stop-Work authorization. Simile, ff. Tr. 3305, Group Exh. 1 at 6, 14; Appl. Exh. 54.

4. Puckett's Termination

Needless to say, Mr. Puckett's recommendations to stop work did not make a favorable impression on CECo. Mr. DeWald, who actually issued the Stop-Work Order on the basis of Puckett's recommendation, was likely embarrassed to learn that the Stop-Work Order he issued was akin to junking a new car because it had a flat tire. Mr. Puckett was hired specifically to provide expert advice and judgments of this type. In light of this, Mr. DeWald's already shaky confidence in Mr. Puckett's expertise and judgment was further eroded. Imagine Mr. DeWald's reaction when later that day he received another memorandum from Mr. Puckett, this time recommending the stopping of all Comstock welding activities. In addition to reaffirming his position that AWS D1.1 was the wrong code and that AWS D1.3 should have been used, Mr. Puckett informed Mr. DeWald that there were so many "inconsistencies" in Comstock's other procedures that he was certain that their adequacy also would be considered "indeterminate." Appl. Exh. 56. Mr. Puckett neither identified the other procedures, explained in what respects they were indeterminate, nor suggested any way to remedy the "inconsistencies." It was this August 22 memo that made it apparent to Mr. DeWald that Mr. Puckett was not the knowledgeable practical problem solver he assumed him to be. It was apparent now that he had made a mistake in hiring Mr. Puckett as his Level III Weld Inspector. It was probably at this point, for what he perceived as good cause shown, Mr. DeWald decided to fire Mr. Puckett.

On Monday August 27, Mr. DeWald fired Mr. Puckett. The stated reason was poor performance on his certification tests. He did not tell Mr. Puckett that it was because he had lost confidence in his judgment and technical expertise. DeWald, Tr. 6454-61. Mr. Puckett was understandably suspect of the motive for his firing since he genuinely believed the issues he raised were important and significant. He took all his concerns about safety and quality to the NRC and his concern over his termination to the Department of Labor. NRC Inspector Jerome Schapker conducted a thorough investigation of each of Mr. Puckett's concerns and found only a single item of noncompliance with NRC requirements. Appl. Exh. 51. The single noncompliance involved minor clerical errors in Comstock's welder qualification records. These errors did not render the welder's qualifications indeterminate and thus had no adverse effect on the quality of the welds made by them in the field. In all other respects, Mr. Schapker found Comstock's welding program to be in compliance with regulatory and code requirements. In his testimony, Mr. Schapker found fault with Mr. Puckett not for raising quality concerns, but for failing to research

the problems adequately to determine whether they were safety significant and thus warranted stopping work. Mr. Schapker, like Mr. DeWald, believed that it was Mr. Puckett's responsibility to do a more thorough job in investigating his concerns. Schapker, Tr. 11,296.

The notion that Mr. Puckett was fired so that his allegations might be swept under the rug does not appear reasonable. His replacement, Anthony Simile, was immediately given a list of all of Mr. Puckett's allegations and was instructed to review the entire welding program to identify and resolve any problems. Simile, ff. Tr. 3305, at 9; Tr. 3358-59. Mr. Simile found that the welding procedures were adequate, but more cumbersome than necessary. He revised them by deleting unnecessary material and simplifying the presentation of necessary material. Simile, ff. Tr. 3305, at 11. He found that various discrepancies required the issuance and resolution of NCRs, and he supervised their resolution. NRC Inspector Schapker concluded that Comstock's management had addressed each and every one of Mr. Puckett's concerns and taken adequate corrective action where needed. Schapker, Tr. 11,425. Mr. Puckett testified that he knew of no instance where the safety of the Braidwood plant was compromised because of any problem he identified. Puckett, Tr. 6663.

It is the Board's conclusion that Comstock did not violate 10 C.F.R. § 50.7(a) in terminating Mr. Puckett but that he was terminated for legitimate reasons. Also, there is no evidence in the record to indicate that his firing had a "chilling effect" on the other inspectors in that they continued to bring quality concerns to the attention of NRC, CECo, and Comstock after Puckett's departure.

B. John Seeders, Richard Saklak, and Richard Snyder

John Seeders has been employed by Comstock at the Braidwood site since early August 1982.[8] His first position, as a Level I Quality Control Inspector for approximately 6 months, was followed by certification and promotion in early 1983 to a Level II Inspector and assignment to calibration. There he was responsible for the accuracy of tools, other measuring instruments, testing devices, and, at one time, of welding machines. A number of incidents occurred during his tenure, leading to an alleged verbal altercation between Mr. Seeders and his supervisor once removed, R.M. Saklak. The confrontation was witnessed by a number of Mr. Seeders' peers, including W.O. Puckett with whom he was in conversation. Puckett, Tr. 6238.

The outset of this interaction among Mr. Seeders and members of his management can be traced, in part, to an audit of the Comstock calibration

[8] Mr. Seeders had been discharged some months earlier by another Braidwood contractor for absenteeism. Seeders, Tr. 7293.

responsibilities by a member of the CECo Quality Assurance Department in May of 1984. (Appl. Exh. 83 (also known as Appl. Exh. 27); although this document was identified and discussed on the record, it was never offered into evidence.)

The audit disclosed the absence of a record of any examination and verification of inspections known to have been performed using tools or other instruments previously determined to have been out of calibration. Seltmann, ff. Tr. 1960, at 11.

Comstock procedures require close control and historical recording of each item of testing and measuring equipment. Appl. Exh. 24 at 1-2.

The receipt, storage, retention, and issuance of this equipment is the responsibility of the Comstock warehouseman. The calibration and recalibration is the function of an appropriate craftsman under observation by a Quality Control inspector who, in turn, shall retain all records identifying the status of each item to be subjected to the calibration-recalibration program. This Quality Control person shall verify adherence to the established recalibration schedule and the validity of inspections made by out-of-calibration and lost items. Appl. Exh. 24 at 2-4. In the present instance the Quality Control person is John Seeders.

As a consequence of the discovery, by the audit, of incomplete histories of calibrations and of their consequences, Mr. Seeders was directed by the Quality Control Manager to do a 100% review of the calibration files to establish the presence of additional irregularities in the administration of the equipment control procedures. A date for the completion of this review was established to conform to a schedule set in the CECo audit. DeWald, ff. Tr. 1700, at 35; Seltmann, ff. Tr. 1960, at 12.

Concurrently with the equipment record review, Larry Phillips, both Mr. Seeders' lead and the Quality Control inspector in receiving, was absent on personal matters, resulting in a shift of his receiving inspections to Mr. Seeders. Additionally, Mr. Seeders was a trainer of four potential inspectors — two in calibrations and two in receiving. Mr. Seeders considered the effort required in these several assignments to be beyond his capability, particularly when, on one occasion while in conversation with still another inspector, he was rebuked by Quality Control Supervisor Saklak, for what the latter deemed to be time wasting. These items, collectively and among others,[9] were construed by Mr. Seeders as harassment and intimidation and comprise the theme of a letter, Mr. Seeders

[9] In April 1984, shortly before the above occurrences, Comstock had inaugurated a salary scale for Level II inspectors whereby a base of $12 per hour was set. This sum was to be augmented by an additional 50 cents per hour for each certification, over one, earned by an individual. Additionally, a necessary increase in the number of well-qualified inspectors necessitated offering initial salaries greater than the above base with the excess to be "caught up" by certifications in additional disciplines. A result, at least temporary, was a lower wage for older employees. Further, the training of both new and advancing inspectors became the lot of older inspectors who allegedly became deprived of time and opportunity to seek additional certifications themselves.

to Mr. DeWald (QC Manager), dated August 17, 1984 (Int. Exh. 23). Mr. Seeders emphasized in his letter that "he maintain[ed] the highest level of professionalism" and that he "never did nor will falsify documentation for . . . any reason."

An investigation of the charges leveled by Mr. Seeders' August 17 letter at Comstock management was reported by Mr. DeWald on September 25, 1984 (DeWald, ff. Tr. 1700, at 37; *see also id.*, Attach. 2.C (DeWald-5)),[10] and documents a number of errors in the letter. Six, not thirty, Level II inspectors had left the Braidwood site since the establishment of the $12/hr wage scale. No disciplinary action had been threatened against reluctant trainers. The Seeders' statement, "[f]or . . . six months, we have been subjected to endless harassment and intimidation by . . . management to justify the incompetence and disregard for all company inspectors," may have arisen from Mr. Seeders' own experience with numerous (adverse) findings in calibration inspections.

One of the complaints voiced by Mr. Seeders in support of this claim of harassment was the assignment to him of inspection of received goods, added to calibrations, on the occasion of the absence of Phillips, the regularly assigned receiving inspector.

Joe Hii, the present Comstock vault supervisor charged with custody of all records, found Material Receipt Reports identifying thirteen shipments received at Braidwood during the interval August 8 through 17, 1984. Mr. Seeders' signature on each of the thirteen identified him as the responsible inspector. Hii, ff. Tr. 16,608, at 2-3; Tr. 16,610-13.

In response to a line of inquiry by Applicant's counsel, Mr. Seeders was indefinite in his recollection and estimation of the time required, within the 10-day period, to accomplish the inspection of the thirteen shipments he processed. He did opine, however, that each required less than 1 day (Seeders, Tr. 7400) and, in fact, testified that ½ to 1 hour sufficed for several. *Id.*, Tr. 7396 ff. It was noted that the usual inspection consisted of counting the number (the order of ten) of cartons or spools on a pallet or in an open-work crate (*id.*, Tr. 7399, 7412-13); also, the inspector was not required, nor even permitted, to physically handle any part of a shipment, such effort having been assigned to craftsmen (*id.*, Tr. 7407).

In summary, it becomes apparent that the assignment of receiving inspection could not have been burdensome to Mr. Seeders, certainly not a sufficient addition to his usual work to warrant a claim of harassment.

---

[10] It is noted that in at least two copies of the transcript DeWald Attach. 2.C (DeWald-5) in its entirety is incorrectly bound and even bound differently in those two transcripts. Specific reference here is made to only four pages of DeWald-5. The first is identified by Bates stamp 00002012, a Comstock memorandum dated 9-25-84 from DeWald to distribution, subject: "Review of J. Seeders Letter Dated 8-17-84," and is followed by three pages of "J. SEEDERS LETTER OF ACCUSATIONS AND CONCERNS," pages 1, 2, and 3 of 11, bearing Bates stamps 00002013, 14, and 15. A complete copy of the DeWald Report is Appl. Exh. 4 withdrawn at Tr. 2953.

An extended colloquy between Mr. Seeders and Applicant's counsel and Mr. Seeders and the Board (found at Tr. 7417-91) centered around Mr. Seeders' letter of August 17, 1984, alleging harassment. The preparation of the letter, on the evening of August 17, was triggered by a verbal clash between Mr. Seeders and Mr. Saklak, earlier that day, when Mr. Saklak accused Mr. Seeders of wasting time, also interpreted by Mr. Seeders as harassment, and by a formal Employee Warning issued by Mr. Seese, Assistant Quality Control Manager, and Mr. Saklak during the afternoon of that day. Seeders, Tr. 7421-22; Seese, ff. Tr. 2330, Attach. 2.C (Seese-3).

As a consequence of the results of an audit of instrument/tool calibrations, the Applicant had requested from Comstock, on July 3, 1984, certain information, by July 20, which required a review of all recent calibration-inspection reports. The review was assigned to Mr. Seeders. Inquiry on the status of the review was made of Mr. Seeders by Robert Seltmann, then a Comstock QA Engineer, on July 20 and again on July 23, only to learn that the task had not been completed. On August 14, a partial response to the review requested some 5 weeks earlier was available. Upon request by Mr. Seltmann, CECo granted extensions of each of several intermediate target dates established after it became evident that those expected dates would not be met. Mr. Seltmann's effort to comply with good business practices by frequent inquiry into progress of a program to which there had been commitment was characterized by Mr. Seeders as harassment. (*See* Seltmann Response to Allegations by Seeders in August 17, 1984 Letter. The response is a part of an attachment to Mr. DeWald's testimony, ff. Tr. 1700, Attach. 2.C (DeWald-5) supporting Seese's Employee Warning Record dated 8/17/84. The Seltmann statement, dated 8/20/84, bears Bates number 00002035.)

Additionally to the allegation by Mr. Seeders of his subjection to harassment and work overload, the record cites a history of the quality of his performance. Of many, one responsibility of the calibrations inspector is to initiate Inspection Correction Reports (ICRs) or Nonconformance Reports (NCRs) of instances of out-of-calibration measuring devices. Seltmann, ff. Tr. 1960, at 11-12.

As noted, *supra*, absence of reports of defects and of repairs to defective instruments previously reported demand an investigation and inspection, as necessary, of all items tested by a particular instrument during any period of uncertainty in its capabilities. Comstock Procedure 4.9.1, Rev. C, Appl. Exh. 24, ¶¶ 3.3.7 and 3.3.7.1.

The CECo audit, in progress both before and after the preparation of Mr. Seeders' letter of allegation, disclosed a number of deficiencies in the calibration inspection effort. The matter of use of out-of-calibration instruments had surfaced in May and persisted into September 1984, in spite of additional

training of Mr. Seeders the previous June.[11] Seltmann, ff. Tr. 1960, Attach. 2.C (Seltmann-3) Form 101.

The various audits and document reviews disclosed, as examples of procedural deficiencies, ICR/NCR documents listing eighty out-of-calibration torque wrenches, half of which had been reissued to the field without correction, some individual ones as many as twenty-five times. An additional ten wrenches were found to have been observed as faulty in the June-August 1984 period, yet were not so reported on an ICR. Seltmann, ff. Tr. 1960, Attach. 2.C (Seltmann-3).

These examples and other procedural violations, such as submitting reports on forms that Mr. Seeders had photocopied after entering information prior to an inspection (Seese,[12] ff. Tr. 2330, at 18), absences of calibration reports from files and incompletely prepared reports, all traceable to the time of Mr. Seeders' tenure, characterize the quality of his work.

The altercation between Mr. Saklak and Mr. Seeders occurred early in the August 17, 1984, work day and, in Mr. DeWald's absence, was immediately reported to Mr. Seese. Until late afternoon Mr. Seese investigated the occurrence through conversation with witnesses and with Mr. Seeders' supervisors, including a review of Mr. Seeders' recent performance. Finally, late in the day, Mr. Seese in the presence of Mr. Saklak and Mr. Seltmann, issued to Mr. Seeders an "Employee Warning" of possible future termination. The warning was not solely the result of the encounter with Mr. Saklak earlier that day. Seese, ff. Tr. 2330, Attach. 2.C (Seese-3) including Mr. Seese's report of the day's activities to DeWald dated August 20, 1984, the following work day. At the time of the "warning meeting," Mr. Seeders listed a number of complaints. During that evening he prepared the August 17 letter to Mr. DeWald.

Pursuant to a condition in the warning, Mr. Seeders' work performance was observed closely during the ensuing period while his management continued its investigation of the matter for several weeks, resulting in a report by Mr. DeWald. DeWald, ff. Tr. 1700, at 37 and Attach. 2.C (DeWald-5); *see also* Seltmann, ff. Tr. 1960, Attach. 2.C (Seltmann-3).

Persistence of procedural violations by Mr. Seeders into this post-warning period was disclosed during a September 1984 CECo audit (Seltmann, ff. Tr. 1960, Attach. 2.C (Seltmann-3)) including discovery of discrepancies which should have surfaced in Mr. Seeders' record review assigned to him in July. These cumulative infractions lead to a decision by Comstock management at a meeting

---

[11] Much was made in the hearing of the observation that the June training period was 10 minutes. At the time of this refresher, Seeders had been a qualified Level II calibration inspector for some 18 months, obviously preceded by training. The 10-minute session could not have been insufficient as Intervenor implies. Int. Fdg. 305; *see also* DeWald, Tr. 1600-04. The Board is forced to inquire of the time required to refer to two short paragraphs in Appl. Exh. 24 and/or to instruct an individual to prevent use of a faulty tool.

[12] Mr. Seese is Comstock's Assistant Quality Control Manager at Braidwood. During the absence of Mr. DeWald on August 17, 1984, Seese served as Quality Control Manager.

where NRC and Applicant's personnel were present (DeWald, ff. Tr. 1700, at 38) to transfer Mr. Seeders, within Comstock, to a position less demanding and with fewer responsibilities without financial and benefits penalty. Appl. Exh. 95. An alternate presented to Mr. Seeders for choice was termination. In early October 1984 he became a clerk in Comstock Engineering. He subsequently received a promotion to Assistant Field Engineer and a salary increase. He has been complimented on his work. There has been no indication of his management's dissatisfaction of a degree affecting his tenure. In hearing, however, Mr. Seeder maintained he was transferred out of Quality Control because of the content of his August 17, 1984 letter to Mr. DeWald. Seeders, Tr. 7490-91.

Also, the Intervenor would have the Board believe that the transfer of Mr. Seeders from Quality Control inspection was a revengeful act. Int. Fdg. 301. The preponderance of evidence on the Seeders incident, however, points to his failure to comply with prescribed procedures necessary to his assignment and his inattention to the details of his operations, including a disrespect for necessary schedules of accomplishments.

The Board recognizes Mr. Saklak's scurrilousness and his correspondingly characteristic manner with associates. It is also aware that such behavior contributed to his being done in at Comstock. DeWald, ff. Tr. 1700, at 26-27. Mr. Saklak exercised this temperamental behavior by affronting a number of inspectors (DeWald, ff. Tr. 1700, at 26), not only Mr. Seeders, as his manner of instilling his aggressiveness into his subordinates. His demeanor was widely known among the inspectors where it was received with varying gravity (*see*, as examples, Snyder/Seeders, Tr. 4020-21; Snyder, Tr. 4038, 4196-97; Rolan, Tr. 4653-58; Mustered, Tr. 4969, 4973-75; Holley, Tr. 5101-02; Hii, ff. Tr. 16,608, at 4-5; Tr. 16,638.

Intervenors' witness Mr. Saklak himself gives some insight into his behavior in his description of the Quality Control organization into which he was brought as Supervisor in mid-1982. In his observation, Quality Control lacked organization and control of its own activities. He characterized the office as a "zoo" and its behavior as "a party . . . eight hours a day, five days a week . . . ." Saklak, Tr. 8014. He believes the trek to the NRC inspectors by more than twenty Comstock Quality Control inspectors in March 1985, when the pressure to unionize them was high, was an effort to strengthen that organizational process. Saklak, Tr. 8059, 8070-71, 8175-78. There is additional support for this cause of the March meeting with the NRC. Hii, ff. Tr. 16,608, at 6.

Additionally, Mr. Saklak observed individual problems within the Quality Control organization involving alcohol and controlled substances, obvious absenteeism, and union-organization meetings during working hours. Saklak, Tr. 8085-86, 8178, 8213.

The Board perceives Mr. Saklak as an overindustrious employee of Comstock interested in production and, in his way, in a productive inspection program. Unfortunately, his experiences as a supervisor were marred by his short temperability and a domineering manner. His demeanor and his drive suited his earlier position in construction, supervising crafts, better than being in charge of a group of independent workers — the inspectors.

About a dozen present and former Comstock Quality Control inspectors, including those now working for Comstock's successor companies, testified before this Board on various items of employee relations, work conditions, etc. Some of these appearances are particularly noteworthy and are included in this Decision. One concerned John Seeders whose letter to Comstock management, claiming intimidation in the form of excessive demands on his time and capabilities and allegedly leading to his transfer out of Quality Control, has been discussed, *supra*.

A second instance centered on Richard Snyder, who succeeded John Seeders as calibration inspector (DeWald, Tr. 1617), and who in early March 1985 found a Comstock weld machine out of calibration. Although the procedure governing weld machines was under revision to eliminate reporting such deficiencies,[13] the revision had not then been officially effected. Consequently, Mr. Snyder and Mr. Nemeth, his lead, persisted in reporting the machine deficiency contrary to Mr. Saklak's instruction. Snyder, Tr. 4182-83, 4185, 4195. Mr. Snyder was supported by the QA Manager, Robert Seltmann, who ruled Saklak in error. *Id.*, Tr. 4186. Mr. Saklak, in temper, threatened Mr. Snyder with bodily harm. *Id.*, Tr. 4196. Although Mr. Saklak later apologized to Mr. Snyder, the latter reported the incident to the NRC early on March 29, 1985, which led to the massive audience of Comstock inspectors before the NRC later that day (*id.*, Tr. 4201), which, in turn, at least contributed to the termination of Mr. Saklak a few days later. Saklak, Tr. 8033; Snyder, Tr. 4270-71.

C. Gregory Archambeault

A third alleged instance of harassment concerned a Comstock Level II Quality Control inspector certified and assigned to cable pull. The inspector's name is Gregory Archambeault who appeared as a witness for the Intervenors. His concerns/complaints, though connected, can be placed in two categories — one having to do with work product and the second being personal. No item was found to be of great consequence.

Mr. Archambeault was employed at Braidwood in early January 1986. Within 5 months he had reported to the NRC on alleged frustrations experienced

[13] This alteration was justified by the practice of inspecting all welds. Snyder, Tr. 4187.

by Quality Control inspectors at Braidwood because of the "general attitude that quality problems are ignored . . ." by Comstock. Appl. *in camera* Exh. 125. Subsequently, the Witness prepared a detailed review of the inspection deficiencies on which he based his allegations. This document is identified as Int. Exh. 108, not admitted into this record, but utilized, essentially in its entirety, to guide his oral testimony. The assortment of alleged deficiencies and irregularities will now be reviewed briefly and their disposition indicated.

An area above the control and adjacent rooms where electrical circuitry is distributed is known as the upper cable spreading room. Archambeault, Tr. 12,231. Within the spreading room are hundreds of cables of which Mr. Archambeault identified fifty-six discrepancies (Simile, Tr. 16,243) including cable damage, cable bends too short (or tight), cable separations, cables not orderly in trays (not trained). Archambeault, Tr. 12,232. Had this situation occurred in first or primary inspection, an NCR or ICR would have been written. In the somewhat unusual situation here, however, where the installation had been turned over to and accepted by the Applicant, thereby placing the cables beyond the jurisdiction of Comstock inspectors (*id.*, Tr. 12,247, 12,581), both the inspector and his lead were uncertain of the procedure they should follow until the lead requested preparation of a memo to elicit guidance from a higher authority in Comstock. *Id.*, Tr. 12,578-79. That guidance, from Mr. Simile, Comstock's Quality Control supervisor, was to prepare a generic NCR demanding that all cables in the spreading room be reinspected, contrary to Mr. Archambeault's insistence that an NCR be prepared for each deficiency he had observed. *Id.*, Tr. 12,580. In this way possible damages in the area not detected by Mr. Archambeault would be found. Simile, Tr. 16,206. Further, since the Applicant had accepted the cables, the expense of the NCRs, either generic or singly, need not fall on Comstock. A remark by his lead to Mr. Archambeault was construed to mean that ensuring quality was overly expensive. Archambeault, Tr. 12,410. The Applicant, having reviewed the cable room, prepared the ultimate NCR, making Mr. Archambeault's moot and accounting for his impression that nothing had been done. Simile, Tr. 16,238. Further, the investigation of the cable spreading was continuing in October 1986. *Id.*, Tr. 16,247. This disposition is now satisfactory to Archambeault. Archambeault, Tr. 12,246.

Another complaint concerned the absence of cable-length markers, spread along the cable at 2-foot intervals to facilitate obtaining sections of proper length. On an occasion the markers were not consecutive, a defect in manufacture, although, apparently, after an interruption the markings resumed in the proper sequence. *Id.*, Tr. 12,514.[14] When asked by the craft for an action, Mr. Archambeault consulted his supervisor with the suggestion that the irregu-

[14] At the same transcript page, line 15, the Witness says differently.

larity be referred to Comstock Engineering per the Comstock Cable Installation (Work) Procedure 4.3.8, ¶ 3.5.1.1. Appl. Exh. 124. The Supervisor pointed out that inspectors did not "work to work procedures"[15] and directed continuation of the cable-cutting operation. Archambeault, Tr. 12,198-204. The footage-number mixup was not detrimental to the cable and its quality was not affected (*id.*, Tr. 12,538); it could affect cable accountability (*id.*, Tr. 12,540) and traceability in case defects arise (*id.*, Tr. 12,545). The Witness ascribed the remark by his supervisor as a disregard for procedures. In any case, the issue is not safety significant.

Mr. Archambeault learned from another inspector that a CECo craftsman had walked on cables and had disregarded the inspector's admonition not to do so. The craftsman was verbally disciplined not to repeat the occurrence. *Id.*, Tr. 12,679-81. This is hearsay repeated by the Witness.

In another instance, Mr. Archambeault was directed to assist in a cable pull urgently needed by the Applicant which required 2 to 3 hours. The task is known colloquially as a "hot pull." The direction came after he had completed some field work but before he had finished the necessary documentation. Consequently, the records were not completed until the following day, then in a satisfactory manner. The inspector considered this sequence to be a procedural violation (Proc. 4.8.8, ¶ 3.6 (Appl. Exh. 124)) and an instance of putting production ahead of inspection — quantity over quality. Archambeault, Tr. 12,287-88, 12,602-12. In this instance cited there were no safety consequences. *Id.*, Tr. 12,612.

Another concern related to the required separation among cables in air and/or in cable trays. Mr. Archambeault cited forty-two items he believed to be in nonconformance with the requirements of Cable Installation Procedure 4.3.8, ¶ 3.13.1, at 14. Appl. Exh. 123. Although it developed that the concern was unfounded, having arisen from a misinterpretation of the procedure and some inconsistency with Inspection Procedure 4.8.8, ¶ 3.5.4.1 (Appl. Exh. 124), Comstock supervision took clarification of procedures under advisement. Archambeault, Tr. 12,295-310, 12,615-20; Int. Exh. 121.

The personal item is Mr. Archambeault's displeasure with working on the second (evening) shift because of interferences in his family life. His claim is that the first-shift union (Pipefitters, Local 306) steward, at the entrance interview, predicted Mr. Archambeault would soon be working on the first (day) shift. *Id.*, Tr. 12,655. The steward, Larry Bossong, denied having made such a promise and disclaimed any authority to do so. Bossong, ff. Tr. 16,252, at 3; Tr. 16,260-61. Tony Simile, the Comstock Quality Control Supervisor, confirmed that disclaimer. Simile, ff. Tr. 16,180, at 9.

---

[15] The remark implies that inspectors "work to" Comstock Procedure 4.8.8, Cable Installation Inspection.

On three occasions during the summer of 1986, Mr. Archambeault claims to have filed with his union steward (second shift) a written request for a shift transfer, only the third reached the responsible Comstock supervisor, Mr. Simile, on a timely schedule. Archambeault, Tr. 12,272, 12,328, 12,335; Simile, ff. Tr. 16,180, at 8. In the 1985-1986 period, cable pulling had been largely placed in the second shift, to avoid conflicts with other crafts, with a concomitant need for inspectors. For this reason newly hired inspectors and even some already on the first shift were assigned to the second. The Archambeault complaint was aggravated by a retransfer back to the first shift of two individuals selected by Mr. Simile from a June 1986 list of three, including Mr. Archambeault,[16] prepared by the second shift supervisor. More than two transfers would have overly depleted the second shift. The two transferees held seniority over Archambeault in company service and in date of request. One of them had a strong compelling personal reason and both had recently gone to the second shift, albeit reluctantly, to cover a need. Simile, ff. Tr. 16,180, at 2-5.

In late June, Mr. Simile received an indication from the NRC that it was Mr. Archambeault who had cited alleged inspection problems, thereby placing him (Simile) in a potentially awkward position that would be publicized — a transfer could be considered placative in view of this ongoing hearing; a denial could be considered retributory. *Id.* at 6-7. Nevertheless, Mr. Archambeault was transferred to the first shift in early September 1986. Archambeault, Tr. 12,498. A prerogative of an employer is certainly the assignment of employees to areas and at times of need.

There is no evidence that the quality of Mr. Archambeault's work suffered from the concerns and allegations he voiced. Archambeault, Tr. 12,404.

D. Richard Martin

Richard Martin was hired into the Braidwood site on May 18, 1981, as a Level I inspector. He remained at the site through the several changes in the contractor responsible for Quality Control inspection, i.e., Comstock, BESTCO, and now General Electric's Multicraft Installation Services. In each instance he was assigned to the inspection of L.K. Comstock's electrical construction. He was certified as a Level II inspector in a number of efforts, including cable pulling, welding, and configuration of hanger supports over a period beginning September 1, 1983. In early spring 1986, he was transferred to a position as Technical Statistician. It is the cause of this transfer and the events leading to it that are under consideration in this part of the Braidwood hearing. Martin, Tr. 8261-67. He was called as a witness by the Intervenors.

---

[16] Through this medium, Mr. Simile had a first indication of Mr. Archambeault's desire for a transfer.

At the time of his most recent appearance before this Board, in September 1986, Mr. Martin was favorably anticipating his return to inspection on a schedule of his choice. *Id.*, Tr. 12,726.

The transfer from inspection was occasioned by a confrontation between Mr. Martin and a craft foreman named Krone. A news item reporting on this hearing linked Mr. Martin with a supposed 500 weld-inspections-per-day achievement which, according to Mr. Martin, may have arisen from an early practice of transcribing from field notes several days' accomplishments onto the official documents, the checklists, on a single day. Nevertheless, Krone took the value as a measure of Mr. Martin's efforts and used it as a topic for ridicule of Mr. Martin in front of his peers. He allowed Mr. Martin to offer no explanation. Harsh words and body contact subsequently led to Krone's discharge by Comstock and to Mr. Martin's assignment, a couple of weeks later, out of field inspection. *Id.*, Tr. 8376-94, 9590-92. According to Mr. Martin, he was removed from cable-pull inspection at the instigation of a union steward who reported that, after Krone's discharge, the cable pullers would not work with Mr. Martin. *Id.*, Tr. 8394.

Shortly before the Krone incident, Mr. Martin had been effectively removed from cable-pulling inspection following his persistent requests to his lead for assistance from other inspectors in effecting a continuous pull of a 350-foot-long cable through a tortuous path, a common request to permit an alternative to the more laborious method of pulling by sections called "pull-and-coil." Upon denial of his request for aid, Mr. Martin expressed that he "didn't feel comfortable doing it [that way]." Mr. Martin had never inspected a pull-and-coil operation at Braidwood. *Id.*, Tr. 12,765. Further, he believed helpful inspectors to be available. As a result, another inspector was assigned to the pull and Mr. Martin made work for himself during the next couple of weeks. *Id.*, Tr. 12,704-20.

From time to time since his initial employment in 1981, Martin encountered a number of irregularities in his work experience. His certifications were withdrawn on two separate occasions for periods of a few months because of large numbers of reversals, by PTL and CECo, of his inspection decisions. *Id.*, Tr. 9348-50. Martin attributed this increase in reversals to his misinterpretations of drawings, to inadequate training, and to his increased output which made for more rejects though his fractional reject rate remained about normal. *Id.*, Tr. 9547, 9582. After some retraining and investigation of previous work, the certifications were reinstated. *Id.*, Tr. 8326, 8329, 9344. Two record-keeping matters were addressed in Mr. Martin's testimony. One was his practice of recording field observations in notebooks, then subsequently transcribing them *en masse* to the official checklists, usually in the office. Mr. Martin, together with other inspectors, developed the practice of photocopying inspection forms on which largely generic information had been added, then filling in blanks of the copies with inspection-specific information. Signatures and dates were

original. *Id.*, Tr. 8330-31. This is to say, additionally, that the checklists were seldom taken to the field. *Id.*, Tr. 8370, 9576. The Witness asserted that in these manners he and other inspectors had been trained by Irving DeWald, the then and current Comstock QA manager. These irregular documentation practices were uncovered during a CECo audit and came to the attention of Walter Shewski, the CECo corporate QA manager, who ordered appropriate retraining. Immediately thereafter Mr. DeWald held a training session. *Id.*, Tr. 9574-77.

In spite of these and other somewhat similar occurrences, Martin retained a very open and understanding attitude toward his management. He testified that, whereas he perceived some actions were not in good taste, were unfair, and stemmed from mismanagement, he did not identify the actions as harassing or intimidating. On one occasion, in a meeting with Mr. DeWald and his assistant, Mr. Seese, he assured them he was aiming not to cause trouble, he "wanted to try to do better [at his job]" and asked "them for suggestions if there is anything I could do to better myself." *Id.*, Tr. 9595-96. Neither did he consider transfer to what he judged a less-interesting job to be retaliatory. *Id.*, Tr. 12,756-77, 12,773-78. He expressed strongly his enjoyment of and his satisfaction with his weld-inspector position. His industriousness even brought criticism from his peers. *Id.*, Tr. 9546. He was less sure of his responses to procedural requirements, a reaction he attributed to deficient training. To himself he adequately justified his practice of photocopying premature entries into checklists by noting that each list bore his signature in the original and that it vouched for the performance and acceptance of a weld. His problems with procedures and paper work he laid to his inadequate training. *Id.*, Tr. 9544-47. We state, succinctly, that he was proud of his work and of being a part of such a large effort as is Braidwood.

The Board cannot ascribe to Martin any support of the alleged harassment, etc., voiced as the principal contention in this case, particularly as it may relate to the ultimate safety of the operation of the Braidwood plant.

E. Other Considerations

Additionally to those Quality Control inspectors whose testimony has been reviewed in some detail above, about a dozen others appeared at the hearing either in person or through deposition. Among them are Larry Bossong, Francisco Rolan, Michael Mustered, Terry Gorman, Dean Peterson, Therman Bowman, Robert Wicks, Larry Perryman, Dan Holley, Robert Hunter, Herschel Stout, Joe Hii, and Mark Klachko. The concerns of many of these individuals with the inspector-management relations at Comstock had been taken to a meeting with the NRC in March 1985. Most were subsequently interviewed separately by NRC personnel. The tenor of their contributions to the history of the inspection program is resemblant both to that already recounted and consistent within themselves. With scarcely an exception, each inspector testified that he

had encountered or observed outbursts of temper from Quality Control Supervisor Saklak. These instances have been described in great detail by the Staff in its Findings of Fact and Conclusions of Law, ¶232 through ¶413. The Board adopts these paragraphs and the citations therein as an historic record of those encounters. Collectively, they strengthen the picture of that individual that we have drawn, *supra*. There were threats of discharge of Rolan, Martin, and Holley though Mr. Saklak's authority did not extend that far; accounts by Mr. Gorman of berating inspectors; the rebuff of Mr. Saklak's remarks by Mustered; a jestful response by Mr. Peterson to Mr. Saklak's directive; a counterthrust by Mr. Bowman to Mr. Saklak's aggressive behavior.

Other members of Comstock management, particularly Mr. DeWald, were the subject of complaints of poor communications, perceived aloofness, apparent work place and time discrimination including allocation of overtime and attempts to establish quotas for performance. Threats of discharge by Mr. DeWald were more meaningful due to his position in the organization.

During this period of contention and apparent unrest, three inspectors, Hunter, Arendt, and Stout, were discharged — Hunter and Arendt for improperly inspecting welds that had been previously painted and Mr. Stout for absenteeism and low productivity. (Truly, Stout resigned though his discharge was imminent.)

Applicant's witness Laney, a person of considerable experience in construction, management, and direction at diverse nuclear facilities including the Quincy (MA) shipyard, where nuclear-powered naval vessels are constructed, and the Argonne National Laboratory, where nuclear reactors are developed, testified at length on several aspects of the issues aired in this hearing. Laney, ff. Tr. 17,245; Tr. 17,246 ff. The topics were both site specific and more general. Of relevance here is Laney's judgment of Mr. Saklak's competence and behavior as a supervisor. On the basis of his review of summaries of depositions and oral testimony of a number of inspectors and interviews with individuals, largely at supervisory level, Laney concluded that inspectors considered Mr. Saklak a blusterer and, as such, a weak supervisor whose threats were not or could not be always carried out. He was looked upon as an irritant and a bother but not one whose promised intimidations were to be taken seriously. Laney, Tr. 17,361. Laney cited experiences by Inspectors Snyder, Martin, and Mustered who rolled with Mr. Saklak's punch only then to brush it off or to carry it to higher authority. *Id.*, Tr. 17,350, 17,355-57. These actions are consistent with Laney's experience with and belief in the position of an inspector who usually works alone at his task, utilizing his skills in a professional manner. To his task an inspector brings his two essential qualifications — his technical skills and his personal integrity — of which he is both proud and protective. These represent his job security and, more importantly, they are his badge of acceptance in the work area and he will scrupulously protect these basic assets, unaffected by external group dissension. As a group, however, having belief in complaints centered around supervisor-inspector fric-

tion, the expressed need to keep abreast of craft production, salary uncertainties, and perhaps inequities, likely pressure to support the then-ongoing unionization effort, the inspectors would be expected to voice their collective feelings as was their behavior here in the audiences with the NRC. Laney, ff. Tr. 17,245, at 24-25. The Board shares and subscribes to these observations.

Although the actions and remarks of the Quality Control personnel, both management and the inspectors, attest to a deteriorating esprit de corps at Comstock, the result was not as catastrophic as Intervenors would have us believe. Guild, Tr. 7915 ff.

VI. REINSPECTION EVIDENCE

In response to Intervenors' theory that alleged acts of harassment, intimidation, and production pressure impaired the effectiveness of Comstock Quality Control inspectors (Guild, Tr. 7903-04), Applicant presented the results of two separate reinspection programs. The first program was the Construction Sample Reinspection (CSR) which was part of the Braidwood Construction Assessment Program (BCAP). The CSR consisted of a visual reinspection of a sample of onsite, safety-related construction which had been completed, Quality Control inspected, and accepted by Comstock as of June 30, 1984. The second program consisted of the data obtained from the routine overinspections of Comstock Quality Control–accepted work by the Pittsburgh Testing Laboratory (PTL) during the period July 1, 1982, to June 30, 1986. Neither program was initiated in response to Intervenors' allegations but they were conducted for other reasons. The reinspection programs were unrelated and were carried out by Quality Control inspectors who were independent of the Comstock QA/QC organization. DelGeorge, ff. Tr. 16,740, at 6, 9; Kaushal, ff. Tr. 13,068, at 9; Marcus, ff. Tr. 15,568, at 1, 7.

A stated objective of the BCAP program of which CSR is a part was to ensure that no unidentified or unaddressed programmatic design-significant construction problems existed at Braidwood. Kaushal, ff. Tr. 13,068, at 3. A "design-significant" deficiency is one that affects the ability of a safety-related system, structure, or component to perform its intended safety function. *Id.* at 5; Thorsell, ff. Tr. 14,270, at 9. As regards structural components, "design significance" relates to the ability to carry all design loads within code-established allowable stresses. Kostal, ff. Tr. 14,270, at 16.

The CSR was carried out by an organization called the BCAP Task Force. Most of the BCAP engineering staff was drawn from Stone & Webster Engineering Corporation and all of the quality control inspection staff was drawn from the Daniel Construction Corporation. The BCAP Task Force Director was an Applicant employee. None of the individuals, including the Task Force Di-

rector, had any prior involvement with the work that was to be reinspected or reviewed under BCAP. Kaushal, ff. Tr. 13,068, at 9. The NRC Staff concluded that the BCAP Task Force personnel were "qualified for their assigned tasks with a good balance of education and experience in the nuclear industry.". Gardner, ff. Tr. 17,606, at 12.

Sargent & Lundy, Applicant's architect-engineer, was assigned the task of evaluating the discrepancies found by BCAP CSR inspectors. Kaushal, ff. Tr. 13,058, at 7. Because Sargent & Lundy is responsible for developing the Braidwood design, including all drawings and specifications, it has the greatest expertise in evaluating the significance of Braidwood construction discrepancies.

BCAP Task Force activities, including the CSR, were overviewed by the BCAP QA group established within Applicant's Quality Assurance Department. BCAP QA personnel, none of whom had any prior responsibility for construction at Braidwood, were drawn from Applicant, Gilbert Commonwealth, and Pittsburgh Testing Laboratories. The BCAP Task Force, BCAP QA group, and Sargent & Lundy were overviewed by an independent expert overview group (IEOG) which was assembled by the Evaluation Research Corporation and consisted entirely of individuals outside of the Commonwealth Edison Company. Smith, Tr. 14,196-97; Appl. Exh. 137; Kaushal, ff. Tr. 13,068, at 9, 10. All of the various groups including the IEOG were, in turn, overviewed by a resident NRC inspector who dedicated full time to reviewing the BCAP program. Kaushal, ff. Tr. 13,068, at 11.

The CSR sample program was set up to assure with at least a 95% confidence level that at least 95% of the work in each construction category is free of design-significant discrepancies. *Id.* at 6.

The BCAP/CSR was a large reinspection program and involved more than 90 man-years of direct engineering and reinspection effort in addition to the engineering evaluation of identified discrepancies by Sargent & Lundy and the support services provided by the various construction contractors on site. *Id.* at 7. The CSR data base includes the results from reinspections of 733 electrical items including more than 10,000 welds and 276,000 inspection points. DelGeorge, ff. Tr. 17,082, at 19.

The PTL data base includes more than 7200 components and over 28,000 welds, approximately 28% of the total number of components and 10% of the total number of welds completed and Quality Control-accepted by Comstock during the 4-year period from July 1982 through June 1986. Marcus, ff. Tr. 15,568, at 12; DelGeorge, ff. Tr. 16,740, at 17, 32.

Using the data collected from both the CSR and the PTL reinspection programs, the Applicant prepared a computerized data base that matched the reinspection results with the names of Comstock Quality Control inspectors whose work was reinspected along with the dates of such "first-line" inspections. The computerized data base permitted comparison of Comstock Quality Control in-

spector performance over time with episodes of alleged harassment, intimidation, and undue production pressure. As shown in the following sections, the data show no trends or correlations between inspector performance (as measured by agreement rates with CSR and PTL overinspections) and episodes of alleged harassment, intimidation, and undue production pressure.

Dr. Martin R. Frankel, a noted statistical sampling expert, participated in the design of the CSR program and analyzed the results of both the CSR and PTL reinspection programs. Frankel, ff. Tr. 17,082, at 1-4, 12-27. The CSR sampling program made use of both probability samples and nonprobability samples in six different electrical construction categories. *Id.* at 9-10. The total sample for each category consisted of three parts. The first or "random" portion was chosen in such a manner that each item in the population had an equal chance of inclusion in the sample. This is the probability sample. The number of items in the random portion of the CSR sample was sufficient to support a conclusion with 95% confidence that a minimum of 95% of the population is free of design-significant defects, assuming no defects were found in the sample. For the second portion, engineering judgment was used to determine sample size and to select items. This portion emphasized areas of plant construction that had previously exhibited discrepancies or are parts of the safe-shutdown and emergency core cooling systems. About half of this engineering judgment sample portion was selected using random methods. The other half of this portion focused on items that comprise, support, or enclose some of the most significant safety systems. The third portion of the CSR sample was identified as "more highly stressed" items. This included items where structural stress is a significant design factor. A total of sixty-eight "more highly stressed" items was included in the third portion. Kaushal, ff. Tr. 13,068, at 13-16.

No design-significant discrepancies were found in any of the six CSR construction categories and using only the results from the first or random portion of the CSR sample one can conclude with a 95% confidence level that at least 95% of the electrical construction population at Braidwood is free of design-significant defects. *Id.* at 16; Frankel, ff. Tr. 17,082, at 11. Even higher levels of reliability and confidence will result when the reinspection data are combined across all electrical populations. Further, the results of the additional CSR sampling (the engineering judgment sample and the additional sampling of "more highly stressed" items), adds even more confidence to the inferences that may be drawn from the probability sample. Frankel, ff. Tr. 17,082, at 11; Tr. 17,145-47.

Dr. Frankel also looked at Quality Control inspector "agreement rate" data. Agreement rate is defined as the ratio of the number of inspection points within a particular interval determined by CSR inspections to be acceptable (i.e., nondiscrepant), to the total number of inspection points reinspected in the same interval. Since all of the inspections reevaluated in the CSR had been inspected

and approved by Comstock Quality Control in their first-line inspection, it was possible from the agreement rates derived from the CSR data to obtain a measure of the quality of the product of Comstock inspectors. The CSR agreement rates used in the evaluation represented points first inspected during time periods before, during, and after incidents of alleged harassment. Dr. Frankel found that the CSR agreement rates were statistically independent of the time period when the first-line inspections were made. In particular, taking July 1, 1982, when Mr. Saklak became Quality Control Supervisor for Comstock as a dividing point, Frankel observed that the CSR agreement rates prior and subsequent to that date were essentially the same. This comparison, being sensitive to a 1% difference with a 99% probability, says that Mr. Saklak's entrance into the Comstock Quality Control organization had no effect on the quality of the product of his inspectors. Frankel, ff. Tr. 17,082, at 12-20. Dr. Frankel also compared the agreement rates before and after August 1, 1983 (DeWald started as Quality Control Manager) and similarly found no statistically significant difference. *Id.* at 20-21. In examining the results of the PTL overinspections, Dr. Frankel concluded that while there are variations in agreement rate over time, there does not appear to be a strong trend over time. He stated that while there was some indication of increasing agreement rate, the linear relationship between agreement rate and time was quite small. *Id.* at 25-27.

Applicant presented the results of a review of the combined and individual PTL overinspection results of each of the 100 Quality Control inspectors included in the 4-year period from July 1982 through June 1986. Applicant selected an agreement rate of 90% as a threshold for acceptable work by the inspector. Applicant used a fifty-inspection minimum for calculating combined monthly agreement rate averages. Marcus, ff. Tr. 15,568, at 13, 14. For 8 months the agreement rates were below 90%. During four of those months, the agreement rate was within a couple of percentage points of the 90% threshold, and for 1 month there was insufficient overinspection data to draw a conclusion. *Id.* at 17. On only three occasions, the monthly Comstock agreement rate dropped significantly below the 90% threshold level. No single inspector contributed to more than one of the dips in the 7 months where sufficient inspections were made and the agreement rate dropped below 90%. For each of these 7 months, there was a single, technical reason that caused the drop in agreement rate. Each of the seven technical reasons occurred only one time in the 4-year period. *Id.* at 18. None of these technical reasons was related to harassment, intimidation, or undue production pressure. *Id.* at 18-33.

Mr. DelGeorge also reviewed agreement rate data for both the CSR and PTL reinspection programs with particular attention to the class of twenty-four Comstock inspectors who complained of harassment to the NRC on March 29, 1985. From his study of the CSR results, Mr. DelGeorge concluded that the variation in results over time does not reveal any apparent relationship between

Comstock Quality Control inspector performance and the incidents of alleged harassment, intimidation, and production pressure. DelGeorge, ff. Tr. 16,740, at 27-32. As regards the PTL overinspection results, his evaluation of the twenty-four Quality Control inspectors as a class, and individually, also did not reveal any trends over time which would support Intervenors' claim of a pervasive problem. *Id.* at 34-35.

Intervenors presented no witnesses to controvert Applicant's case analyzing the CSR and PTL data. Rather, there was extensive cross-examination of Applicant's witnesses. Intervenors question the independence of the BCAP CSR program even though not a single person on the BCAP task force had any prior involvement with electrical construction work at Braidwood. The only specific point raised by Intervenors was that the Director of the BCAP Task Force was an Edison employee and he reported to Edison's Braidwood Project Manager. Kaushal, ff. Tr. 13,068, at 10. No evidence was presented as to how that relationship compromised the validity of the data collected. The intense regulatory spotlight and the built-in overviews under which the CSR program was conducted would make compromise extremely unlikely.

Question was raised as to the applicability of 10 C.F.R. Part 50, Appendix B criteria to the activities of BCAP. The question is of academic interest only, since it appears that the program was conducted in accordance with the general principles and requirements of Appendix B. Certainly the manner in which the NRC BCAP inspector managed his activities indicated stringent adherence to the requirements of Appendix B. Gardner, Tr. 17,685-88.

Intervenors also questioned the role of Sargent & Lundy, arguing that because it had been responsible for Braidwood's original design and for evaluating and accepting departures from that design, it had a vested interest in accepting its past design and evaluative work. There is no evidence to indicate that Sargent & Lundy's participation in evaluating BCAP discrepancies was anything less than highly professional and impartial. Sargent & Lundy did not perform construction, and there is no reason why it would be adversely affected by identified construction defects. Gardner, ff. Tr. 17,606, at 8. Additionally, and as mentioned previously, the overall regulatory atmosphere surrounding the BCAP program with virtually continuous oversight by BCAP QA, IEOG, and a full-time resident NRC inspector assigned only to BCAP activities reduced the possibility of lenient treatment of discrepancies to virtually zero. In fact, there is considerable evidence in the record, attesting to the zealousness of the overinspectors, wherein 30 to 40% of the "discrepancies" found by overinspectors were determined not to be discrepancies at all. Marcus, ff. Tr. 15,568, at 17; Kaushal, Tr. 13,338-47.

One of the principal reasons why no design-significant discrepancies were identified is that Sargent & Lundy has provided large design margins in the Braidwood electrical work, over and above code requirements. These margins

arise due to the standardization of components and due to the engineer's recognition that construction work is not always perfect. The record is replete with examples of the design conservatism and much hearing time was spent discussing the subject. Tr. 14,453-60, 14,477-90, 14,641-86, 14,755-805, 15,517, 16,675-76. One example that is illustrative of the conservatism used by Sargent & Lundy is the design for conduit hangers. There are approximately one dozen standard designs for conduit hangers. Each is based on conservative assumptions of maximum conduit size, maximum cable weight, maximum hanger length, and maximum space between hangers, even though all of these conditions will seldom, if ever, be present in any field installation. As regards seismic design, peak seismic accelerations are used even though more refined analyses based on actual component frequencies would result in considerably lower seismic design forces. A further conservatism is provided by manufacturers who typically provide materials that exceed minimum strength requirements to avoid the potential expense of scrapping substandard material. Kostal Revised (Appl. Exh. 179), at 7-9, 17-18, 24-29. There are additional design margins for which no credit was taken in the design-significance evaluations. These are the code-required margins. The code writers typically use a margin of two between failure and code allowable. *Id.* at 18. Moreover, the AWS D1.1 Code indirectly provides additional margin by requiring minimum sizes and lengths for welds. *Id.* at 25. Considering the conservatism in the design, it was not surprising to find very large safety margins even in the presence of discrepancies. For those construction categories where notable discrepancies were found, the average design margin remaining for all welds with discrepancies ranged from 300% above code-allowable stress for cable pans to 900% for conduit hangers. Electrical equipment and cable pan hangers were found to be an average of 500% and 800% above code-allowable, respectively. No notable subjective discrepancies were found in the cable or conduit construction categories. *Id.* at 18-21.

Intervenors wanted the reinspection results stated in terms of items rather than inspection points. Since many items have thousands of inspection points, the Intervenors' method would reject the entire item if one or more discrepant points was found. This is clearly unreasonable and would be misleading. On the other hand, presentation of data on an attribute or inspection point basis with, for example, one weld having seventeen attributes might also be misleading by presenting what might appear to be a high agreement rate. Applicant presented results on both a weld basis and an inspection point basis. Applicant defends its inspection point basis by stating that it permits judgment and meaningful comparison of inspector and inspection performance particularly with respect to items of differing complexity. The strongest argument that Applicant makes in defense of its method of reporting results is that each individual inspection point represents a necessary check of a potentially "design-significant" attribute. On an inspection point basis the CSR results show that over 98% (actually 98.7%)

of the inspection judgments made by Comstock Quality Control inspectors were correct. Analysis of the CSR results on a weld basis, produced an agreement rate of about 85%. The corresponding value for PTL overinspections during the period July 1, 1982, through June 30, 1986, is 93%. For the period in which the CSR and PTL data overlap (July 1, 1982, to June 1984) the agreement rates were 89% and 90%, respectively. DelGeorge, ff. Tr. 16,740, at 37-38; Tr. 16,802.

Intervenors argue that agreement rate is not a measure of inspector performance and the exercise revealed nothing except a large number of defects. The Board disagrees. While a direct comparison of inspector accuracy would be desirable, the possibility of a direct comparison is long gone. The discrepancies identified in first-line inspections are referred back to the craft for remedial action and work is not considered complete until accepted by a Quality Control inspector. What Applicant is trying to determine is any change in QC inspection effectiveness (the identification and rejection of bad work) over time to ascertain whether such changes can be correlated with Intervenors' allegations. Applicant's witness Hulin concluded that agreement rates were "the best available behavioral trace measure" and further stated that the CSR and PTL data analyses do a reasonably good job of capturing the accuracy of Comstock's Quality Control inspector performance. Hulin, ff. Tr. 17,924, at 17; Tr. 17,934-35, 18,231-32. The results of the analyses of the reinspection data for the entire period show no significant change in agreement rate. Frankel, ff. Tr. 17,082; DelGeorge, ff. Tr. 16,740; Marcus, ff. Tr. 15,568.

Intervenors say the agreement rates are meaningless because nothing is known of the craft error rate and efficiency of overinspection, and each can have an effect on the agreement rate. The Board disagrees. While there exists the possibility that there might have been changes in either or both craft error rate and reinspector efficiency, there is no information in the record to substantiate any conclusions as to whether there was an effect. Since there was little or no change in agreement rate over considerable periods of time, some imagination is required to foresee that these effects (craft error and overinspection efficiency effects) masked the pervasive effects of intimidation and production pressure described by Intervenors. The more logical explanation is that neither craft error rate, overinspection efficiency, nor agreement rate changed appreciably over the period of study.

Intervenors refer to the problems at Comstock as programmatic, systematic, pervasive, widespread, massive, etc., and "on a scale which distinguishes Braidwood from any recorded case in the annals of licensing proceedings." The reinspection evidence presented covered a 6-year period ending in mid-1986 and encompassed all of the specific acts of intimidation and production pressure that allegedly occurred. There apparently were some mistakes made and there is evidence of some production pressure. There is, however, no evidence of any effect of these on the quality of the Comstock Quality Control inspection

work. Of all the Quality Control inspectors testifying at the hearing, not one indicated that intimidation or production pressure had an effect on the manner in which he did his work. The CSR and PTL reinspection programs were relatively large as sampling programs go. Even Intervenors' witness Arvey stated that a 10% random sampling program would be very precise if the sampling size were of the order of 10,000. Arvey, Tr. 4435-42, 4447. Each of the reinspection programs greatly exceeded 10,000 observations, the bases upon which inferences may be drawn. In the CSR program, 98.7% of all observations were found to have been correct. Of the 1.3% found to be discrepant, the vast majority was insignificant, and not a single discrepancy was such as to have an effect on the capacity or ability of the component to perform its safety function. Kostal Revised (Appl. Exh. 179) at 22.

VII. GRID INSPECTIONS

Early in the period addressed in these proceedings, that is, in the first part of the 1980s, electrical-related welding was inspected on a grid-area basis in which a designated area of the plant, specified within a local coordinate system, was assigned for inspection. During that period there were few Quality Control inspectors, less than five. All relevant entities within that area were then reviewed by one or more inspector, at a 35% sampling. DeWald, ff. Tr. 1700, at 7. The results were recorded in the inspector's notebook and, at some later time, several days' worth of inspection results were entered into the official report. *Id.* at 24; Holley, Tr. 5176; Martin, Tr. 8285-89. In this grid-inspection procedure, large numbers of inspections were lumped on one inspection report, bearing a single date. That practice is in contrast to the present method in effect since November 1, 1982, when CECo directed that the installations of 100% of safety-related items be inspected and, further, a copy of the inspection report be placed in the file or package for each component, say a cable-pan hanger.[17]

The increased work load reflected in the inspector population which progressively increased to 36 in August 1983, to 77 in May 1985, and to nearly 100 in August 1985. Shamblin, ff. Tr. 16,252, at 28; DeWald, ff. Tr. 1700, at 10.

In the early scheme, as noted, *supra*, many welds located on many components, could have been reported on a single sheet, resulting in a confusing record which, when coupled with the likely changes in item designations, made difficult an identification of an item in the field with an entry on an inspection report. Hunter, Tr. 8892. It was virtually impossible to even correlate the number of welds in a grid with the number on the corresponding inspection report, a

[17] The older method resulted in an apparent record that could be construed as reporting a large number of welds inspected on a single day. Bowman, Tr. 6933-35.

necessary exercise to verify that all welds had been inspected. These discrepancies could have been due to design changes, welds added or removed. They were aggravated by the fact that this exercise extended back into the era when Ernst, the predecessor of Comstock, held the Quality Control inspection contract.[18] Hunter, Tr. 8738-43; Gorman, Tr. 5863.

Although Walter Shewski, the CECo corporate QA manager, was unable to contribute to the discussion, there was agreement between Applicant and Intervenor counsel that the essence of the above grid-system inspection procedure and the confused reporting were correct. Tr. 10,202-07.

In a discussion of the validity of results from samples of various size taken from large populations, Intervenors' witness Arvey testified that a 10% random sample from a population of 10,000 would yield very reliable results with the proviso that if that first sample of, say, welds showed a large number of discrepancies, the sample size should be increased. Arvey, Tr. 4434-36, 4449.

As noted, the program of inspections of electrical items followed in the grid-area scheme consisted of a 35% sample with an enlargement if an inordinate number of discrepancies were found. The weld population sampled was large. Additionally, this pre-November 1, 1982 work was caught in the BCAP reinspection program.[19] As noted elsewhere in this Decision, the BCAP reinspection revealed no discrepancy sufficiently severe to affect the capacity or ability of an item to perform its safety function. *See*, for example, Kaushal, Appl. Exh. 179, at 22. Accordingly, the Board discerns no cause to be concerned about the utility of that Braidwood construction which was initially inspected by the "grid-area" scheme.

VIII. CONCLUSIONS

This case involves many questions of perceptions and credibility in addition to questions of pure fact. It is not the typical type of case brought before a licensing board. The Board is not asked to judge the adequacy of the design or the suitability of the materials used in the construction of Braidwood. We are asked to evaluate the quality of the electrical systems installed by Comstock only insofar as the quality might have been affected by poor quality control inspection. We are asked to determine whether Comstock Quality Control inspectors were harassed, intimidated, threatened, or pressured from adequately performing

[18] The time and effort required to review and remedy these ancient historical records together with the increased work load, 100% sample up from 35% (Int. Exh. 205, Attach. III), contributed to the infamous "backlog" of inspection data alleged to have been the cause of undue work pressure put on inspectors more recently. DeWald, ff. Tr. 1700, at 7. This work backlog, which at one time was composed of 14,000 welds and 50,000 documents to be reviewed, was eliminated in September 1984. Shamblin, ff. Tr. 16,274, at 17.

[19] The BCAP reinspection program reviewed all safety-related construction at Braidwood which had been completed as of June 30, 1984. Kaushal, ff. Tr. 13,068, at 3.

their duties in accordance with applicable requirements. The harassment allegations are directed toward both Applicant CECo and Comstock managements and center around three questions. Did the Commonwealth Edison Company intentionally and unreasonably pressure Comstock's Quality Control managers to increase productivity? Second, as a result of this pressure or for whatever reason, did Comstock Quality Control managers systematically engage in conduct intended to pressure Quality Control inspectors to overlook deficiencies and accept discrepant work? Lastly, assuming production pressure was imposed on the inspectors, did they succumb to that pressure? There are some other issues but they are all related to the above three questions which constitute the heart of the harassment matter. The issue of discrimination is also related to the above three questions and involves only a few of the inspectors, notably Messrs. Puckett, Seeders, Martin, and Archambeault, although others might be included.

In answering the first question, the record clearly indicates that there was substantial pressure imposed on Comstock Quality Control management to reduce the backlog of inspections. Not reducing the backlog would inevitably result in an inability to ascertain the quality of a rapidly expanding volume of installed work. Such a consequence made reducing the backlog an absolute necessity. Given the requirement of reducing the backlog, the actions of Mr. Shamblin, Applicant's principal instrument on site, appeared to be necessary and reasonable. Comstock Quality Control management performance is not quite as readily characterized. From the privileged position of looking back at other's actions, there is little doubt in the Board's view that some things should have been done differently. Mr. Saklak was obviously better suited to ride herd over production workers than safety inspectors. Although he might not have had any more success with welders than he had with Comstock's inspectors, his bullying tactics are almost universally rejected and it is not surprising that such actions resulted in his termination. The transfer of John Seeders following a complaint letter to Quality Control Manager DeWald was viewed as a vengeful act by Intervenors. The issue was fully ventilated in the hearing with the result that the transfer appeared to be in the best interest of all parties. Mr. Seeder's work performance record in the months immediately preceding his transfer show a plethora of procedural violations and an inattention to detail combined with a disdain for compliance with schedules. His performance after transfer has been exemplary. As to Worley Puckett, he should have been hired for the position he originally applied for. He went to Braidwood for a job as a Level II Quality Control weld inspector, possibly the most qualified man in the country for that job. Based on the evidence in this record, his strength was not in interpreting weld procedures or welding codes, a task for which he was hired as a Level III inspector at Braidwood by Comstock. Because he was ill-suited for the task, his performance was not what Comstock needed and he was fired. While the Board is of the opinion that Comstock management had sufficient justification to re-

move Mr. Puckett from his position as a Level III at Braidwood, its handling of Mr. Puckett from the initial mistake of hiring him for that post to his termination bespeaks of a management lacking in judgment and communicative skills. The firing of two other Quality Control inspectors for inspecting welds through paint contrary to procedure appeared to be justified. Mr. Archambeault's allegations were both personal and quality related. All of his QC-related allegations were found without substance or were resolved. His personal complaint was his objection to working the night shift. There appeared to be good and sound reason for night-shift assignment and there is no reason why the issue should have been before the Board. Most of the cable-pulling operations were conducted at night so as not to interfere with other craft operations. He was eventually transferred to day shift when the work load permitted.

Although we agree that some actions taken in dealing with Quality Control inspectors crossed the line of acceptable behavior even for a large construction site, on balance and in consideration of the overall environment in which all of the actual or perceived instances of harassment or production pressure took place, we do not find these indiscretions of sufficient severity to warrant the precipitous action of license denial. The severity and consequences of such unacceptable behavior might reach for civil penalty but the majority of this Board, in a close call, declines to do so. There is no evidence that any of the demonstrated instances of harassment or production pressure was intended to have an effect on the quality of the inspection or to promote the failure to observe defects in workmanship. A consideration of the union organizing activity which was concurrent with many of the allegations, the inspector shortage, wage and work hour considerations, and *inter alia*, the notion that an inspector should provide a day's work for a day's pay are all included in our decision not to pursue a recommendation for license denial or civil penalty. That is not to say that some other arm of the Commission might see the issues in another light and move accordingly.

With respect to the third question, "Did the inspectors succumb to the pressure?", even our dissenting colleague agrees that they did not. We find that the Quality Control inspectors, in spite of management harassment and schedule pressure, performed their inspection duties in a professional manner, and the fruit of their labors was not poisoned by management's actions. The Board subscribes to the judgment of a witness who described the inspectors as members of a group that are proud and protective of their technical skills and personal integrity. Their technical skill and integrity represent their job security and their families' livelihood, but even more importantly, these are their badge of acceptance in the work arena. The witness suggested that an inspector working alone at his job will scrupulously protect these, his most basic assets, unaffected by external group dissension. We agree. Our personal observations of the demeanor and the testimony of more than a dozen Comstock Quality

Control inspectors confirms those impressions. The Board notes the position taken by the Intervenors on the value of testimony by witnesses describing their professional behavior when under the alleged work pressure and subjection to harassment. The Intervenors deprecatorily dismiss the sworn statements by inspectors asserting that, though the conditions in their workplace may have been clouded by strained management-employee relations, the quality of the inspections was unaffected and that there was no compromise in the construction of Braidwood. Intervenors claim such evidence to be self-serving, that, under the circumstances, nothing different could have been expected and, therefore, it should be heavily discounted. On the other hand, the Board observes that not one shred of information was presented to it describing and authenticating any significant shortcoming in the Braidwood construction that has not been identified, evaluated, and corrected as necessary.

The Board finds reasonable assurance that the Braidwood Plant has been properly constructed and can be operated without endangering the public health and safety. Our finding in that regard is buttressed by the results of two large reinspection programs presented as rebuttal evidence in this proceeding. The major thrust of this evidence established that there was no discernible difference in the inspection agreement rates between Comstock inspectors and the reinspectors before, after, or during periods of alleged harassment. If harassment and intimidation occurred on a scale commensurate with Intervenors' allegations, it should have manifested itself in the results of both reinspection programs. No effect was observed. Additionally, and of assistance to the Board in reaching a conclusion on the ultimate issue, is the fact that not a single one of the discrepancies found in either reinspection program was such as to have an effect on the capacity or ability of the component to perform its intended safety function.

IX. CONCLUSIONS OF LAW

In reaching this Decision, the Board has considered all the evidence submitted by the parties and the entire record of this proceeding. That record consists of the Commission's Notice of Hearing, the pleadings filed by the parties, the transcripts of the hearing, and the exhibits received into evidence. All issues, arguments, or proposed findings presented by the parties, but not addressed in this Decision, have been found to be without merit or unnecessary to this Decision. Based upon our findings which are supported by reliable, probative, and substantial evidence as required by the Administrative Procedure Act and the Commission's Rules of Practice, and upon consideration of the entire evidentiary record in this proceeding, the Board, with respect to the issues in controversy before us:

CONCLUDES that the Applicant, Commonwealth Edison Company, has met its burden of proof on each of the issues decided in this Initial Decision. As to these issues, there is reasonable assurance that the Braidwood Station, Units 1 and 2, can be operated without endangering the health and safety of the public.

X. ORDER

WHEREFORE, in accordance with the Atomic Energy Act of 1954, as amended, and the rules of the Commission, and based on the foregoing, IT IS ORDERED THAT:

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), as to each respective reactor unit, to issue to the Applicant, Commonwealth Edison Company, a license or licenses to operate the Braidwood Station, Units 1 and 2; provided, that prior to authorizing operation beyond 5% of rated power, the Director shall assure compliance with the conditions stated in our Partial Initial Decision on Emergency Planning issues dated May 13, 1987.

Pursuant to 10 C.F.R. § 2.760 of the Commission's Rules of Practice, this Partial 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 Partial Initial Decision. Each appellant must file a brief supporting its position on appeal 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.

IT IS SO ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Dr. Richard F. Cole
ADMINISTRATIVE JUDGE

Dr. A. Dixon Callihan
ADMINISTRATIVE JUDGE

Bethesda, Maryland
May 19, 1987

APPENDIX

Exhibit No.	Description	Marked	Received
	APPLICANT'S EXHIBIT LIST		
1	5/12/84 Memo from DeWald to Mennecke re L 2790.	1823	1840
2	9/27/84 DeWald memo re Seeders termination.	1905	1906
3	LKC Proc. 4.11.3 (stop work), 3/31/83.	2213	2221
4	DeWald 9/25/84 review of Seeders 8/17/84 letter.	2946	2946
5	DeWald evaluation of Puckett's 8/22/84 test.	3084	16,579
6	Vogt test key.	3086	16,580
7	Excerpts of S&L 2790 plus Am. 40 718-84.	3324	3529
8	Am. 48 excerpt for S&L 2790, 11/4/85.	3324	3529
9	S&L Form 1701.	3324	3529
10	LKC Proc. 4.3.3, Rev. C.	3324	3529
11	LKC Proc. 4.3.3, Rev. F.	3324	3529
12	AWS D1.1-1975.	3324	3529
13	NCRs 3710, 4649 thru 4656, 4795, 5014 thru 5018, 5028-29, 5044.	3499	3529
14	AWS D1.3-1978.	3525	3530
15	AWS D1.3-1981.	3525	3530
16	S&L Spec. 2790 thru Am. 39, 6/13/77 (and 5/84).	3527	3530
17	Am. 40 to S&L Spec. 2790, 7/18/84.	3527	3530
18	Am. 41 to S&L Spec. 2790, 8/31/84.	3527	3530
19	Am. 42 to S&L Spec. 2790, 11/9/84.	3527	3530
20	LKC Proc. 4.3.10, Rev. C (12/20/83 eff.).	3532	3551
21	LKC Proc. 4.3.10, Rev. D (9/11/84 interim).	3532	3551

Exhibit No.	Description	Marked	Received
22	LKC Proc. 4.3.10, Rev. E (interim approval).	3532	3551
23	LKC Proc. 4.3.3, Rev. D.	3650	3652
24	LKC Proc. 4.9.1, Rev. C, Seeders Dep. #4 (12/30/83).	3966	4053
25	LKC Proc. 4.9.4 (5/22/81).	3984	4053
26	7/28/84 (Upper right-hand corner), Seeders' writing/Snyder's writing work day (7/21/84 Saturday).	3989	7497
27	CECo QA 20-84-528 audit, 5/21/84 (calibr. audit).	3997	
28	27-Page calibr. audit report, 9/27/84, Snyder, Sproull, Coss.	4053	4175
29	Portions of LKC ICR log, Jan. 18, 1983, thru Dec. 14, 1984 (ICR 2293 thru 7574).	4079	
30	Package of materials — Form 77s for torque wrench A872; torque wrench calibr. records PGCo, 3/24/83; 6/29/84.	4095	4175
31	Form 77s torque wrench A985, and a Form 23.	4115	4175
32	Form 77s T.W. A1366; PGCo calibr. certificate, 7/13/84.	4118	4175
33	Form 77s T.W. 9702; PGCo calibr. certificates.	4136	4175
34	Form 77 T.W. 6018; PGCo calibr. certificates.	4143	4175
35	Form 77s T.W. A174, 8/15/83.	4147	4175
36	LKC NCR 3406, 10/9/84.	4149	4175
37	LKC NCR 3419 — 1st 5 pp., 10/11/84.	4160	4175
38	LKC Proc. 4.9.1, Rev. D.	4165	4175
39	NRC Form 3 (Notice to Employees).	4402	4439

Exhibit No.	Description	Marked	Received
40	LKC Proc. 4.11.2, Rev. B (ICRs).	4543	4616
41	Saklak to DeWald, 10/17/84 (commendation to terminations inspectors).	4742	4921
42	Seltmann to QC inspectors, 8/24/84 (backlog completion and OJR delay).	5146	5256
43	Employee performance appraisal and development plan for Puckett, July 1, 1980, to [illegible], 1, 1981.	5313	5357
44	Memo from Goedecke to Geri Keegan, 10/29/81.	5313	5357
45	Performance evaluation for Puckett, 10/5/81 to 4/15/82.	5313	5357
46	Memo from Goedecke to Don Biller, 4/20/82.	5313	5357
47	Performance evaluation for Puckett, 5/15/82 to 4/1/83.	5313	5357
48	Metals Engineering Institute course/tests and certificate of Puckett's completion.	5329	5357
49	NRC Inspection Report on CG&E, 3/25/83, No. 82-10.	5335	
50	LKC Form 58 — Puckett's required reading log.	5358	5520
51	NRC Inspection Report on Braidwood, 11/21/85, No. 85-09.	5362	
52	Memo from Puckett to DeWald, 8/9/84 (recommending stop work on A-36 to A-446).	5390	5520
53	Memo from Puckett to DeWald, 8/13/84 (recommending stop work on A-36 to A-446).	5391	5520
54	LKC (Rolan?) memo stopping work on A-36 to A-446.	5393	5520

Exhibit No.	Description	Marked	Received
55	Another version of Int. Exh. 28, LKC NCR 3099 (Miner's NCR per Puckett instructions).	5395	5520
56	"Personal letter" from Puckett to DeWald, 8/22/84.	5441	5520
57	LKC Proc. 4.3.14, eff. 9/17/80, until 5/85 (stainless steel welding).	5501	5520
58	LKC NCR 3145, dated 8/24/84.	5532	5605
59	LKC NCR 3145 (later version — through on bimetallic weld reference).	5554	
60	Group LKC NCRs (LKC NCR 388, 10/23/81; NCR 2552, 5/22/84; NCR 2536, 6/13/84; NCR 2571, 6/19/84; NCR 2572, 6/19/84; NCR 3423, 10/12/84).	5559	
61	Memo to Puckett from Tier, dated July 12, 1984.	5583	5605
62	Response from Puckett, dated July 26, 1984.	5583	5605
63	Inspection Report 84-13, August 7, 1984.	5595	
64	DeWald to Puckett, dated 7/6/84.	5626	5678
65	Puckett to Saklak "April 15, 1984," rec'd 8/17/84.	5626	5678
66	Puckett to Saklak, August 17, 1984.	5626	5678
67	CMTR for Heat No. 401S7441, 402S9011, 3S202061.	5643	
68	Puckett's review of welder qualification records.	5678	
69	Memo from Simms/Seltmann to _____, 8/6/84, re fab shop audit.	6146	
70	(Indoctrination) weld test facility, 3 pp.	6189	6314
71	Rules for LKC test facility, Puckett's 2 pp.	6189	6314
72	McGregor to Weil, August 28, 1984.	6279	6314
73	Comstock Proc. 4.7.1, Rev. A.	6297	6314

Exhibit No.	Description	Marked	Received
74	LKC NCR 3276.	6297	6314
75	LKC welder qualification log.	6297	6314
76	Puckett's welding practical exam with Nemeth's notes, 7/6/84.	6681	6721
77	PTL QC document transmittal re Report Nos. MWQ-530, MWQ-531, MWQ-532, MWQ-533.	6716	
78	Memo from T. Bowman to DeWald, dated 12/8/84.	6813	6846
79	Memo from DeWald to Mennecke, dated 12/10/84.	6824	6846
80	LKC audit of Aug. 15-17, 1983.	7295	9469
81	CECo Audit Report 20-83-59.	7298	
82	LKC written warning to Seeders, 12/5/83.	7308	7499
83	CECo QA audit 20-84-528, dated 5/21/84 (same as Appl. Exh. 27).	7314	
84	7-Page memo — virtually all Seeders' handwriting, A960 Pyrocon, 5/22/84.	7324	
85	Memo from Seltmann to Mazur, 7/23/84.	7343	7506
86	Memo from Seltmann to Mazur, 8/14/84.	7348	
87	Memo from Dominique to DeWald, 8/21/84.	7355	
88	Memo from Seeders to DeWald with Saklak/ Seese notes re overtime, dated 8/16/84.	7371	7510
89	September request for overtime by Seeders.	7381	7510
90	MRRs for 1-week period of Seeders' August 1984 work load.	7385	16,608
91	LKC Proc. 4.10.2, Rev. B — procedure for material inspections.	7410	
92	Memo to file from Gieseker, dated 8/22/84, re Seeders.	7465	
93	Memo to file from Gieseker, dated 8/23/84, re meeting with Seeders and Tapella.	7470	

Exhibit No.	Description	Marked	Received
94	Memo from DeWald to Seeders re termination and voiding by DeWald 9/27/84 (9/28/84).	7489	
95	Memo from DeWald to Seeders re transfer of 9/28/84.	7489	
96	Memo from Marino to file re Saklak, dated 4/8/85.	8146	8236
97	DeWald training session Form 101s of all QC department re production pressure, dated January 1985.	8171	8190
98	Memo from Corcoran to Saklak/Kast, files dated 12/21/82, re certification of supervisors.	8182	8217
99	Request for inspection #532 re hanger 12 H 35, and signed by R.D. Hunter, 3/10/86.	8942	9042
100	Form 19 by R.D. Hunter, 3/10/86, for hanger 12 H 35.	8952	9042
101	Tom Skidmore's April 16, 1986 memo re Hunter/Arndt termination.	8996	
102	Photograph of a portion of hanger 12 H 35 taken on 3/24/86.	9004	
103	Group exhibit — copies of Martin weld inspection notebook I-VIII.	9384	9396
104	Martin notes of Saklak tape incident.	9404	9560
105	May 7, 1985 request by Perryman to Lamb & Landers for transfer out of walkdown.	9759	9788
106	Letter from Shamblin to DeWald, dated 5/21/85, with attachment, Rev. 2, to dispositioning of NCR 708/709 and cable pan walkdown.	9763	9788
107	Letter from Shamblin to DeWald, dated 5/27/85, with Rev. 3 of cable pan walkdown procedure and dispositioning NCR 708/709.	9766	9788

Exhibit No.	Description	Marked	Received
108	Memo to DeWald from Schriner & Simile with personnel log form for 5/28/85 re Rev. 3 of cable pan walkdown.	9768	9788
109	Memo from McGregor and Schulz, 3/29/85 (with McKirnan notes).	10,277	10,392
110	Memo from Weil to Norelius, 4/5/85 (with McKirnan notes).	10,277	10,392
111	Memo from McGregor and Schulz to Warnick & Williams, 3/29/85 (with McKirnan notes).	10,277	10,392
112	Excerpt from Holley deposition, pp. 86-91 (with McKirnan notes).	10,277	10,392
113	Perryman deposition excerpt, pp. 82-85 (with McKirnan notes).	10,277	10,392
114	Excerpt from Snyder deposition, pp. 78-83 and Snyder deposition Exh. 5 (with McKirnan notes).	10,277	10,392
115	Excerpt from T. Stewart deposition, pp. 41-57 (with McKirnan notes).	10,277	10,392
116	Shewski excerpt of deposition, pp. 1-3 and 185-90.	10,419	10,420
117	Memo from Weil to Norelius re allegation regarding qualifications of LKC inspectors.	11,717	11,718
118	Letter from Shamblin to Wallace re steps of LKC re address inspector morale problems; and, 1.0.0 policy statement and personnel instruction logs.	11,845	
119	Memo from Wm. Dircks, Director of Operations, to BDO office, Directors Reg. Administrators	11,955	11,956
120	S&L Spec. L 2790, Amendments through 42.	12,465	12,883
121	S&L Spec. L 2790, Amendments through 48.	12,465	12,883
122	Group exhibit, volumes I-V, excerpts from CECo Spec. L 2790 original contract.	12,472	12,882
123	Proc. 4.3.8, Rev. G.	12,570	12,661

Exhibit No.	Description	Marked	Received
124	LKC cable installation, Proc. 4.8.8, Rev. D.	12,570	12,661
125	LKC procedure tracking sheet, Proc. 4.3.8, Rev. G, *in camera*.	12,623	12,624
126	9/2/86 Memo from Weil to Norelius, re employment discrimination allegation involving the L.K. Comstock Company at P[illegible]dwood, *in camera*.	12,637	12,637
127	Chart prepared by Guild, rescinded (forerunner of Int. Exh. 145).	13,389	—
128	O'Conner to Keppler, 8/30/84.	13,757	13,758
129	Extract from Gardner deposition.	13,814	13,822
130	Observation CSR-R-M-1-005 (red line).	13,828	13,833
131	BCAP does re cable selection.	13,835	13,849
132	History of CBL 001.	13,849	14,254
133	Warry-Patterson, 1/2/85.	13,907	14,139
134	List of attributes excluded.	13,908	13,916
135	Conduit support reverification.	13,927	13,940
136	BCAP observation CSR-R-E-CND-110.	13,948	13,968
137	Paper V-1 to V-3 from BCAP program document.	13,967	13,967
138	ERC report.	13,973	—
139	8/13/86 Surveillance 5624; NCR 451 attached.	13,979	13,981
140	10/6/86 Orlov to Guild.	13,988	14,253
141	9/30/86 Steptoe to Guild.	13,995	13,995
142	Invalid and out-of-scope compilation by G. Orlov.	14,035	
143	10/9 Wozniac's drawing of an "easy" item WS-conduit hanger.	—	15,140
144	Mr. Shevlin's "hard" item cable pan.	15,141	

Exhibit No.	Description	Marked	Received
145	Kostal sketch of SCC weld.	14,332	14,333
146	Kostal sketch of weld cross-section.	—	15,142
147	Thorsell sketch of cable array.	—	15,142
148	Thorsell sketch of cable cross-section.	—	15,143
149	Kostal sketch of conduit hanger and table.	14,516	15,143
150	Kostal sketch of conduit hanger discrepancy; out of position.	14,533	15,143
151	S&L proposal tach. data for 600-volt cables.	14,627	15,144
152	S&L elec. cable installation info drawing 0-30008.	14,627	15,144
153	Bending-radius observations.	14,964	14,978
154	Thorsell sketch limit switch and min. bend radius of conductors.	14,963	15,145
155	Thorsell letter to Okonite, dated 10/13/86, re Cable IVP004.	14,977	14,970
156	Okonite letter to Thorsell, dated 10/14/86, re Cable IVP004.	14,979	—
157	Kostal sketch of stress planner.	15,031	15,516
158	Kostal sketch of CPH 104 for seismic analysis.	15,031	15,516
159	Sketch tray loads: comparison of "original analysis and new analysis."	15,036	15,145
160	Conduit hangers: more highly stressed, revised.	15,056	15,074
161	Hanger support loads over 90%.	15,064	15,074
162	S&L Design Proc. 19.3.1, 9/23/85.	15,138	15,140
163	Kostal's sketch of material "certs" failure graph.	15,485	15,516
164	S&L trend analysis — tables and text.	15,496	15,514

Exhibit No.	Description	Marked	Received
165	BRIMOIX PTL overinspection painted/ nonpainted.	15,825	15,850
166	Correspondence from Cordell Reed to Keppler re SALP IV (late 1984).	15,834	15,851
167	Four Simile photos of hanger (AR002187-2190).	16,037	
168	Puckett weld coupons.	16,507	16,579
169, 170, 171		16,507	16,579
172	S&L procedure for weld recount.	16,670	16,691
173	____ counting from CBH 104-004 (4 pp.)	16,670	16,691
174	BCAP verification pading CPH 104-004.	16,670	16,691
175	Struct. eng. div. calculation CPH 014-004.	16,670	16,691
176	Summary of changes in weld discrepancies and disc. weld.	16,678	16,691
177	Kaushal Attach. 3, Rev. 2, 10/30/86.	16,680	16,691
178	Kaushal Attach. 4, Rev. 2, 10/30/86.	16,681	16,691
179	Kostal testimony with revised weld counts.	16,683	16,691
180	Seismic calc. CPH 104.	16,685	16,691
181	Int. Exh. 145 with revised weld counts.	16,687	16,691
182	DelGeorge recalculation of agreement rate — case 1.	16,918	17,047
183	DelGeorge recalculation of agreement rate — case 2.	16,959	17,047
184	DelGeorge recalculation of agreement rate — case 3.	16,961	17,047
185	Excerpts from NRC Inspection Report 8203.	17,483	
186	Interviews of all QC inspectors except Kimball.	18,296	18,296

Exhibit No.	Description	Marked	Received
187	Designated portions of Goedecke deposition, 3/12/86.	—	—
188	8/1/83 CECo response/closeout of GO audit of contractors' records (referred to in Int. Exh. 225).	—	—
	INTERVENORS' EXHIBIT LIST		
1	March 2, 1983 memo to Kast and Saklak from Corcoran.	1232	1238
2	1/17/83 Letter to Spessard from Wallace.	1239	1243
3	1/31/84 Specific trouble report and letter to Reed from Spessard, 1/27/84, plus 1/27/84 NRC I.R. 83-18.	1244	1245
4	QA manpower recap.	1260	1260
5	3/19/84 Memo to Paserba from DeWald; 3/16/84 Memo to Cosaro from Wallace.	1266	1267
6	3/2/84 Letter to Keppler from Swartz.	1278	1278
7	3/23/84 Letter to Keppler from DelGeorge.	1297	1297
8	6/9/84 Letter to Rolan and DeWald from Shamblin.	1316	
9	5/18/84 Memo to Mennecke from DeWald.	1304	1316
10	5/21/84 Memo to Mennecke and Quaka from DeWald.	1326	1326
11	11/6/84 DOL letter to Trumble from Daniel P. New re *Puckett v. Comstock*.	1328	1328
12	6/5/84 Memo to Rolan from DeWald re BR-PCD 84.	1341	1343
13	2/6/85 Letter to Rolan from Shamblin re LKC Proc. 4.13.1 and 4.13.2.	1364	1364

Exhibit No.	Description	Marked	Received
14	3/8/85 Memo to Shamblin from DeWald.	1369	1369
15	4/19/85 Memo to Rolan from DeWald re manpower.	1379	1379
16	2/7/85 Memo to distribution-attendees from DeWald re site meeting minutes, 2/7/86.	1385	1386
17	DeWald — certificate of qualifications.	1432	1434
18	1/2/85 Memo to Mennecke from DeWald re Asmussen letter dated 12/14/84.	1475	1475
19	DeWald checklist.	1493	1509
20	LKC forms.		
21	Comstock QC evaluation form (Martin), 1/30/85.		
22	4/29/85 Letter to DeWald from Quaka re BR/PCD 85-288, 3/29/85.	1599	1580
23	8/17/84 Letter to DeWald from Seeders.	1583	1584
24	Nonconformance reports.	1584	1596
25	9/5/84 Handwritten letter to Dept. of Labor.	1596	1637
26	Resume of Worley O. Puckett.	1651	1651
27	Discharge forms — Worley Puckett.	1658	1659
28	Nonconformance report — LKC 3099+ documents.	1688	1699
29	Weld procedure meeting, 8/22/84.	1704	1705
30	7/6/84 Memo to Puckett from DeWald re NRC finding on weld rod control.	1704	1706
31	Various LKC memoranda to DeWald, Saklak, Puckett, Rolan.	1704	1714
32	R. Saklak personnel file review.	1760	1760
33	Larry Seese's diary.	2388	2473
33-A		2472	2473

Exhibit No.	Description	Marked	Received
34	LKC NCR 4762.	2450	2451
35	Perryman's requests for transfer (three memos in May 1985).	3428	3440
36	Paserba (LKC) letter to Shamblin, 4/1/85.	3870	3872
37	Saklak's letter to Shamblin re termination.	3878	3879
38	Shamblin letter to Saklak, 6/6/85.	3883	3886
39	Shamblin letter to Marino, 6/6/85.	3883	3886
40	Form addressed to Preston, 8/20/85, re Saklak — laid off.	3883	3886
41	March 13, 1985, NRC to Forney from from McGregor.	4322	4322
42	Group exhibit (3/29/85, 3/29/85, 4/5/85), expurgated version.	4601	4604
42A	Same as Int. Exh. 42, except unexpurgated and *in camera*.	4602	4604
43	Handwritten notes [DeWald] of 11/20/84 meeting involving Saklak and Rolan.	4780	4810
44	DeWald memo to R. Saklak file, 11/20/84.	4800	4810
45	Written warning to Saklak, dated 11/20/84.	4809	4810
46	Evaluation of Puckett by Kaiser at Zimmer.	6357	6359
47	Summary of W.O. Puckett history.	6421	—
48	August 2, 1983 Corcoran allegation to NRC.	6756	
49	Seese memo, dated 12/3/83 (Wicks).	7124	7124
50	DeWald memo, dated 12/5/83 (Wicks).	7124	7124
51	August 20, 1982 evaluation of Saklak by Brown.	8001	8006
52	September 14, 1983 evaluation of Saklak by DeWald.	8007	8010

Exhibit No.	Description	Marked	Received
53	December 22, 1983 "6-month evaluation" of Saklak by DeWald.	8011	8016
54	Wage rate change effective January 1, 1984, signed by Marino re Saklak.	8016	8018
55	Annual review by DeWald of Saklak, January 30, 1984.	8019	8021
56	January 5, 1985 review of Saklak by DeWald.	8022	8025
57	January 1985 payroll change notice for Saklak from Paserba and Marino.	8025	8027
58	January 20, 1984 payroll change notice for Rick Martin.	8264	8317
59	September 1982 memo to Kast/Corcoran re Level II and Martin certs.	8304	8316
60	Kast/Corcoran memo re Martin certs, dated December 7, 1982.	8321	8327
61	October 6, 1983, from DeWald to Martin re certs removal based on CECo audit [pre-copies checkmarks; inspections while uncertified].	8327	8334
62	Memo to DeWald from Hii and Seese re Martin evaluation, dated November 17, 1983.	8396	8415
63	Memo dated 2/6/84 from Seese to McGuigan file re Martin reinspection.	8418	8422
64	Memo dated 2/13/84 from DeWald to Netzel re reinstatement of Martin certs.	8424	8431
65	Memo dated 2/4/85 by Seese — read and reply re Martin certs and upgrade to Rev. C.	8437	8437
66	Group exhibit of Hunter speedy memos requesting training.	8507	8515
67	R.D. Hunter's review of the thirteen hangers he had previously inspected.	8598	8618

Exhibit No.	Description	Marked	Received
68	Two-page letter authored by R.D. Hunter (handwritten), dated 3/25/86.	8606	8618
69	VWAC 2-page handout from CECo.	8621	8628
70	Two-page letter to Quality First.	8636	8679
71	Request for inspection on hanger 13 H 13 and Bowman's analysis.	9064	9066
72	Employee warning to R. Martin, 1/7/82.	9159	9162
73	Employee warning to R. Martin in 7/82 by Mike Kast.	9162	9165
74	Employee warning to R. Martin on 10/6/83 by Saklak for documentation practices.	9166	9173
75	DeWald memo to file re R. Martin decertification of 10/83.	9173	9177
76	12/4/84 Work performance memo from Seese to Martin.	9178	9186
77	Handwritten note from Martin, dated 10/29/84 and 10/30/84.	9182	9188
78	1/5/85 Memo between Seese and DeWald.	9197	9199
79	1/29/85 Warning to Martin for reading college book.	9202	9202
80	Cover sheet of Int. Exh. 21 plus Attach. A.	9205	9469
81	Memo dated 4/8/85 from Seese re Martin talking to Nemeth during Nemeth working hours (7:52 a.m.).	9206	9208
82	Group beginning 4/10/85 memo from Rolan, Sr. (5 pp.) and at end is another warning to Martin dated 4/85 (4:22 clocked out).	9208	9213
83	Threatening notes to Rick Martin a/k/a "Opie" of 2/84.	9252	9270

Exhibit No.	Description	Marked	Received
84	OI investigation of Rick Martin threats from craft in 2/84.	9264	
85	Drawing of Martin weld stamp.	9586	9586
86	Letter from Keppler to J.J. O'Conner, dated 2/2/83, re NRC I.R. 82-05.	10,001	10,028
87	Subject: Braidwood technical support group evaluation, signed by Maily and Wallace.	10,015	10,028
88	Letter from Keppler to O'Conner, dated 5/7/84.	10,051	10,095
89	BPI's FOIA request to NRC of 11/21/85.	10,610	10,613
90	July 11, 1985 memo from Schulz to McGregor.	10,618	11,669
91	9/25/84 Memo to Forney from Schulz re QC inspector concerns (0119-1).	10,659	10,663
92	USNRC Outgoing transmission service request, 12/28/84, to Forney from Schulz (re meeting with CECo Project Manager and Construction Superintendent, who then met with LKC Manager.	10,706	10,706
93	9/13/85 NRC memo from Weil to Norelius (0119-3).	10,707	10,713
94	2/24/86 NRC memo from Pelke (tracker of allegations) to Region III file (0119-5).	10,714	10,718
95	NRC memo from Gardner to Warnick and Weil re LKC QC inspector who may discredit mang. (125).	10,722	10,723
96	4/17/85 NRC memo by Pelke of allegation review board minutes and assignment of investigation to Mendez (66).	10,723	10,912
97	Memo from DeWald to Mennecke and Quaka, dated 5/12/84, re L 2790.	11,0[illegible]	11,079
98	Dave Thomas LKC checklist located by Mendez.	11,339	11,340

Exhibit No.	Description	Marked	Received
99	NRC memo to Little from Hayes, dated 3/16/84, re Braidwood followup.	11,458	11,463
100	NRC memo to Knop from Hayes re comments for second meeting with CECo on QA problems.	11,458	11,477
101	2/6/84 Memo from McGregor to Weil with 4-page attachment ("Opie" materials) (*see* Int. Exh. 83).	11,492	11,503
102	NRC memo to McGregor and Schulz from Forney re division of responsibilities and assignment as SRI.	11,507	11,509
103	NRC memo to McGregor and Schulz re modification of responsibilities, dated 10/31/84.	11,522	11,528
104	NRC memo from Schulz and McGregor to Greenman re ACRS Conference 2/7/85 (?).	11,528	11,546
105	NRC memo from Little to Schulz re BCAPs, dated 7/19/85.	11,614	11,627
106	NRC memo from Schulz to Little in response dated 7/23/85.	11,635	11,642
107	NRC memo from Little to DRS inspectors re final walkdowns, dated 3/19/86 with attachments from Schulz and McGregor.	11,682	11,696
108	Memo by Archambeault shortly before going to NRC in 6/86, re Archambeault allegations.	12,141	—
109	Resume of Gregory Joseph Archambeault.	12,143	12,173
110	Cable Card Attach. "A1" to insulation procedure, re Archambeault.	12,150	12,173
111	Division-Color-Segregation Code Table Attach. "C1," re Archambeault.	12,154	12,173
112	LKC — Cable Raceway Release Attach. "B," re Archambeault.	12,160	12,173

Exhibit No.	Description	Marked	Received
113	LKC — QC cable-pulling checklist, re Archambeault.	12,172	12,173
114	LKC Kellum grid, Attach. J-1 of the installation procedures (photograph).	12,214	12,214
115	Memo from Archambeault to Revels, 3/4/86, re cable violations.	12,233	12,261
116	NCR 4987, 3/19/86, originator Archambeault, QC Mgr. Seese, re cable installation.	12,252	12,261
117	List of damaged cable prepared by Archambeault, re NCR 4987.	12,256	12,261
118	6/2/86 Handwritten letter from Archambeault to Nemeth, re shift change.	12,273	12,276
119	6/10/86 Memo with attachments from Mennecke to Deress, re one of forty-two cable separation conflict reports (B511).	12,288	12,290
120	8/7/86 S&L memo from Regan to Elias, cable separation report BRCSR No. 62.	12,295	12,296
121	9/9/86 Hand drawing by Archambeault of remote shutdown panel unit #1.	12,308	12,310
122	6/4/86 Handwritten memo from Archambeault to NRC, re Archambeault allegations.	12,326	12,328
123	7/10/86 Second request for shift transfer from Archambeault to Carielli and Nemeth.	12,328	12,329
124	8/7/86 Third request for shift transfer by Archambeault. Middle of page is Nemeth's response supporting the transfer, dated 8/11/86. Bottom of page is Simile's denial for transfer, dated 8/27/86.	12,336	12,336
125	8/19/86 Handwritten document by Archambeault to LeSarge, re outlining problems in obtaining transfer.	12,368	12,394

Exhibit No.	Description	Marked	Received
126	Handwritten document from Barels to Simile re Revel's understanding of the circumstances and his displeasure with Archambeault's absence.	12,387	12,394
127	Typewritten document by Archambeault in response to memo by Dougherty and Gieseker, 8/27/86.	12,401	12,416
128	8/27/86 Memo from Dougherty and Gieseker re Archambeault, reference only.	12,412	12,412
129	Archambeault questionnaire.	12,418	12,425
130	Last page of Int. Exh. 129, typed paragraph attached to questionnaire explaining its purpose, offer of proof only.	12,422	
131	Group exhibit of completed Archambeault questionnaires.	12,424	
132	Questionnaire filled out by Archambeault.	12,477	12,479
133	8/27/86 Union grievance filed by Archambeault.	12,493	12,496
134	8/28/86 Memo from Shamblin to Maiman, DelGeorge, Wallace, Preston, Marcus, Gieseker, Dougherty, re Gieseker/ Dougherty memo of 8/28/86.	12,499	12,503
135	9/8/86 NCR 841 and attachment, 4/15/82, recommended guidelines for field examination of suspected nonconformed cable-bending radius.	12,504	12,507
136	Extract of response to 83-09.	12,935	12,938
137	CSR database corrections, 9/10/86.	13,040	—
138	CSR database corrections, 9/27/86.	13,040	—
139	Notes: NRC enforcement conf., 3/7/84.	13,097	13,108

Exhibit No.	Description	Marked	Received
140	7/27/84 Keppler to O'Conner re BCAP.	13,115	13,125
141	BCAP CSR inspection points by S&L.	13,124	14,277
142	8/13/84 Kaushal to Maiman *et al.*	13,201	13,230
143	BCAP Proc. 06.	14,170	13,390
144	Quaka to Kaushal, 2/28/86, NCR 6145.	14,173	13,390
145	Table of percentage discrepant conditions by item.	13,390	
146	NRC report extract 8502.	13,422	13,940
147	3/7/85 Kaushal to Maiman.	13,425	13,486
148	1/23/85 Kaushal to Byers.	13,428	13,488
149	NRC report extract 8506.	13,488	—
150	9/12/85 Orlov to Kaushal.	13,504	13,531
151	BCAP observation CSR-I-E-CPH-001-02.	13,534	13,552
152	CECo NCR 451, 12/21/82.	13,539	—
153	ERC (Hansel) to Kaushal, 1/30/85.	13,568	13,585
154	3/19/85, Smith-Kaushal Air 09.	13,603	
155	CPH 104 observation package.	13,756	
155-A		13,686	13,756
155-B		13,696	13,756
156	Palladino-Dingell, 2/1/82, w/attachment.	13,731	—
157	Weiss handwritten comments on BCAP.	13,736	13,736
158	Pages II-3 to II-5 of BCAP draft program doc.	13,738	13,755
159	Memo re sample selection for other five electrical populations.	14,563	
160	Cable pan hangers packet.	14,141	14,141
161	S&L procedure — design single calculations.	14,346	14,353
162	CBL observation CSR-1-E-CBL-130-02.	14,417	14,471

Exhibit No.	Description	Marked	Received
163	7/13/85, Bojan to Bartulucci.	14,580	14,581
164	NU-22 coordinate system sketch.	14,759	14,768
165	Sketch — local & global ____ system.	14,759	14,768
166	NU-7 coordinate system sketch.	14,760	14,768
167	Response spectra diagram.	14,768	14,778
168	CSR population: list of R values and design margin (except for cables and conduits).	14,799	14,804
169	CSR-I-E-CPH highly stressed hangers (4 pp.).	14,807	14,844
170	Conduit hangers more highly stressed.	14,839	14,844
171	Highly stressed electrical equipment (2 pp.).	14,851	14,862
172	May 8, 1985 meeting notes, inspection point counting.	14,864	14,919
173	List of reconstituted COH ____ .	15,338	15,338
174	Sketch of CND observation package 1503 plus observation package from NCR 6145, subparts 02, 03, and 04.	15,339 17,725	15,341
175	S&L trend process and summaries of trend evaluation.	15,343	
176	S&L trend guidelines.	15,394	15,399
177	Excerpts from IR 86-03.	15,478	—
178	COH pages — summary of missing welds COH-69-002 diagram plus complete observation package.	15,524	16,709
179	72 Undersize weld CPH observation.	15,530	16,709
180	PTL "good news story."	15,584	15,632
181	Excerpts from QCIRP.	15,632	15,653
182	10% visual weld inspection memo and other related memos.	15,702	15,714
183	Memos relating to LKC getting inspectors from PTL on loan.	15,715	15,733

Exhibit No.	Description	Marked	Received
184	Inspecting-through-paint documents.	15,738	15,749
185	First page of PTL instruction sheet.	15,855	15,856
186	AVO1419.	15,958	15,958
187	S&L BCAP CSR inspection/discrepancy points (Revised Int. Exh. 141).	16,702	16,706
188	BPI Tables #1, 2, and sample calculation.	16,808	16,841
189	Intervenors' redo of bar chart on weld discrepancies.	15,738	15,799
190	Revisions of Int. Exh. 189.	16,878	16,895
191	DelGeorge timeline of harassment events.	17,020	17,041
192	Frankel CSR database printout.	17,104	—
193	Hulin interview outline.	17,994	17,995
194	Hulin interview notes.	17,998	
195	Kimball interview.	18,191	18,120
196	Excerpts of Noble interview.	18,134	18,137
197	3/3/82 Comstock memo, Corcoran to installation reports indicating incomplete fabrication.		—
198	3/29/82 Comstock memo, Brown to all personnel, re documentation requires (i.e.) black ink.	18,440	—
199	7/12/82 Comstock memo re correction of quality documents (no whiteout, etc.).	18,440	—
200	7/19/82 Comstock memo, Brown to Cosaro re QC inspection status as of 7/19/82.	18,442	18,442
201	8/17/82 Tapella memo re cable separation (same as HR00031).	18,445	18,445

Exhibit No.	Description	Marked	Received
202	8/18/82 Comstock memo, Saklak/Kast to all QC inspectors re NCR/ICR closeout action to be complete in 2 days.	18,446	18,446
203	7/16/82 Comstock memo, Stiles to all QC personnel re documentation and correction of documents.	18,448	—
204	9/17/82 Comstock memo, Corcoran to QC supervisors re supervisor duties/ authorities.	18,449	—
205	10/25/82 CECo surveillance report 2466 re 35% inspection to 100% inspection.	18,451	18,451
206	9/29/82 Comstock memo, Corcoran to all employees re Saturday, 10/2/82 overtime.	18,452	18,452
207	10/28/82 Comstock memo, Rolan to Brown re 100% inspection requirements effective 11/1/82.	18,454	—
208	11/8/82 Comstock memo, Corcoran to Saklak/ Kost re elimination of daily summary reports.	18,455	—
209	11/15/82 Comstock memo, Corcoran to Sommerfield re meaning of LI/LII signatures on quality documents.	18,467	18,467
210	Comstock memo to all employees re jobsite work rules.	18,468	18,468
211	12/27/82 Comstock memo, Tapella to Rolan re inspection of system control hangers.	18,470	18,470
212	4/11/83 Comstock memo, Rolan to Corcoran re non-SR cable ends stored in turbine bldg.	18,477	18,477
213	6/16/83 Comstock memo, Kast to all welding inspectors re hanger installation reports.	18,480	18,480

Exhibit No.	Description	Marked	Received
214	8/16/83 Comstock memo, DeWald to Lechner/ Saklak/Brown/Rolan/Phillips re daily inspection status reports.	18,481	18,481
215	10/16/83 Comstock memo, DeWald to Marino re formulated plan to complete backlog/ document review.	18,481	18,481
216	2/27/85 Comstock memo, DeWald to all supervisors re field activity — inspectors not working.	18,481	18,481
217	2/20/85 CECo memo, Shamblin to all site contractor management re policy statement on servicing audit groups.	18,484	—
218	3/9/85 Comstock memo, DeWald to Worthington re supervisor responsibilities.	18,484	18,484
219	3/11/85 Comstock memo, DeWald to Saklak re supervisor responsibilities.	18,484	18,484
220	3/11/85 Memo, Tapella to DeWald/Quaka, re LKC to stop CPH configuration inspections unless per 705/70.	18,484	18,484
221	3/15/85 Comstock memo, DeWald to Supervisor Distribution re supervisions required by 6/1/85.	18,484	18,484
222	Saklak handwritten notes from staff meeting re Tyler inspection through paint.	18,484	18,484
223	10/8/82 Memo, Brown to Corcoran re definition of M-process inspection.	18,485	—
224	10/11/82 Memo, Sommerfield/Cosaro to Rubino/Brown/Patton/Pruitt re upgrade inspection personnel.	18,486	18,486
225	11/12/82 Comstock memo, Corcoran to Marcus re response to CECo G.A. audit.	18,489	18,489
226	1/11/83 Comstock read and reply re inspection of RRRs — no additional personnel.	18,492	

Exhibit No.	Description	Marked	Received
227	2/2/83 Comstock memo, Kast/Saklak/ Corcoran to QC personnel re QC production charts.	18,492	
228	3/10/83 Comstock memo, Corcoran to Kast/ Saklak re writing NCRs instead of ICRs.	18,492	18,492
229	5/11/83 Memo, Cosaro to site contractors re description of original QCIRP.	18,493	18,493
230	3/17/83 Comstock memo, Corcoran to Kast/ Saklak re in supervision responsibilities missing inspection records of LKC inspectors.	18,493	18,493
231	4/28/83 Comstock memo, Saklak/Corcoran to Marino re improper review by construction of installation procedures.	18,493	18,493
232	5/3/83 Comstock memo from Rolan to Corcoran, yes, re safety-related cable cards.	18,496	18,496
233	4/6/83 Comstock memo from Saklak/Brown to F. Rolan re safety-related cable-pull cards.	18,497	—
234	5/16/83 Comstock memo, Corcoran to Rolan/ Mennecke re weld in inspection nonreported backlog chart condition.	18,498	18,498
235	7/7/83 Comstock memo, Corcoran to Rolan re NCR for nonsafety-related work.	18,498	18,498
236	7/19/83 Comstock memo, Corcoran to Saklak/ Pysell re NCR 929, inspection of configuration and welding.	18,499	18,499
237	8/5/83 Comstock memo, DeWald to Saklak/ Phillips re weld rod control.	18,499	18,499
238	10/23/83 Comstock memo, Hii to all welding and configuration inspectors re welding and configuration meeting 9/22/83.	18,499	18,499
239	Sample daily inspection status report.	18,499	18,499

Exhibit No.	Description	Marked	Received
240	10/3/83 Comstock memo, Seltmann to Sommerfield/Rolan re trend analysis report 9/1/82–8/31/83.	18,502	18,502
241	10/5/83 Comstock memo, DeWald to training file re checklist/procedures in field during inspections.	18,503	18,503
242	10/11/83 Comstock memo, DeWald to Rolan re DeWald signature authorization to Saklak.	18,503	18,503
243	10/19/83 Comstock memo, Saklak/Baranowski to Mennecke re vendor welding hangers.	18,506	18,506
244	10/24/83 Speed letter, Hansen to Matz re continue installing hangers in Unit II wing walls.	18,506	18,506
245	11/1/83 Comstock memo, DeWald/Saklak to LKC construction/QC re stamping vendor welds by LKC weld inspection.	18,506	18,506
246	11/8/83 Comstock memo, DeWald to all QC inspectors re completing documentation in field and work hours.	18,506	18,506
247	1/12/84 Comstock memo, Seese to DeWald re backlog/phase II completion schedule 5/1/84).	18,506	18,506
248	1/23/84 Comstock memo, Rolan to area managers re limit ICRs open.	18,506	18,506
249	1/24/84 Memo, Hill to Shamblin/Mennecke re electrical bulk quantity curves.	18,509	18,509
250	1/25/84 Comstock memo, DeWald to Seese/ Brown/Saklak re ICRs — transmitting Rolan memo to QC supervisors.	18,509	18,509
251	Status from original QCIRP.	18,509	18,509
252	2/9/84 Comstock memo, DeWald to Seese re NCR/ICR closeout QA surveillance 3244.	18,509	18,509
253	2/27/84 Comstock memo, DeWald to Seese re identification requirements for QC supervisors.	18,509	18,509

Exhibit No.	Description	Marked	Received
254	4/18/84 Comstock memo, DeWald to all QC personnel re cross-training (on one's own time).	18,509	18,509
255	4/26/84 Saklak meeting notes re problems between QC and craft.	18,510	18,510
256	5/1/84 Comstock memo, DeWald to Seese/ Saklak/Seltmann re T. Paserba memo (84-04-27-03).	18,512	18,512
257	5/2/84 Comstock memo, DeWald to Quaka re weld coupons with known defects for practical.	18,512	18,512
258	5/2/84 Comstock memo, Seese to Saklak re rework program started.	18,512	18,512
259	5/5/84 Comstock memo, DeWald to Seese/ Saklak re Cosaro request for matrix of QC special projects.	18,512	18,512
260	5/5/84 Comstock memo, DeWald to Rolan re AVD review — estimated completion date.	18,515	18,515
261	5/8/84 Comstock memo, DeWald to Seese/ Saklak/Klacko/Hii re QC-US reports and 4-inch × 6-inch × 1/2-inch laminated plate surveillance.	18,518	18,518
262	5/10/84 Comstock memo, DeWald to Rolan re safety-related cable-pulling stopped.	18,520	18,520
263	5/12/84 Comstock memo, Seese to Saklak re new daily inspection status report — Saklak comments.	18,521	18,521
264	5/12/84 Comstock memo, Seese to DeWald re QC matrix.	18,521	18,521
265	5/16/84 QA memo, Quaker to all site personnel re MRR processing.	18,523	18,523
266	4/19/83 CECo letter to Comstock, Getschow & Pullman from Cosaro re installation clearance.	18,526	18,526

Exhibit No.	Description	Marked	Received
267	6/9/84 Comstock memo, DeWald to all leads re daily inspection assignments.	18,527	18,527
268	6/13/84 Comstock memo, Saklak to Nelson re beam stiffener installation.	18,528	18,528
269	6/16/84 Comstock memo, DeWald to Worthington/Saklak re improving inspection productivity.	18,528	18,528
270	6/23/84 Comstock memo, DeWald to Saklak re rework review — turnaround time is 1 day.	18,529	18,529
271	6/27/84 Comstock memo, Klena to Rolan re BCAP meeting attendance.	18,532	—
272	6/27/84 Comstock QC staff meeting — DeWald/Worthington/Saklak/Seese.	18,533	18,533
273	6/30/84 Comstock memo, DeWald to Worthington/Saklak re inspectors directing craft.	18,534	—
274	7/9/84 Comstock memo, DeWald to Worthington/Seese/Saklak re suggestions from 7/30/84 meeting with QC inspectors, open-door policy.	18,536	18,536
275	7/21/84 Comstock memo, Seese to DeWald re weekly status reports — 7/13/84–7/19/84.	18,536	18,536
276	7/30/84 Comstock memo, DeWald to Saklak re Saklak — expedite training in areas he supervises.	18,536	18,536
277	8/16/84 Comstock memo, DeWald to Saklak re NCR for ECE DCRs — Saklak response.	18,536	18,536
278	7/23/84 Comstock memo, DeWald to Worthington re drop in number of inspections performed.	18,536	18,536
279	8/10/84 Comstock QC staff meeting attendance, DeWald/Seltmann/Saklak/Seese/ Nash/Worthington.	18,536	18,536

Exhibit No.	Description	Marked	Received
280	8/1/84 Comstock memo, Worthington to DeWald re backlog counts.	18,536	18,536
281	8/1/84 Comstock memo, Seese to DeWald re Worthington memo 84-08-01-05.	18,536	18,536
282	8/22/84 Comstock QC meeting re Puckett/ Hii practical, 72-hour shift.	18,536	18,536
283	10/4/84 Seese memo re steady increase in number of inspections.	18,536	18,536
284	10/23/84 Comstock memo, DeWald to Saklak/ Simile re were any welds inspected through paint?	18,536	18,536
285	1985 Quality First file re BCAP AR007388-7480.	18,572	18,572
	NRC STAFF EXHIBIT LIST		
1	Cover letter to Snyder re transmittal by NRC of 4/8/85.	4617	4618
2	Cover letter to Rolan re transmittal by NRC of 4/8/85.	4830	4831
3	Cover letter to Mustered re transmittal by NRC of 4/8/85.	5071	5072
4	4/8/85 Letter, Weil to Gorman, transmitting memo.	5871	5889
5	4/8/85 Letter, Weil to Peterson, transmitting memo.	5970	5972
6	12/4/85 Letter, Weil to Puckett, transmitting inspection report.	6485	6637
7	9/6/84 Letter, Weil to Spessard/Norelius, Puckett allegations.	6528	11,931
8	9/26/84 Letter, Weil to Puckett, transmitting transcript of 9/11/84 meeting at Region III.	6532	6637
9	9/6/84 Letter, Weil to Puckett, re meeting at Region III.	6579	6637

Exhibit No.	Description	Marked	Received
10	Transcript of 9/11/84 meeting at Region III re Puckett concerns.	6629	—
11	4/8/85 Letter, Weil to Bowman.	6963	6963
12	8/29/84 Letter from Weil to Seeders re 8/17/84.	7743	7756
13	1/21/85 Letter from Weil to Seeders enclosing Schulz inspection report.	7748	7756
14	NRC inspection report.	7748	—
15	4/8/85 Letter, Weil to Martin, transmitting memo.	9508	9560
16	4/10/85, portion of Intervenors' 42A transmittal from McGregor to Weil.	9508	9560
17	11/11/85 I.R. 85-21.	10,437	10,943
18	Memo from Forney to Weil, 8/23/84, re allegations — Braidwood.		11,941
19	Memo from Weil to Norelius, 8/27/84, re harassment and intimidation of QC inspectors.		11,941
20	Memo from Pawlik to Weil, 1/2/85, re 1/21/85 memo re allegation on L.K. Comstock at Braidwood.		11,941
21	Memo from Weil to Spessard and Pawlik, 10/26/84, re allegation regarding welding by LKC at Braidwood.		11,941
22	Memo from Pawlik to Weil, 12/16/85, re allegations regarding welding by LKC at Braidwood.		11,941
23	Memo from Weil to Pawlik, 11/7/85, allegation re harassment of LKC inspectors at Braidwood.		11,941
24	Weil to Hii, 4/8/84.	16,637	—
25	NRC Inspection Report 86-03.	17,566	17,607
26	Prefiled testimony of William Little.	18,290	18,290

Exhibit No.	Description	Marked	Received
	LICENSING BOARD EXHIBIT LIST		
1	5/14/86 NRC memo for Region III files from B. Stapleton re OI status of Puckett.	6732	—
2	*Chicago Tribune* article dated Sunday, July 6, 1986, re QC inspectors' fears about visiting NRC.	6732	—
3	CECo request by Chris Hayes for AWS interpretation.	9097	9130
4	AWS authorized interpretation, signed Moss V. Davis.	9102	9130
5	Excerpt from 10/84 *Welding Journal* re D1.1 applicability and D1.3.	9109	9130
6	*Chicago Tribune* article, 9/15/86, re investigation of Braidwood media leaks.	12,868	—
7	*In camera* memo, Weil from R.B. Landsman, Project Inspector, DRP re Braidwood allegations.	13,225	—
8	Regulatory Guide 161.	16,693	16,693
9	Memos: 1/27/86, Little to McGregor and Schulz; 1/30/86, McGregor to Little; 1/30/86, Schulz to Little; 3/19/86, Little to Moffett *et al.*	17,388	17,388

Dissenting Opinion by Herbert Grossman, Chairman

TABLE OF CONTENTS

I. MINORITY OPINION

A. Matters of Dissent

I cannot agree with a number of conclusions reached in the majority opinion. In this Minority Opinion and underlying Minority Findings of Fact and Conclusions of Law I find, contrary to my colleagues, that 10 C.F.R. Part 50 was violated by certain practices and in certain instances: Commonwealth Edison Company's Project Construction Department improperly asserted production pressure on its electrical contractor, Comstock, which, in turn, improperly asserted pressure on its Quality Control inspectors; Comstock improperly appointed Irving DeWald as Quality Control Manager to orient the Quality Control Department away from good quality control practices to production; Comstock management improperly gave supervisory authority to Richard Saklak for the purpose of promoting quantity over quality; Commonwealth Edison Company and Comstock improperly terminated Level III Quality Control welding supervisor Worley Puckett for raising legitimate quality concerns; and, Comstock management harassed and attempted to intimidate Quality Control Inspectors Perryman, Archambeault, and Martin, and retaliated against them for raising quality concerns.

I also find that the complaints of twenty-four inspectors to the NRC on March 29, 1985, evidenced improper production pressures asserted on them by their management; that the grid system of weld inspection in effect prior to October of 1983 totally lacks credibility as an inspection program; that the sampling reinspection programs (BCAP and PTL overinspection) were inadequate to support the efficacy of the quality assurance program or the soundness of the electrical system installation; and that NRC Staff's approval of the Comstock Quality Control effort should be afforded little weight.

Notwithstanding my findings of improper production pressure and instances of harassment, intimidation, and retaliation, I find that the Quality Control inspectors properly performed their inspections for the period in issue (post-1983) and that there is reasonable assurance that the electrical system was properly installed. However, contrary to my colleagues, I cannot find reasonable assurance of the safety of the plant without further evidence of the efficacy of the grid system welding inspections performed prior to October 1983, and I would recommend the imposition of civil penalties on Applicant and Comstock under 10 C.F.R. § 50.7(c)(2) for the Puckett, Archambeault, Martin, and Perryman matters.

B. Background

Intervenors' harassment contention asserts that, contrary to 10 C.F.R. § 50.7 and Criterion I of Appendix B to 10 C.F.R. Part 50, Applicant and L.K. Comstock Engineering, Inc. ("Comstock" or "LKC"), the organization that performed the Quality Control inspections of the electrical work at Braidwood, failed to provide Quality Control inspectors with sufficient authority and organizational freedom and independence from cost and schedule, as opposed to safety considerations, to permit the effective identification and correction of quality and safety-significant deficiencies. The contention also asserts the existence of systematic and widespread harassment, intimidation, retaliation, and discrimination by Comstock Quality Control management against inspectors who expressed safety and quality concerns.

Three bases for the contention are recited, namely that:

1. Comstock QC inspectors have been subjected to harassment and intimidation by Comstock QC management, Messrs. DeWald, Seese, Seltmann and Saklak, from at least as early as August 1984 through the present. Such harassment, it is asserted, included widespread pressure to approve deficient works, to sacrifice quality for production and cost considerations and to violate knowingly established quality procedures.
2. QC inspector John Seeders was subjected to harassment about production pressure and was the subject of retaliation and discrimination by virtue of an involuntary transfer to Comstock's engineering department some six weeks after he wrote a letter of complaint to Comstock management (with a copy to the NRC resident inspector).
3. QC inspector Worley Puckett was subjected to harassment and discrimination and improperly terminated by Comstock management, Messrs. DeWald and Marino, because he raised safety and quality concerns.

The time frame for determining when alleged occurrences of harassment are within the scope of the contention was purposely left vague at the time the stipulated contention was accepted by the Board. The early date of interest was characterized with the Board's approval as "at various times since at least August 1984." The end date was stipulated as being the "present." Our purpose was to allow Intervenors the opportunity during discovery to identify as many relevant instances of harassment as possible to buttress their allegation that Comstock's Quality Control inspectors were subject to "systematic and widespread harassment, intimidation, retaliation, and other discrimination."[1] Intervenors have had that opportunity, and the scope of the contention is now defined by the evidence received in this record.

[1] Tr. 254-59 and 266-68.

The evidence as to whether or not a pattern of harassment existed at Comstock centers on its Quality Control Manager, Mr. DeWald. Evidence involving Mr. DeWald's predecessor or events occurring prior to the date of Mr. DeWald's arrival at the Braidwood site as Quality Control Manager was limited to its historical value for purposes of perhaps providing insight as to the motives for actions taken during DeWald's tenure as Quality Control Manager. I, therefore, find that the alleged acts of harassment more relevant to the contention are those that occurred after Mr. DeWald's appointment as Quality Control Manager at Braidwood in August 1983.

The end date is less easy to define. The evidence adduced indicates that the alleged events of harassment carry on through March 1985. Thereafter, in 1985, only one alleged act of harassment and discrimination was considered on the record. We made it clear that the "present" as we approved its use in the contention was not intended as a continuum. Rather, it allowed Intervenors to pursue and use alleged new instances of harassment as they were discovered.[2] It was on this basis that we admitted the issues involving Quality Control Inspectors Hunter, Martin, and Archambeault which arose in March and September 1986, respectively. No other issues have been identified. Accordingly, I limit the reach of the contention, in terms of the "present," to these issues.

C. Organizational Pressure

Intervenors perceive two violations of Criterion I. One involves the suggestion that Comstock's Quality Control organization lacks the requisite organizational independence from cost and schedule considerations, an issue prompted by Applicant's Construction Superintendent's involvement with the Comstock Quality Control Department in 1984. The second issue is whether actions instigated by the management of the Comstock Quality Control Department constituted a pervasive pattern of harassment, intimidation, and production pressure that destroyed the independence of Comstock's Quality Control inspectors.

L.K. Comstock was awarded the electrical contract for Braidwood Units 1 and 2 by Applicant on February 5, 1979. Prior to L.K. Comstock's involvement, the electrical work had been performed by E.C. Ernst Company.

Until November 1982, LKC performed its Quality Control inspections on a 35% sampling basis. Only thirty-five welds out of a population of 100 welds would be inspected by Quality Control inspectors. The remaining sixty-five welds would not be inspected unless deficiencies identified in the sample population indicated the need to expand the inspection sample. In November 1982, CECo required LKC to perform inspections of 100% of all activities

[2] Tr. 268.

requiring Quality Control inspectors because of errors in LKC's sampling methodology. This change in inspection policy required LKC to go back and inspect all electrical, safety-related work performed prior to November 1982. At this time, Comstock's Quality Control organization was inadequately staffed in that there were only three or four Quality Control inspectors to cover 100 welders. As a consequence, an immediate and substantial backlog of approximately 14,000 inspections was created.

In November 1983, the NRC conducted an inspection of the Braidwood facility, including LKC's Quality Control Department. As a result of that inspection, the NRC expressed serious reservations regarding LKC's ability to perform the inspections necessary to eliminate the backlog created by the change in inspection policy while simultaneously keeping pace with current inspections. Accordingly, the Staff contemplated ordering Applicant to cease all electrical installation work until the backlog was eliminated or reduced considerably.

In May 1984, CECo selected Daniel Shamblin to replace Richard Cosaro as Project Construction Superintendent at Braidwood. Shortly thereafter, Mr. Shamblin held a number of discussions with Comstock regarding inspection backlog problems. In response to Mr. Shamblin's concerns, LKC Quality Control Manager Irving DeWald submitted a plan on June 5, 1984, pursuant to which the backlog of inspections in the welding, cable pan, and cable tray, conduit, and terminations disciplines would be targeted for completion by July 12, 1984. Under the plan, however, the backlog of inspections of junction boxes and small equipment would exist until September 1984. Mr. Shamblin was not entirely satisfied with that completion date of September 1984 and, in a letter dated June 9, 1984, informed Mr. DeWald and DeWald's superior Mr. Rolan that, according to CECo's records, the amount of all backlog inspections exceeded 6000 in number. The letter stated that the reduction in this backlog "must be the *first* priority of LKC Production, Engineering and Quality Control Personnel" (emphasis in original). Mr. Shamblin also indicated in the letter that "positive results (i.e., significant current inspection backlog reductions) must be seen *very shortly*" (emphasis in original). If such results were not soon forthcoming, Mr. Shamblin was prepared to suspend LKC's operations. Finally, Mr. Shamblin directed Mr. Rolan and Mr. DeWald to report to him every Monday on the progress in eliminating the backlog that had been made the previous week.

L.K. Comstock had replaced its prior Quality Control Manager, Thomas Corcoran, with Mr. DeWald in August 1983, because Mr. Corcoran had been too quality conscious and not sufficiently construction oriented. Prior to that, in July 1982, Comstock had appointed 24-year-old Richard Saklak as Quality Control Supervisor charged with the mission by Comstock construction of trying to bring the Quality Control Department under control and to organize a production system for responding to the installation reports from the Production

Department. Mr. Saklak had previously been employed as a cost and scheduling engineer at Edison's LaSalle station and immediately prior to his Quality Control reassignment had been a planning and scheduling engineer for Comstock production at Braidwood. He had no prior quality control work experience. Very quickly after Mr. DeWald's appearance as Quality Control Manager in August 1983, DeWald evaluated Mr. Saklak as a "very aggressive individual" who had taken on added responsibilities under him, duties that would have been performed by an assistant quality manager "with great enthusiasm and zest." Mr. DeWald concluded that "Rick is a real asset to the Braidwood QC department." When Mr. Saklak became a Quality Control Supervisor in July of 1982, he shared his supervisory position with another individual. At about the time Mr. DeWald became Quality Control Manager, Mr. Saklak became the sole supervisor of Quality Control inspectors.

In May 1984, at the time Mr. Shamblin became CECo Project Construction Superintendent at Braidwood and began overseeing the Comstock Quality Control Department, Comstock's Quality Control management developed a status tracking system. Under this system, each Quality Control inspector was required to complete and submit to his lead inspector a report documenting the numbers of inspections he had completed that day. The lead inspector would then use this information to compile a daily inspection status report for his group and submit that report to his supervisor. Each supervisor, in turn, was to use this information to compile a daily status report for each of the inspection disciplines under his jurisdiction to be submitted to Quality Control management. The Quality Control inspectors were concerned that the daily status report they turned in to their lead inspectors might be used by management to establish quotas or to punish them if they failed to perform a certain average number of inspections, although Comstock management assured them that that was not the case.

Also during this time Mr. DeWald would meet with the LKC Quality Control inspectors each Friday to discuss LKC's inspection activities. During these meetings, inspectors frequently were exhorted to redouble their efforts to eliminate the inspection backlog and perform current inspections in a timely fashion. It was also at these meetings that Mr. DeWald, on more than one occasion, stated that Comstock was in danger of losing its contract if it failed to satisfy certain promised completion dates. The threatened loss of Comstock's contract was shoptalk among the Quality Control inspectors at that time. At one meeting in the summer of 1984, Comstock Quality Control Manager Robert Seltmann indicated that if the backlog of inspections were not eliminated, it could mean that the livelihood of Comstock at Braidwood would be lost. Assistant Quality Control Manager Larry Seese indicated at another meeting that things were looking very critical for Comstock and that everyone's help was needed to eliminate the backlog. Mr. DeWald acknowledged such a rumor that Comstock was in jeopardy of losing its electrical contract. However,

he recalled the rumor circulating in January 1985. Ultimately, Comstock did lose its contract for a portion of the electrical work on Unit 2 to the Gus K. Neuberg Company.

It is against this background that we must consider the alleged instances of harassment, intimidation, and production pressure. The main instances involved the termination of Worley E. Puckett as a Level III Welding Inspector in August of 1984, the transfer of John Seeders from a Level II Quality Control inspector's position to a clerk's position in the engineering department of Comstock in October 1984, and the March 29, 1985 incident in which twenty-four Quality Control inspectors complained to the NRC of harassment, intimidation, and production pressure. Other, lesser incidents involved Quality Control Inspectors Perryman, Bowman, Archambeault, Martin, Hunter, Peterson, Rolan, Mustered, and Stout.

D. Incidents of Harassment, Intimidation, and Retaliation

1. Worley O. Puckett

In the spring of 1984, faced with the enormous backlogs of inspections and quality documents requiring review, Comstock interviewed and hired Worley O. Puckett as a Level III Weld Inspector to address NRC-identified problems in the welding inspection area. Mr. Puckett's background as reflected in the interview and his resume demonstrated qualification for this position. Mr. Puckett brought with him almost 20 years' experience as a welder in the U.S. Navy. He had graduated with honors from the Navy's year-long welding school. After retirement from the Navy, Mr. Puckett was hired at the Zimmer Nuclear Power Station by the Henry J. Kaiser Company where he worked in a variety of positions for some 9 years until the project was cancelled in January 1984. He was initially hired and qualified as a Level II Mechanical Quality Assurance Inspector, a position he held for approximately 18 months. Thereafter, he was promoted to the position of Lead Mechanical Inspector and then later transferred from the quality assurance to the construction department where he was promoted to the position of Chief Weld Engineer. In that capacity he was responsible for all of the weld-related activities at the Zimmer project. Mr. Puckett received favorable evaluations in these positions.

However, in April 1982, Mr. Puckett received the first critical evaluation that he had received at any time in his Navy or civilian nuclear program experience. As part of a site-wide management restructuring, in which new management was brought into virtually all departments including quality and construction, Mr. Puckett had been displaced in the senior weld engineering position by Mr. Manfred Goedecke, who gave him the critical evaluation. Although he was evaluated as meeting the requirements overall, Mr. Puckett sought and re-

ceived clarification of the adverse aspects of this evaluation. Five days later, Mr. Goedecke clarified the performance evaluation in a more extensive memorandum to acknowledge many of Mr. Puckett's exceptional abilities and to indicate that his deficiencies were attributable to the extensive work load that prevented Mr. Puckett from keeping up with new construction requirements.

Mr. Puckett subsequently took a course taught by Mr. Goedecke on the American Welding Society Code. Tests were administered after each day's lecture, of which there were at least fourteen in number, and Mr. Puckett scored the highest in the class. Thereafter, Mr. Puckett received his last performance evaluation at Zimmer from Mr. Goedecke, which indicated that Mr. Puckett had "improved tremendously," had passed all examinations with excellent marks in the in-house course, and had attained knowledge from seminars and courses in the areas of code applications, procedure preparation, interpretation of codes, standards and specifications requirements, and the practical application of welding and nondestructive examination processes. The evaluation further indicated that Mr. Puckett "needs to reassume a supervisory position," and "will be placed in a supervisory position as soon as one becomes available."

During the course of Mr. Puckett's brief tenure at Comstock (which lasted 89 days), he undertook wide-ranging activities to review the work of the welding and welding inspection program at Comstock and he identified numerous areas for improvement or revision. One of the duties assigned to Mr. Puckett by Quality Control Manager DeWald involved the review of Comstock's welding procedures.

At the beginning of August 1984, Mr. Puckett made three written recommendations to Quality Control Manager DeWald for the issuance of Stop-Work directives that led to Mr. Puckett's termination. The first recommendation, on August 9, 1984, was that all welding be stopped involving the welding of A-446 sheet metal to A-36 structural steel; the second recommendation, on August 10, 1984, was that all stainless steel welding be stopped until the welders are qualified in the "2G" (horizontal) position; the third recommendation, on August 22, 1984, was that all welding, including the welding of A-446 to A-36, be stopped because Comstock was "dangerously approaching a complete breakdown in its QC program." In this third Stop-Work memo to Mr. DeWald, Mr. Puckett stated that procedures involving A-446 "were qualified using the criteria of AWS D1.1-75 and it should never have been done" because that code was never intended for thin-gauge materials like A-446, and all procedures involving A-446 "should have been qualified using the criteria of D1.3."

Comstock management issued Stop-Work directives for the first two Stop-Work requests by Mr. Puckett, but issued them only in informal memoranda that were not made a part of a permanent log, in violation of Comstock procedures which required the issuance of formal documentation that is logged into the company's files. Mr. Puckett, however, followed these informal Stop-Work

directives with NCRs to document his concerns, which he persuaded a certified Quality Control inspector to issue since Mr. Puckett was not, himself, certified at the time. No Stop-Work directive was ever issued in response to Mr. Puckett's third recommendation, and Mr. Puckett was terminated before taking any further action on it.

With regard to the subject of the first Stop-Work recommendation, the welding of A-446 to A-36, Mr. Puckett was correct that no company procedure qualified the welding of those two materials to each other. Applicant and NRC Staff appeared to take the position that this omission was only a technical violation of the procedures and that the joining of these two metals could have been qualified by merely adding A-36 material to the welding procedure specifications that already authorized the welding of A-446 to A-500, since A-36 and A-500 are similarly prequalified metals under AWS Code D1.1. There is some doubt on reading D1.1 whether a prequalified metal such as A-36 can be added to a welding procedure specification covering another prequalified metal, A-500, if that specification includes a nonprequalified material such as A-446. That proposed resolution is even more questionable from the language of Comstock's welding procedures which appear to offer only the alternatives of qualifying a welding procedure on the basis of its having either all prequalified joints and prequalified materials, or of utilizing a qualification test for each joint in which any of the metals or procedures are not prequalified. Since A-446 was not a prequalified material under Code D1.1, a qualification test might have to be run for each particular joint with every identifiable material to be welded in the field. Company procedures did not authorize the addition of any material to a Welding Test Record that had not actually been welded in the test, and Welding Procedure Specifications covering nonprequalified metals or joints merely summarized the Welding Test Record.

Furthermore, as Mr. Puckett pointed out in meetings held to resolve this concern, there was no valid welding procedure in effect at that time to which A-36 could be added that would cover welds smaller than $\frac{3}{8}$ inch, which constituted the bulk of Comstock's welding. The Welding Procedure Specification covering the welding of A-36 to A-500 for welds of less than $\frac{3}{8}$ inch was invalid because the test that was utilized to qualify the procedure did not meet the requirements of the welding procedures.

But whether or not Mr. Puckett's concerns regarding the welding of A-446 to A-36 could be simply resolved, as alleged by Applicant and NRC Staff, by the addition of A-36 to the Welding Procedure Specifications qualifying the joining of A-446 to A-500, Mr. Puckett had raised a valid concern. Furthermore, Mr. Puckett did not object to the proposed resolution of adding A-36 to the existing procedure specification, if the disposition were in writing. It was Engineering, not the Quality Control Department, that was responsible for dispositioning the concern, and Mr. Puckett's concurrence was not even required.

Neither Staff nor Applicant dispute the correctness of Mr. Puckett's concern reflected in his second Stop-Work recommendation, concerning the welding of stainless steel in the 2G position. The welders had not been qualified in the 2G position. The NCR that Mr. Puckett had instigated was subsequently dispositioned on the basis of requalifying the weld procedures and welders to include the 2G position for welding, removing the previously installed horizontal welds, and replacing the welds after requalification.

With regard to Mr. Puckett's third Stop-Work recommendation, concerning the conversion to AWS Code D1.3 from AWS D1.1-1975, the parties have differences in both opinion and fact. According to Applicant, Mr. Puckett insisted that it was improper to weld to AWS Code D1.1-1975 because that code was not intended to cover thin materials that the company was welding, such as A-446. According to Intervenors and Mr. Puckett, Mr. Puckett had not insisted that the utilization of Code D1.3 was mandatory but only that D1.3 should be adopted as an improved alternative to D1.1-1975 since the existing Comstock welding procedures were fundamentally flawed and would have to be revamped in any event. AWS Code D1.1-1975 specifically addressed only structural steel. Structural steel materials such as A-36 and A-500 were specifically listed in D1.1 as prequalified materials that could be welded without performing qualification testing provided the joints to be welded were also prequalified in that code. Code D1.1-1975, however, was applied to all welding and, if the welding involved thinner materials such as A-446, tests would have to be run involving those materials in order to qualify the procedure. The American Welding Society adopted Code D1.3 and incorporated it into Code D1.1 on September 1, 1978. AWS Code D1.3 addressed thin materials such as A-446 and gave them prequalification status by listing them specifically, much as the older version of D1.1 had specifically listed structural metals such as A-36 and A-500.

Applicant's position that it need not adopt a version of D1.1 later than the 1975 edition was founded on the contract specifications for Braidwood having been adopted before September 1, 1978, their specification of being bound by the latest edition of the applicable codes in effect at the time of contract, and the American Welding Society's permission to companies to continue utilizing an older edition of the code than currently in effect if specified by the contract. The main thrust of Applicant's criticism of Mr. Puckett at hearing was that he demonstrated his incompetence in failing to recognize that Comstock had not committed itself to a later edition of AWS D1.1 that included AWS D1.3 and, consequently, that Comstock had the option of utilizing either the early edition of AWS D1.1 or a later one if it so desired.

As the testimony of Applicant's witnesses further indicated, however, the contract documents specifying the use of the latest edition of the applicable codes then in effect were not executed by Comstock until February 5, 1979,

after AWS Code D1.3 had already been incorporated into Code D1.1. It was Comstock's predecessor, Ernst, that had committed itself only to the earlier edition of Code D1.1. If Applicant and Comstock had intended to carry that provision over to the new contract, they had failed to incorporate it in their documents. Had Mr. Puckett familiarized himself with the contract documents when he assumed the position as a Level III, as Applicant's witnesses believed he should have, he would not have concluded that Comstock was not bound to Code D1.3 with regard to thin material.

Moreover, even if the Ernst specification had been carried over, the situation regarding Comstock's option to use either D1.1-1975 or a later edition of D1.1 which included D1.3 was not all that clear to the experts at the time. Although at hearing they denigrated Mr. Puckett's competence for allegedly not recognizing Comstock's option to use either code, shortly after Mr. Puckett's termination, CECo's Quality Control Engineer requested (on October 17, 1984) a formal interpretation from the American Welding Society on whether the welding on material of less than 1/8 inch could be accomplished under the earlier editions of Code D1.1.

Even ignoring the contract specification that may have required Comstock to adopt AWS Code D1.3, Mr. Puckett's recommendation to adopt that later code appears eminently reasonable. The situation of Comstock's welding of sheet metal under the old edition of Code D1.1 appeared to be an anomaly. Most of the time under AWS Code D1.1, contractors use prequalified procedures and stay with the materials listed in the code. AWS Code D1.1-1975 did not give a prequalified status for any sheet metals. Consequently, any company utilizing the early editions of Code D1.1 would have to end up doing qualifications for all the sheet metals, and the qualification requirements are very stringent. The problem Comstock encountered with qualifying A-446 to A-36 was an uncommon problem that resulted from Comstock's not using D1.3, which would have prequalified the sheet metal.

Nor does it appear that Mr. Puckett's proposal to adopt D1.3 would have created a difficult burden. The welding procedures at the Zimmer nuclear plant were requalified from the earlier editions of AWS D1.1 to D1.3, and at Braidwood, the heating, ventilating, and air-conditioning (HVAC) contractor completely requalified its procedures and welders to D1.3. It would have taken only a week of qualification of welders and the weld procedures to make that conversion, and there is no indication that welding under the older edition of D1.1 could not have gone forward while the conversion was being made.

In summary of the three matters raised in Mr. Puckett's recommendations for Stop Work — the A-446/A-36 welds, the welding in the 2G position, and the adoption of AWS Code D1.3 — Mr. Puckett's analyses and recommendations had much merit. He may not have been fully correct in the final analysis (although he appears to have been), but his raising of these issues cannot

be faulted and certainly cannot be considered as reflecting adversely on his competence. Nor was there any suggestion that he was insubordinate with regard to the proposed dispositioning of these issues. The record is clear that, while Mr. Puckett may not have agreed with the proposed dispositions, he was willing to accept them provided that they were in writing. That these issues may not have had safety significance in the sense that the welds created were not done poorly should not detract from his raising the issues. Mr. Puckett was assigned the task of correcting the procedures and no restriction was placed on him with regard to raising only safety-significant issues.

At various times Applicant offered reasons other than Mr. Puckett's alleged incompetence to support his termination. These reasons were all pretextual. To the Department of Labor, Comstock claimed that Mr. Puckett was dismissed because of his low score on the Weld Inspector Proficiency Exam. Mr. Puckett's score of 88 exceeded both the established passing score of 80 and even the score of 85 achieved by Level III Weld Inspector and Quality Control Manager Irving DeWald on the same exam.

In defense of Mr. Puckett's claim for unemployment compensation, Comstock asserted he was fired because of "falsification of his credentials during his interview." Mr. DeWald disclaimed any knowledge of this assertion by Comstock and agreed that Mr. Puckett had neither falsified his credentials nor inaccurately presented his work experience in his resume. Applicant has failed to demonstrate that Mr. Puckett's resume contained any misstatements, concealments, omissions, distortions, inaccuracies, falsifications, or exaggerations, or was, in any way, misleading.

At hearing, Applicant offered a considerable amount of testimony to suggest that Mr. Puckett was terminated because of his failure to become certified in welding by not having passed his practical examination by his 89th day on the job, when he was terminated. But Comstock attached little or no importance to whether Level II supervisors passed their qualification tests and became certified. Mr. Saklak, Mr. Puckett's predecessor as Quality Control Supervisor over welding (from August 1983 until May 1984), never became certified. Mr. Puckett's successor, Mr. Tony Simile, who supervised weld inspection activities from September 1984 onward, did not become certified until July 12, 1985, a period of over 10 months. Similarly, other supervisors supervised Quality Control disciplines for many months without becoming certified.

During his tenure at Braidwood, Worley Puckett appeared to have been highly respected by the Quality Control inspectors who were familiar with his work. For example, welding inspector Danny Holley volunteered:

> Well, I could say Mr. Puckett was, you know — maybe I'm out of line, but the welding inspectors that were around when Mr. Puckett was here really respected his — his professionalism and his background and really felt that he was doing a good job.
>
> When he was let go, a lot of people, you know, brought to their own mind, "Why was he let go?"
>
> There was talk, like I said, that was going on around the office.

Mr. Puckett testified over a number of days at hearing. Despite grueling examination by Applicant's and Staff's counsel, who had been well prepared by their respective experts, Mr. Puckett demonstrated an extensive knowledge of the welding procedures and codes, and a clear grasp of the issues discussed. Although he did not speak as an educated man in the traditional sense and his syntax suffered, his positions and opinions were expressed clearly and logically. On the basis of his testimony, Mr. Puckett appeared to be a highly conscientious, knowledgeable, and competent welding authority — certainly as competent in his area as any of the other experts who testified. On the other hand, we have no way of knowing how much of Mr. Puckett's knowledge and insight into the welding procedures and issues before us was acquired after his termination.

Applicant has failed to sustain its burden of proving that Mr. Puckett was not terminated for raising quality concerns. In fact, the preponderance of evidence is that Mr. Puckett was terminated for raising legitimate concerns and requiring that they be dispositioned in writing. Nor is this an instance in which Applicant, Commonwealth Edison Company, has only derivative liability for Mr. Puckett's improper termination by its contractor, L.K. Comstock. In addition to Commonwealth Edison's placing production pressure on Comstock because of Comstock's backlog in inspections and documentation at that time, which made Comstock inhospitable to Mr. Puckett's proposed revamping of inadequate procedures, CECo had direct responsibility in Mr. Puckett's termination. Mr. Gieseker, a CECo official, had played a large part in the Stop-Work conferences that led to Mr. Puckett's termination and had disparaged Mr. Puckett at those conferences. At one point, when the issue of the use of the AWS D1.1 Code arose, Mr. Gieseker told Mr. Puckett to "Shut up. I don't want to hear [any] more about it." The decision to terminate was a joint one between Comstock and CECo and was finalized in a conference on August 27, 1984, attended by D. Shamblin, CECo Project Superintendent for Braidwood; J. Gieseker; and Irving DeWald, Comstock Quality Control Manager.

2. *John Seeders*

For the most part I agree with Applicant, NRC Staff, and my colleagues that John Seeders was transferred from Quality Control to a clerk's position in the

Engineering Department because he failed to discharge his duties properly as a calibrations inspector. Comstock had a legitimate reason for transferring him even though the record suggests that he was treated unfairly with regard to a dispute with his supervisor, Richard Saklak.

Although Mr. Seeders may not have been treated fairly by his supervisor, Mr. Saklak, and by other Comstock management in reviewing his dispute with Mr. Saklak, he was not transferred for raising quality concerns. That one of the reasons for his transfer may have been unreasonable behavior on the part of his supervisor Saklak is not the Board's concern because we are not here to examine Comstock's management practices, except to the extent that they affect quality control requirements. The major reason for Mr. Seeders' transfer was the poor quality control practices within his department, and L.K. Comstock was justified in transferring him for that reason. However, Comstock management is not blameless for the poor quality practices that existed in the Calibration Department. Not only did they assign poorly trained Seeders to be the sole calibrations inspector, but they also assigned Mr. Saklak to supervise the department when he was uncertified and unqualified in that discipline. The lack of certification of Comstock Quality Control supervisors was in violation of LKC Procedure 4.1.2 and later became the subject of NCR 4528. Despite the problems encountered in the Calibration Department because of lack of knowledgeable supervision, not only by Mr. Seeders but also by his successor, Richard Snyder, Comstock was inexplicably permitted to disposition NCR 4528 by eliminating the requirement from its procedures that the Quality Control Supervisor obtain certification prior to assuming his responsibility.

3. Other Instances of Alleged Harassment

On the morning of March 29, 1985, six Comstock Quality Control inspectors walked into the NRC Braidwood office and raised a number of complaints against LKC Quality Control management. One of these complaints concerned a threat made against one of the inspectors, Richard Snyder, the previous day by his supervisor Richard Saklak. Other inspectors also complained about Mr. Saklak's conduct. In addition, the Quality Control inspectors raised a number of other complaints against Quality Control management. Among these complaints were that Edison's "Quality First" program was not effective, that unqualified persons were awarded lead inspector positions, that certain of LKC's Quality Control management team harassed and intimidated Quality Control inspectors, and that management was more concerned with the quantity rather than the quality of the inspectors' inspections.

After the meeting adjourned, the two NRC Senior Resident Inspectors present, Leonard McGregor and Robert Schulz, contacted their superiors in the Regional Office to bring to their attention the events that transpired that

morning. Mr. McGregor and Mr. Schulz recommended to the Region that someone from the Regional office be sent to Braidwood immediately to take sworn statements from the Quality Control inspectors.

Mr. Weil, Mr. McGregor's supervisor in the Region, asked Mr. McGregor to arrange a telephone conference with the six Quality Control inspectors. Mr. McGregor in turn contacted some of the inspectors and asked them to attend a meeting in his office during their lunch break. He also indicated that any other inspectors who wanted to attend should feel free to do so.

At approximately 12:00 noon, twenty-four inspectors, including the six that had visited the NRC office previously that day, were present in the NRC office for a conference with the NRC Region. The Quality Control inspectors reiterated the complaints made earlier by the six inspectors with regard to production pressure by LKC management. At some point during the meeting a request was made for a show of hands to determine how many Quality Control inspectors agreed that Comstock Quality Control management was emphasizing quantity over quality. Senior Resident Inspector McGregor recalled that the twenty-four inspectors' agreement with the statement was unanimous, without abstentions or denials, and that he or Mr. Schulz relayed that agreement to the Region during the conference call.

Despite Mr. Schulz and Mr. McGregor's recommendation that the Regional office send an inspector immediately to take sworn statements from the Quality Control inspectors, an NRC inspector was not sent until a month later. That inspector had not been trained in investigating allegations of wrongdoing.

Much of the testimony given during the hearing was presented by some of the twenty-four inspectors who complained about Comstock's emphasizing quantity over quality. The examination of these witnesses was directed toward establishing whether there were concrete instances of harassment, intimidation, or retaliation by Comstock management because of quality concerns raised by Quality Control inspectors. Testimony was also presented with regard to alleged acts of harassment, intimidation, or retaliation occurring after the March 29, 1985 complaints to the NRC that, Intervenors assert, show a continuing improper Quality Control management practice of harassment and intimidation. Staff and Applicant find only two instances of harassment and intimidation in a quality sense. Those were perpetrated by Quality Control Supervisor Richard Saklak: one was against Mike Mustered and the other against Richard Snyder. In the first instance, Mustered successfully resisted Saklak's attempt to intimidate him into improperly closing some ICRs he had written to document discrepancies. In the other instance, Mr. Saklak was terminated for threatening Mr. Snyder.

Having found that Mr. Puckett was properly terminated, Mr. Seeders was properly transferred, Mr. Saklak was properly disciplined for his later act of harassment and intimidation, and there were no other instances of established acts of harassment and intimidation, Applicant and Staff conclude that the Quality

Control inspectors were not harassed, intimidated, threatened, or pressured into failing to perform their duties in accordance with the applicable regulatory and procedural requirements.

I do not agree that only concrete acts of harassment and intimidation can evidence improper production pressure by management in violation of Criterion I of Appendix B to Part 50. Exhortations by management to increase production at the expense of quality, even if not accompanied by harassment and intimidation, constitute improper production pressure. Under that circumstance, Quality Control inspectors might cooperate with Quality Control management in adopting improper inspection practices without any threatened retaliation. I did not find any evidence in this proceeding of such a general Quality Control management practice of encouraging inspectors to disregard quality for quantity. However, there is evidence, as discussed above, that Edison's project construction manager did improperly assert pressure on Comstock's Quality Control management at weekly meetings to speed production under threat of loss of contract and that Comstock Quality Control management, in turn, improperly transmitted that message of increased production under threat of loss of contract to its Quality Control inspectors at weekly meetings. That twenty-four Quality Control inspectors also gathered *en masse* to the NRC onsite office to complain of improper production pressure also establishes its existence notwithstanding that there may not have been concrete instances of harassment and intimidation to compel the inspectors to succumb to the production pressure and sacrifice the quality of their inspections. Moreover, I do find concrete instances of harassment and intimidation that further support the presence of improper production pressure and a failure to maintain the Quality Control organization's independence from cost and schedule required by Criterion I of Appendix B to Part 50.

In addition to the improper termination of Worley Puckett, discussed above, significant acts of harassment and intimidation against Quality Control Inspectors Perryman, Archambeault, and Martin are discussed in my Minority Findings, *infra*. Those acts of harassment and/or retaliation reflected the improper attitude and practice of Quality Control management in discouraging Quality Control inspectors from raising any large item that might interfere with production. Other, lesser acts of harassment and intimidation discussed in the Findings, such as incidents involving Mr. Bowman and Mr. Peterson, are ordinary occurrences on any construction site and cannot be assumed to be reflective of Quality Control management attitudes.

In addition to the enumerated instances of harassment and intimidation, Comstock management also appointed Mr. Saklak as a Quality Control Supervisor in July of 1982 and, later, under Quality Control Manager DeWald, expanded Mr. Saklak's supervisory authority in violation of Comstock's procedures and in contravention of good quality control practices. Mr. Saklak had no quality control background, had primarily a scheduling and production background, was

not knowledgeable about the disciplines he supervised, and was temperamentally suited only for driving his inferiors toward greater production. Even though he was removed from his position after the second concrete instance of his harassment and intimidation explored at the hearing, involving Richard Snyder, his lack of knowledge and experience in quality control and the disciplines he supervised was well known to his superiors before that time. He was retained in his position for the primary purpose of maintaining pressure on production. Comstock's violation of its regulations, which required Quality Control supervisors to be knowledgeable and certified in the disciplines they supervised, by maintaining Mr. Saklak in his supervisory position and expanding his authority when he was neither knowledgeable nor certified, contributed to poor quality control practices in at least the Calibration Department, for which John Seeders was disciplined. It was not merely a technical violation of Comstock's procedures; it was substantive.

Notwithstanding Edison's and Comstock's violation of Criterion I through the *de facto* change in organization by which Comstock Quality Control management reported weekly to Edison's Project Construction Manager, who asserted excessive production pressure on Comstock's Quality Control management, which in turn asserted improper pressure on its Quality Control inspectors and, notwithstanding the few major instances of Edison and/or Comstock harassment, intimidation, or retaliation against inspectors for raising quality concerns, the evidence indicates that the Quality Control inspectors continued to perform their inspection activities properly in the period from October 1983 onward. They withstood the improper production pressure and performed their inspections in a satisfactory manner.

For that period, October 1983 to present, I would apply the test in *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983), and determine that there has not been a breakdown in quality assurance procedures of sufficient dimension to raise legitimate doubt as to the overall integrity of the installation of the electrical system. There is reasonable assurance that the electrical system installed after October 1983 can be operated without endangering the public health and safety.

Because of the gravity of the violation of 10 C.F.R. § 50.7 by Comstock and Edison in the termination of Worley O. Puckett, I would recommend the imposition on Applicant of a substantial civil penalty under § 50.7(c)(2). A lesser penalty should be imposed for the Archambeault, Martin, and Perryman incidents.

E. Grid-Area Weld Inspections

Although neither the practice of grid-area weld inspections nor the period in which they took place, prior to October 1983, were in issue in this proceeding,

evidence was adduced with regard to that practice. The evidence was offered to support allegations of a poor quality attitude of Quality Control Manager Irving DeWald who was reputed to have inspected over a thousand welds in one day. Numerous Quality Control inspectors testified that they had seen a checklist by Mr. DeWald covering over a thousand welds. Other inspectors had heard rumors to that effect. No such checklist had been found during discovery and Mr. DeWald doubted that he had ever documented a thousand or more welds on a single inspection checklist. A DeWald checklist covering 551 welds was discovered, as were checklists of over a thousand welds by other Quality Control inspectors. All of the welds on these checklists were found to be acceptable by the original Quality Control inspector. One Quality Control inspector observed a checklist covering up to 2500 to 3000 welds.

According to the testimony of Quality Control Manager DeWald and Mr. Richard Martin, both of whom had inspected during the grid-basis weld inspection era, there were only a small number of inspectors. They would inspect a grid area covering a number of installed components over a period of from 1 to 4 days and then document their inspections on the day following when they returned to the office. As a rule, no official documentation of rejected conditions was ever made unless the craft couldn't fix the defect promptly. Only then would an Inspection Correction Report be issued documenting the defect. Only acceptable items were documented on the official weld inspection checklist. The reason that inspectors did not fill out inspection reports as they completed each component was because there were only three or four inspectors covering a hundred welders.

Evidence adduced with regard to one of the checklists, covering 1166 welds deemed acceptable, indicated that one of the seventy-seven hangers listed on the grid inspection cover sheet was later the subject of a 1984 reinspection which identified extensive welding defects not identified in the original grid inspection. Other evidence indicated that the quality of the welds inspected under the grid system was poor.

In 1984 and 1985, under the Braidwood Construction Assessment Program, a random sample of welds that had been previously inspected was reinspected. Of over 13,000 welds reinspected, approximately 16% were found to be deficient in one or more respects that might have an effect on their safety function. Assuming at least a 50% original Quality Control inspector effectiveness, at least 32% of the welds would have been discrepant originally (i.e., before inspection). If we project these percentages to the example of the 1166-weld checklist, one might expect at least 340 welds to have been discrepant originally. Not only is it inconceivable that the weld inspection reports indicating acceptances of multi-hundred welds could have reflected the original condition of the welds, it is also inconceivable that such large numbers of discrepancies could have been reworked or repaired during the 1, 2, 3, or 4 days between the beginning of

the inspection and the signing of the inspection report. Neither time nor space would be adequate for such operations even if craft were not otherwise occupied in its further construction activities.

Moreover, the failure to record discrepant conditions, which surely must have existed in the multi-hundred weld inspections under the grid system, if observed, would violate Criterion XVII of 10 C.F.R. Part 50, Appendix B, which requires, as a minimum, a record of any deficiencies noted. On the basis of the evidence adduced, which indicates that the inspection standards of a significant portion of the weld inspectors were substandard, that the inspectors failed to observe significant numbers of discrepancies, and that the weld inspectors failed to document discrepant conditions as required by Appendix B, the weld inspections performed under the grid system, in effect until October of 1983, are totally lacking in credibility. Under those circumstances, a 100% reinspection program, rather than a sampling program, is ordinarily required to determine whether there is reasonable assurance about the safety of the construction. However, since the grid system inspections and the time period in which those inspections conducted were not directly in issue in this proceeding, Applicant should have the further opportunity of proving the efficacy of those inspections.

F. Applicant Sampling Reinspection Programs

In an attempt to prove the effectiveness of the Comstock Quality Control Program, Applicant presented the results of two large sample reinspection programs: (1) the Construction Sample Reinspection (CSR) portion of the Braidwood Construction Assessment Program (BCAP), and (2) the Pittsburgh Testing Laboratory (PTL) routine overinspection of Comstock's Quality-Control-accepted work. Neither of these programs was designed to measure Quality Control effectiveness and neither program, as presented by Applicant, was able to offer any assurance that Comstock's Quality Control Program was effective or that the electrical system was properly installed by Comstock.

Most of the evidence concerned BCAP. Three types of data were produced as a result of the BCAP CSR Program. First, the raw data from the CSR reinspections were tabulated in terms of the number of discrepancies and the number of acceptable conditions identified by the CSR reinspectors. Second, those numbers were used to compute so-called "agreement rates." Third, the discrepancies were analyzed to determine whether they were "design significant."

Sargent & Lundy categorized all discrepancies sent to it for evaluation of design significance as either: "insignificant," "notable," or "design significant," depending on their severity. Discrepancies that reduced an item's capacity by less than 10% but did not impair its ability to perform its safety-related design function were termed "insignificant." Discrepancies that reduced an item's capacity by 10% or more but did not impair its ability to perform its safety-

related design function were termed "notable." Any discrepancy that would impair the item's ability to perform its safety-related design function within code-allowable stresses was called "design significant." Sargent & Lundy's evaluation of discrepancies for each of the six electrical construction categories concluded that there were no design-significant discrepancies.

Each inspection criterion used to determine the acceptability or rejectability of an item was identified and termed an "inspection point." Each inspection point that resulted in a CSR discrepancy was termed a "discrepancy point." On that basis, a high percentage of the inspection points were found to be nondiscrepant and more than two-thirds of the discrepancy points were termed "insignificant."

Applicant also presented the CSR results for the electrical construction categories on a per-weld basis. About 84% of the welds had no discrepancies.

A third way of looking at the CSR results was supported by Intervenors in this proceeding. Any item with one or more discrepancies would be termed a "discrepant item." On an item basis, a majority of the cables, cable pans, conduit, conduit hangers, cable pan hangers, and electrical equipment installation would be deemed "discrepant items."

None of these units was satisfactory for evaluating the efficacy of the Quality Control inspection.

An item-basis determination equates very dissimilar reinspection outcomes. For example, a huge cable pan hanger with hundreds of welds, one of which might be discrepant due to an arc strike, would count the same as a conduit wall strap support that was totally missing.

On the other hand, judging the quality of the original inspection on the percentage of attributes that were discrepant, as Applicant proposed, was similarly unrealistic. It seems unlikely that any weld that had more than two or three discrepant inspection points (i.e., attributes) would have become the subject of an original inspection by an L.K. Comstock Quality Control inspector. If a craftsman were to weld a weldment with more than two or three faulty attributes, such as being undersized, cracked, lacking fusion, etc., it is likely that he would redo that weld himself without waiting for Quality Control to reject it. On a practical level then, the original Quality Control inspector is inspecting welds that might have, at most, one, two, or three defective attributes (although any of those, such as a crack, might render the weldment totally nonfunctional). But, even if we were to assume that the Quality Control inspector inspected and passed only discrepant welds (those with one, two, or three defective attributes), his percentage of acceptable calls (i.e., his "agreement rate" under BCAP) would range between 82% and 94%. On its face, an 82% to 94% rate does not seem egregious, even though it should because, in our example, the Quality Control inspector missed every discrepant weld that the craftsmen would not have redone of their own volition.

There are infirmities in the BCAP CSR reinspection program that go beyond the question of whether components, subcomponents (such as welds), or inspection points should be tallied to determine the percentage of discrepancy. Even if we were to choose one of these, we would still lack the perspective to judge the quality of the original Quality Control inspection. The main element lacking in the evaluation would be the number of the discrepant units (components, subcomponents, or attributes) that the original Quality Control inspector *reported*, as opposed to those that he missed, only the latter being disclosed under the BCAP program.

As an example, let us use welds as the unit of measurement and 15% of the welds as being found discrepant under the BCAP reinspection program. (Appl. Exh. 181 indicates that approximately 16% of the welds examined by the BCAP inspectors were found to be discrepant.) If we assume that the craftsmen had welded 45% of their welds discrepantly, the Comstock Quality Control inspector would have had to miss one-third of those discrepant welds ($\frac{1}{3} \times 45\%$) to have been found 15% discrepant under BCAP. If, on the other hand, the craftsmen had welded 20% of the welds discrepantly, the Comstock Quality Control inspector would have had to miss three-quarters of the discrepant welds ($\frac{3}{4} \times 20\% = 15\%$). Consequently, unless we know either explicitly or deductively (or inductively, as the case may be) how many discrepancies were reported by the original Quality Control inspectors, we do not know whether the Comstock Quality Control inspectors were 67% effective, 25% effective, or any other percentage.

There would seem to be no reason why the discrepancies uncovered by the BCAP reinspectors could not be compared to the discrepancies originally reported by the Comstock inspectors, as contained in the inspection packages for the sampled components. Under the requirements of Part 50, Appendix B, Criterion XVII, the original inspection records should be retrievable. Criterion XVII states, *inter alia*:

> XVII. Quality Assurance Records
>
> . . . Inspection and test records shall, as a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted. Records shall be identifiable and retrievable.

It would appear that even at this point a comparison can be made between the discrepancies found by the BCAP inspectors and those found by the original Quality Control inspectors. We need only examine the original sampling packages, with no need for any further sampling, if we wish to measure the effectiveness of the original Quality Control inspectors. Whether any such comparison was ever made has not been disclosed and is not a part of the record. In the absence of such comparison the BCAP program cannot be accepted

as *any* measure of the effectiveness of the original Quality Control inspector. It might also be noted at this juncture that if a comparison had been made, the entire controversy over which units (i.e., components, subcomponents, inspection points) should be measured would have been obviated. Had Applicant compared only those attributes examined by the BCAP reinspector with the comparable attributes originally inspected by the Comstock Quality Control inspector, Intervenors would have no basis for challenging the results. Of course, even if Applicant had measured apples against apples and oranges against oranges, it would only have arrived at a *percentage* of the effectiveness of the original Quality Control inspector. Unless those results were determinative on their face (i.e., either an extremely high rate of Quality Control inspector effectiveness or an extremely low rate), the results would still have to be evaluated by the experts and the Board.

Without any measure of *effectiveness* of the Quality Control inspector, and with only a measure of the absolute numbers of discrepancies missed, a meaningful comparison cannot be made between different periods of inspection activity. Moreover, any BCAP sampling comparison between the pre-DeWald (as Quality Control Manager) era and the period in which the contention alleges that management harassed and intimidated inspectors, is particularly inappropriate. Mr. DeWald became Quality Control Manager in August of 1983, shortly before the grid-area basis for weld inspectors was discontinued in October of 1983. The grid system was not a proper or effective method of inspection and, consequently, neither the grid system period nor the DeWald-Saklak period represents a standard against which any other period can be judged.

In the absence of any measure of Quality Control effectiveness based upon a comparison between discrepancies missed and discrepancies reported, the BCAP evaluations of "design significance" were presented as a measure of Quality Control effectiveness. But the question of whether a discrepancy is "design significant," is totally irrelevant to the function of a Quality Control inspector. He is not charged with seeking out design-significant discrepancies or even with determining whether any putative discrepancies are significant from a safety standpoint. His obligation is to report all discrepancies. Any attempt by him to ignore those discrepancies that he might consider insignificant would interfere with this obligation. The question of whether a discrepancy is design significant is uniquely in the province of an engineer to evaluate based, in part, on the inspector's findings, but also based on a variety of other data and expertise that are not immediately known to a Quality Control inspector. The measure of the qualification of a Quality Control inspector is whether he can inspect to established acceptance criteria.

The only value, therefore, that BCAP could have for us, considering the way it was programmed, is with regard to the constructed hardware, rather than with

regard to the effectiveness of the Quality Control inspection program. However, even there, little weight can be given to the results. The main problem is with the party selected to make the determination of design significance, Sargent & Lundy.

Sargent & Lundy is the architect/engineer on the project and, as the accompanying Minority Findings suggest, is too committed to the licensing of the plant to be considered an objective evaluator. And, as detailed in the accompanying Minority Findings, not only is S&L committed institutionally to supporting the licensing of the facility and to contributing to a finding that there are no design-significant defects, but it failed to perform its design-significant evaluations in a manner that could inspire confidence. Moreover, the design-significant evaluations that it performed do not lend themselves to a statistical application by which they can be projected to the population of inspected items at large. The calculations and evaluations appear to be unique, and suitable only for the particular items selected.

While Sargent & Lundy is certainly entitled to evaluate the plant's construction under BCAP or any other program for its *own* purposes to determine *for itself* whether the plant is properly constructed, its commitment to the licensing of the plant is too strong for me to accept its opinions as impartial. Furthermore, its past actions and testimony at trial confirm its partisanship in that regard. Its attitude in general appeared to be that it had designed the plant with so much safety margin that no deficiencies in construction and inspection in the electrical area could impair the ability of the electrical system to function safely. While that might be the case, that opinion should be expressed by someone other than the designer of the plant to be afforded much weight.

For the same principal reasons that the CSR agreement rates are not indicative of the efficacy of the original Comstock Quality Control inspector, because there is no comparison between the discrepancies he missed and those that he found, the PTL overinspection results are similarly unilluminating. Furthermore, the sampling for PTL was not done on a statistically random basis and PTL inspectors were permitted to overinspect welds through paint, which could have distorted the results considerably. Although the PTL witnesses claimed that only 7% of the welds were inspected through paint, the testimony was not credible, as discussed in the Minority Findings, below.

G. NRC Staff's Review

For reasons detailed throughout my Findings, I do not find NRC Staff's approval of various aspects of the Comstock Quality Control effort to be meaningful. *See, e.g.*, Min. Fdgs. 83-91, 107-112, 192-194, 235-253, 339. In general, NRC Staff prejudged the incidents of alleged harassment in favor of Comstock, and assigned inspectors to inspect only the hardware, rather than the

existence of any improper actions by management. The NRC inspectors assigned to the inspections were generally exceedingly accepting of Applicant and Comstock's positions. Those who became somewhat critical of Applicant and Comstock, such as the two Senior Resident Inspectors, soon found themselves out of favor with NRC management. The quality of the NRC inspection reports reflects the uncritical nature of the underlying analyses.

H. Conclusion

For the reasons stated in this Minority Opinion, the accompanying Minority Findings, and the accompanying Minority Ultimate Findings of Fact and Conclusions of Law, I would find that there is reasonable assurance that the portion of the electrical system installed after October 1983 can be operated without endangering the public health and safety.

I would recommend that a substantial civil penalty be imposed on Applicant under 10 C.F.R. § 50.7(c)(2) for the improper termination of Worley O. Puckett, and that a lesser penalty be imposed for the Archambeault, Martin, and Perryman incidents.

I would also require that Applicant prove the efficacy of the Quality Control inspections when the grid-area welding inspection system was in effect before October 1983, or find some other satisfactory method of proving that the welding was done adequately.

II. MINORITY FINDINGS OF FACTS

A. Organization

I accept Staff's Proposed Findings 1-15, *in toto*, as Findings 1-15.

1. [1.] Commonwealth Edison Company ("Applicant" or "CECo") is the owner of the Braidwood Nuclear Station, located in Braceville, Illinois. As the owner, Applicant ultimately is responsible for the design, construction, and operation of the facility. Applicant engaged Sargent & Lundy ("S&L") to design the Braidwood Station. Various contractors were retained by Applicant to construct the facility, only one of which — Comstock, the electrical contractor — is pertinent to these findings. In particular, our focus is on certain activities and events involving that contractor during the period August 1984 through March 1985.

2. [2.] Comstock was awarded the electrical contract for Braidwood Units 1 and 2 by Applicant on February 5, 1979. Testimony of Bobby Treece, ff. Tr. 12,881, A.13 at 6 (Treece Test.). Prior to LKC's involvement, the electrical work had been performed by E.C. Ernst Company. *Id.*

3. [3.] Comstock performs two important functions at Braidwood: electrical equipment installation and quality control and assurance. Testimony of Irving DeWald, ff. Tr. 1700, A.3 at 2 (DeWald Test.). L.K. Comstock and Company, Inc., performs the production function at Braidwood. Testimony of Daniel Shamblin, ff. Tr. 12,274, A.8 at 6 (Shamblin Test.). Responsibility for the production function is vested in LKC's Project Construction Manager. Int. Exh. 7 at 9. Comstock Engineering, Inc., performs the quality assurance (QA) and quality control (QC) functions. Shamblin Test., A.8 at 6. Responsibility for QA and QC at Braidwood is reposed in the Manager for QC. *Id.* at 11. Both L.K. Comstock and Company, Inc., and Comstock Engineering, Inc., are subsidiaries of a parent company, the Comstock Group, Inc. Shamblin Test., A.8 at 6. In these findings of fact, parent company and its subsidiaries are referred to as "LKC."

4. [4.] LKC has had three Quality Control Managers and one Manager for QA during the time it has been the electrical contractor at Braidwood: Robert Brown, Thomas Corcoran, Irving DeWald, and Robert Seltmann. Mr. Brown was Quality Control Manager until November 1982, at which time he was replaced "because he lacked administrative abilities." Int. Exh. 6 at 2. Mr. DeWald has held the position since August 1983. In November 1985, as a result of a reorganization, the position of QA Manager was created. Testimony of Robert Seltmann, ff. Tr. 1960, A.2 and A.4 at 1-4 (Seltmann Test.). Mr. Seltmann was selected to fill this position. *Id.* As Manager of Quality Assurance, Mr. Seltmann was Mr. DeWald's superior. *Id.*; DeWald Test., A.3 at 2.

5. [5.] The Quality Control Manager reports to Thomas Paserba, LKC's Regional Manager for QA/QC Services in Chicago, Illinois. DeWald Test., A.3 at 3. Mr. Paserba reports to LKC's Corporate Manager for QA/QC Services, Robert Marino, who in turn reports to the head of L.K. Comstock Engineering, Inc. Int. Exh. 4. Below the Quality Control Manager on the chain of command are the following: Assistant Quality Control Managers, supervisors of inspectors, lead inspectors, and Quality Control inspectors. Tr. 1281-89; Int. Exh. 7 at 17; Int. Exh. 4.

6. [6.] Mr. DeWald previously was a weld inspector at Braidwood. DeWald Test., A.2 at 1. In 1981, Mr. DeWald was transferred by LKC to the D.C. Cook Nuclear Power Plant where he served as the Quality Control Manager and Level III Electrical Inspector until August 1983, when he assumed Quality Control Manager at Braidwood. *Id.*

7. [7.] The Assistant Quality Control Manager is Larry Seese. Testimony of Larry Seese, A.1 at 1 (Seese Test.). Mr. Seese has held this position since October 1983. *Id.*, A.2 at 2. Like Mr. DeWald, Mr. Seese came to Braidwood from the D.C. Cook nuclear facility. *Id.* As the Assistant Quality Control Manager, Mr. Seese is responsible primarily for administrative matters such as compiling status reports used by LKC to track its progress on its work load. *Id.*, A.3 at 3-4.

8. [8.] The other senior LKC Quality Control Department official at the Braidwood site during the relevant period was Robert Seltmann. Mr. Seltmann has been employed by Comstock Engineering, Inc., since February 1978. Seltmann Test., A.2 at 1. Mr. Seltmann was transferred to the Braidwood Station in September 1983 to fill the position of QA Engineer. *Id.* Prior to this transfer, Mr. Seltmann was employed by LKC for more than 5 years at the Enrico Fermi II Nuclear Project, serving in a variety of QC and QA positions. *Id.* at 2. As the QA Engineer at Braidwood, Mr. Seltmann was responsible for conducting audits of LKC's Quality Control Program; responding to audits and inspections of LKC's activities conducted by CECo and the NRC; and revising LKC procedures to incorporate recommended changes. *Id.* at 2-3. In November 1984, Mr. Seltmann's title was changed to QA Manager, a title that more accurately reflected his managerial duties. *Id.* at 3. And, as noted earlier, a year later, Mr. Seltmann was elevated to a position superior to Mr. DeWald and became the ranking LKC Quality Control Department on site. *Id.* at 3-4.

9. [9.] The Quality Control inspections themselves are conducted by certified inspectors. The Quality Control inspectors fall into two general categories: welding and nonwelding. The nonwelding category can be further subdivided into disciplines such as terminations, cable pulling, configurations, calibrations, conduits, and receipt inspections. *See* Int. Exh. 7 at 7.

10. [10.] The number of Quality Control inspectors has varied over the course of LKC's tenure at Braidwood, ranging from a handful in 1981 to a high of nearly 100 in 1986. *See* Int. Exh. 4; DeWald Test., A.6 at 10.

11. [11.] Until July 23, 1985, LKC Quality Control inspectors were hired and employed by LKC. However, in July 1985, Applicant contracted with Brand Examination Systems and Testing Company (BESTCO) to provide Quality Control inspectors for LKC's scope of work. DeWald Test., A.11 at 17. Testimony of Thomas Maiman, ff. Tr. 3806, A.11 at 11 (Maiman Test.). At that time all Quality Control inspectors then employed by LKC were discharged by LKC and immediately rehired by BESTCO. DeWald Test., A.11 at 17; Maiman Test., A.11 at 12.

12. [12.] BESTCO's contract with Applicant was terminated on July 27, 1986, and its functions assumed by GE-MCIS. Tr. 6761. Both BESTCO and GE-MCIS are what is known in the industry as "job shoppers." Tr. 8262. Although BESTCO and later GE-MCIS were responsible for hiring, firing, and paying the Quality Control inspectors they provided to LKC, LKC retained the authority to direct the Quality Control inspectors in the performance of their work activities. DeWald Test., A.3 at 3-4; Maiman Test., A.11 at 12.

13. [13.] LKC's construction or "production" function was the responsibility of the Project Construction Department. Shamblin Test., A.8 at 6. At all times relevant for our purposes, the Project Manager was Frank Rolan. *See* Int. Exh. 7. Mr. Rolan reports to the L.K. Comstock Central Region Vice-

President, who in turn reports to superiors in L.K. Comstock and Company, Inc. Tr. 1300; Int. Exh. 7 at 9; Shamblin Test., A.8 at 6. Beneath Mr. Rolan on the chain of command are the project engineers, craft foremen, and individual craftsmen. Int. Exh. 7 at 9.

14. [14.] As noted at the outset, CECo is the owner and thus ultimately is responsible for the design, construction, and operation of the Braidwood nuclear station. CECo personnel charged with administering its quality assurance program do not report to those with construction responsibilities. Shamblin Test., A.8 at 6. Thomas Maiman, CECo Vice-President and Manager of Projects is responsible for the construction, licensing, and operation of the Braidwood facility. Maiman Test., A.3 at 1-2. Mr. Maiman reports to James O'Connor, President and Chairman of the Board of CECo. Beneath Mr. Maiman in the chain of command are Michael Wallace, the Braidwood Project Manager, and Mr. Shamblin, the Braidwood Project Construction Superintendent. Shamblin Test., A.9 at 7. As Project Construction Superintendent, Mr. Shamblin is responsible for administering the Braidwood construction contracts let to LKC and other major contractors. Shamblin Test., A.6 at 3. All told, Mr. Shamblin ultimately is responsible for the design, construction, and QA activities of more than 4000 employees. Tr. 16,429.

15. [15.] For the past 13 years, Walter Shewski has served as CECo's Corporate Manager of Quality Assurance. Tr. 10,113. Since the spring of 1984, Mr. Shewski has reported directly to Mr. O'Connor. Tr. 9998, 10,122. Prior to that time, the chain of command was Mr. Shewski, Eugene Fitzpatrick, Assistant to Corporate Manager of QA (Tr. 10,148), and Thomas Quaka, CECo's QA Manager at Braidwood. *See* Shamblin Test., A.18 at 15; Tr. 11,581. CECo QA is responsible for conducting audits and surveillances of activities relating to quality to ensure compliance with CECo's quality assurance program. Shamblin Test., A.9 at 7.

B. Nature of LKC's Quality Control Work

I accept, *in toto*, Staff's Proposed Findings 16-36 as Findings 16-36.

16. [16.] At Braidwood, one of the principal duties of a Quality Control inspector is to ensure that safety-related components, structures, and systems installed by craftsmen are installed pursuant to applicable procedure. *See* Int. Exh. 40. Work that is not safety related generally falls outside the jurisdiction of the Quality Control Department. In performing his inspections a Quality Control inspector is guided by the acceptance criteria set forth in the applicable inspection procedure. *Id.* The actual inspection, however, is documented on an inspection checklist which lists the most important attributes that must be found acceptable in order for the activity being inspected to pass muster. *See, e.g.*, Appl. Exh. 124 (Form 37).

17. [17.] Each inspection performed by a Quality Control inspector is reviewed by another inspector. Testimony of Rogelio Mendez and John Neisler, A.25 at 12, ff. Tr. 10,490 (Mendez or Neisler Test.). Since all of the Quality Control inspectors presently utilized by LKC are certified to Level II under the ANSI N45.2.6 (1978) standard, this review is limited to determining whether the inspection report is completed. *See id.* The reviewer does not and is not required to determine that the inspection was performed properly. *Id.* Also, pursuant to LKC Procedure 4.1.2 (Rev. C), the reviewing inspector must be certified as a Level II in the particular discipline (e.g., welding, terminations, cable pulling) that is the subject of the inspection. Mendez Test., A.25 at 12-13. Prior to September 1984, the procedure only required that the reviewer be certified to Level II in any inspection discipline. *Id.*

18. [18.] If the activity inspected by the Quality Control inspector satisfies the applicable acceptance criteria and the report documenting that inspection is complete, the work is accepted and the inspection report is transmitted to LKC's document vault and maintained by LKC as a permanent record until such time that it is "turned over" to Applicant. On the other hand, if the activity being inspected fails to meet one or more acceptance criteria, the Quality Control inspector is required to document that condition on an Inspection Correction Report (ICR) or a Nonconformance Report (NCR). Appl. Exh. 40. One of the differences between an NCR and an ICR is that an NCR must be reviewed by the responsible individuals in CECo's production, engineering, and quality assurance departments. ICRs need only be reviewed by LKC personnel. In either event, the documented deficiency must be "dispositioned." *See id.* What this means is that an evaluation must be performed to determine whether the item involved is able to perform satisfactorily in service in its "as-is" condition or whether the deficiency must be corrected. *Id.* In the latter instance, after the item is repaired or replaced, a new inspection must be performed. *Id.*

19. [19.] Until November 1982, LKC performed its Quality Control inspections on a 35% sampling basis. DeWald Test., A.5 at 7. What this means is that, for example, only thirty-five welds out of a population of 100 would be inspected by Quality Control inspectors. The remaining sixty-five welds would not be inspected unless deficiencies identified in the sample population indicated the need to expand the inspection sample.

20. [20.] In November 1982, CECo required LKC to perform inspections of 100% of all activities requiring Quality Control inspections because of errors in LKC's sampling methodology. Int. Exh. 205. This change in inspection policy required LKC to go back and inspect all electrical safety-related work performed prior to November 1982.

21. [21.] There was another important consequence of the change in policy. An immediate and substantial backlog of approximately 14,000 inspections was created. DeWald Test., A.5 at 7. Although LKC's inspection work effec-

tively increased by almost 200% (from 35% to 100%), this increase was not immediately offset by a corresponding expansion of the Quality Control inspector workforce. *Id.*

22. [22.] This dramatic expansion of LKC's inspection responsibility had yet another repercussion. In November 1983, the NRC conducted an inspection of the Braidwood facility, including LKC's Quality Control Department. Int. Exh. 3; Tr. 11,479-85. As a result of that inspection, the NRC expressed serious reservations regarding LKC's ability to perform the inspections necessary to eliminate the backlog created by the change in inspection policy while simultaneously keeping pace with current inspections. Int. Exh. 3, *passim*. Accordingly, the Staff contemplated ordering Applicant to cease all electrical installation work until the backlog was eliminated or reduced considerably. *See id.*

23. [23.] To address the NRC's concerns regarding the ability of LKC to perform its quality function effectively, Applicant and LKC had undertaken the following measures by March 1984: (i) LKC created two new supervisory positions — "Supervisor of Inspectors" and "Lead inspector" — in order to "provide additional uniformity of inspection" and (ii) LKC expanded its Quality Control inspector workforce from twenty-two to fifty-one. Int. Exh. 7 at 11. This increase in Quality Control inspectors was intended to ensure "that timely inspections are performed and that the number of backlogged inspections is reduced." *Id.* In addition, CECo pledged to "monitor the progress and closeout of L.K. Comstock open items" and "corrective actions" as well as the LKC Quality Control inspector workforce to "assure that it is adequately staffed to address any additional work . . . ." *Id.*

24. [24.] In May 1984, shortly after CECo had been advised by the NRC of the need "for more aggressive CECo management" to ensure that its contractors remained in compliance with applicable regulations and other commitments (Int. Exh. 88 at 1), CECo selected Daniel Shamblin to replace Richard Cosaro as Project Construction Superintendent at Braidwood. Shamblin Test., A.2 at 1; Tr. 3815. Mr. Shamblin, who is a Registered Professional Engineer and holds an M.B.A. from the University of Chicago, previously held the position of Project Construction Superintendent at CECo's LaSalle County Nuclear Power Station. Shamblin Test., A.3 and A.4 at 1-2. Shortly after assuming the Project Construction Superintendent position at Braidwood, Mr. Shamblin observed that LKC was "having difficulty coping with the inspection backlog problems." *Id.*, A.10 at 8. In response, a number of discussions between LKC and Mr. Shamblin were held and, to allay Mr. Shamblin's concern, on June 5, 1984, Mr. DeWald submitted a plan pursuant to which the backlog of inspections in the welding, cable pan and cable tray, conduit, and terminations disciplines would be targeted for completion by July 12, 1984. Int. Exh. 12; Tr. 1338-45. Under Mr. DeWald's plan, however, the backlog of inspections of junction boxes and small equipment would exist until September 1984. Int. Exh. 12; Shamblin Test., A.13 at

10-11. Under Mr. DeWald's plan, twenty LKC Quality Control inspectors were dedicated to performing backlog inspections and thirty-four Quality Control inspectors were assigned to "current inspections." Int. Exh. 12 at 4-5.

25. [25.] Mr. Shamblin was not entirely satisfied with Mr. DeWald's target completion date of September 1984 for the junction box and small equipment backlog. *See* Shamblin Test., A.13 at 11. In a letter dated June 9, 1984, Mr. Shamblin informed Mr. Rolan and Mr. DeWald that according to CECo's records, the amount of all backlogged inspections exceeded 6000 in number. Int. Exh. 8 at 1. Mr. Shamblin observed to Mr. DeWald and Mr. Rolan that CECo was "very concerned about the large existing backlog" and stated that "[r]eduction of this backlog must be the *first* priority of LKC Production, Engineering and Quality Control personnel." *Id.* (emphasis in original). Mr. Shamblin also took note of the fact that LKC's request for additional time to reduce the inspection backlog had been granted, indicating that "positive results (i.e., significant current inspection backlog reductions) must be seen *very shortly*." *Id.* (emphasis in original). If such results were not soon forthcoming, Mr. Shamblin was prepared to suspend LKC's operations. Shamblin Test., A.18 at 15. Finally, Mr. Shamblin directed Mr. Rolan and Mr. DeWald to report to him every Monday on the progress in eliminating the backlog that had been made the previous week. Int. Exh. 8 at 2.

26. [26.] In May 1984, LKC developed and instituted a system to enable it to monitor the progress of the activities within its scope of work, particularly those intended to eliminate the inspection backlog. DeWald Test., A.17 at 20; Testimony of Larry Seese, ff. Tr. 2330, A.5 at 8-9 (Seese Test.); Tr. 2498. Under this system, each Quality Control inspector was required to complete and submit to his lead inspector a report documenting the numbers of inspections he had completed that day. Seese Test., A.10 at 11; Tr. 2518. The lead inspector would then use this information to compile a daily inspection status report for his group and submit this report to his supervisor. Tr. 2518, 6380. Each supervisor in turn was to use this information to compile a daily status report for each of the inspection disciplines under his jurisdiction to be submitted to Mr. Seese. Tr. 2388, 2518. Mr. Seese would use the information obtained from the Quality Control supervisors to compile his weekly status reports which were distributed to senior LKC Quality Control management. Seese Test., A.5 at 8. Mr. Seese's report was used by LKC to determine, among other things, whether in light of progress made, target completion dates set by LKC were feasible. *Id.* at 8-9.

27. [27.] While the status reports served an important purpose in enabling LKC management to monitor effectively the performance of the Quality Control Department in eliminating the inspection backlog, that also caused consternation on the part of LKC's Quality Control inspector workforce. Tr. 2370, 2376-77. This was because it was possible to use such reports to monitor an individual

inspector's output. Tr. 2522. Inspectors were concerned especially that the daily status reports they turned in to their lead inspectors might be used by management to establish quotas or to punish them if they failed to perform a certain average number of inspections. *See* Tr. 2370; Dep. Test. of Mark Klachko, ff. Tr. 18,539, at 98-100. To dispel any apprehension among the Quality Control inspectors that the status reports they were required to complete would be used against them, LKC met with the inspectors in October 1984 to explain that the purpose of the status reports was not to monitor the daily output of any individual inspector. Tr. 1576-77, 2371, 2498. The inspectors were assured by LKC management that their status reports would not be used to establish inspection quotas or to reward or punish them for their inspection output. Tr. 2498. LKC even decided to post the weekly status for the department on an office bulletin board to develop a "spirit of togetherness and teamwork" between the inspectors and their management. Seese Test., A.5 at 9; Tr. 2499.

28. [28.] Also during this time, Mr. DeWald would meet with the LKC Quality Control inspectors each Friday to discuss LKC's inspection activities. Tr. 1786. During these meetings, inspectors frequently were exhorted to redouble their efforts to eliminate the inspection backlog and perform current inspections in a timely fashion. *E.g.*, Tr. 4241-55, 7567.

29. [29.] In April 1984, after LKC had requested and received from CECo authorization to hire fourteen additional Quality Control inspectors (Int. Exh. 9 at 1; DeWald Test., A.5 at 7), LKC launched a recruiting drive. *Id.* During this time period, however, there was a shortage of available experienced electrical inspectors. *Id.* at 6. Consequently, to attract new Quality Control inspectors, LKC usually had to offer a salary that was higher than that being paid to its most senior current inspectors. *Id.*

30. [30.] The disparity in levels of compensation of newly hired inspectors fostered resentment on the part of LKC's veteran inspectors. Int. Exh. 23; Tr. 4034, 7740. That dissatisfaction was exacerbated by the fact that these inspectors were required to provide the training necessary for the newly hired inspectors to obtain their certifications. Tr. 4034, 7739-42. In this connection, it should be noted that even though a newly hired inspector may have been certified as a Quality Control inspector at some other nuclear facility, he was still required to be certified to LKC's Quality Control procedures. To obtain certification in any particular discipline, a candidate was required to attend a 1-hour orientation lecture, complete 8 hours of classroom study and 40 hours of on-the-job training, and pass both a written and a practical examination. Tr. 3951, 7737.

31. [31.] To make its pay scales more competitive and thus reduce the number of LKC inspectors resigning their positions for more lucrative opportunities elsewhere, LKC initiated in April 1984 a new compensation policy. DeWald Test., A.7 at 10-12. Mr. Marino, LKC's Corporate Manager for QA/QC Services, decreed that retroactive to April 1, 1984, all Quality Control inspec-

tors henceforth would be paid a minimum of $12.00/hr. DeWald Test., A.7 at 11. Furthermore, inspectors would be compensated at the rate of $.50/hr for each certification they held in excess of one. *Id.* Inspectors who were then making more than $12.00 per hour would suffer no reduction in pay but would be required to be certified in five disciplines. As a result of this compensation policy many of the veteran inspectors received substantial raises, some as much as $5,000.00 per year. *Id.*, A.9 at 14-15. According to Mr. DeWald, the new policy "put the emphasis on the individual inspector to excel and," as of May 1984, appeared "to be accepted quite well by the existing group of Inspectors." Int. Exh. 9 at 3.

32. [32.] The new compensation policy, however, had an unintended consequence. Since an inspector's compensation was now tied to the number of certifications he held, it was in his economic interest to obtain as many certifications as possible. Int. Exh. 9 at 3; DeWald Test., A.9 at 15. In one sense this was also to the advantage of LKC because the more certifications an inspector held, the more flexibility LKC would have in putting his abilities to use. Seese Test., A.25 at 18; *see* Int. Exh. 8 at 5. What LKC failed to foresee, however, is that the policy they promulgated would set off a flood of requests from the inspectors to receive the training necessary to certify in new disciplines. The reason LKC was inundated with requests for training was because it turned out that the only groups of Quality Control inspectors who were eager for cross-training were those who held multiple certifications; all other Quality Control inspectors were eager to obtain cross-training either to maintain their salary or to earn more money. DeWald Test., A.9 at 14-15. Indeed, it appeared to some that many inspectors were more interested in receiving training than they were in performing inspections in the disciplines in which they were certified. DeWald Test., A.8 at 13.

33. [33.] Additionally, because cross-training was to be provided by Quality Control inspectors, it was necessary to arrange matters such that an inspector would be able to perform inspections and receive training in another discipline himself. *Id.* at 12-14. Furthermore, LKC was confronted with complaints that many newly hired inspectors were receiving precedence in obtaining training "to justify their high salaries," as one inspector later put it. Int. Exh. 23 at 1. To respond to "these unprecedented demands for cross-training" and to minimize disruptions to its inspection work requirements, LKC established training schedules and hired a training coordinator, who began work on June 1, 1984. DeWald Test., A.8 at 13-14.

34. [34.] Unfortunately, the training coordinator was injured seriously in an automobile accident on June 25, 1984. *Id.* at 13. More than 3 weeks passed before Jeffrey Dominique was selected as his replacement. *Id.*

35. [35.] Also, requests for training from some inspectors who were assigned to high-priority inspections (such as the inspection backlog) or special

projects were denied or postponed by LKC management citing the press of business. *See, e.g.*, Int. Exh. 66; DeWald Test., A.8 at 14. In fact, on August 24, 1984, all inspectors assigned to perform welding and configurations backlog inspections were asked to forego cross-training until the backlog had been eliminated. Appl. Exh. 42.

36. [36.] Finally, it should be noted that during much of 1984, Local 306 of the Pipefitters union sought to obtain the right to bargain collectively on behalf of the LKC Quality Control inspectors. DeWald Test., A.11 at 15-16; Maiman Test., A.10 at 9-10. This organization effort culminated in November 1984 when a majority of LKC Quality Control inspectors voted in favor of the union. Maiman Test., A.10 at 10. However, the validity of the election was contested by LKC and the issue was not resolved in the union's favor until April 1985. DeWald Test., A.12 at 16-17. Contract negotiations between LKC and Local 306 began the following month (*id.*), but soon reached an impasse. Maiman Test., A.10 at 10. To break this deadlock, on July 23, 1984, Mr. Maiman contracted with BESTCO (which already had a contract with Local 306) to supply electrical Quality Control inspectors for LKC. *Id.*, A.11 at 12. On that date, LKC laid off all Quality Control inspectors, document reviewers and clerks, and Quality Control engineers, all of whom were rehired the next day by BESTCO. DeWald Test., A.11 at 17; Maiman Test., A.11 at 12.

In addition I add the following five findings (37-41):

37. In July 1982, newly promoted Quality Control Supervisor Richard Saklak was charged with the mission by Comstock construction of trying to bring the Quality Control department under control and to organize a production system for responding to the installation reports from the production department. Tr. 8014-15. At 24 years of age, the young Mr. Saklak had previously been employed as a cost and scheduling engineer at Edison's LaSalle station and immediately prior to his Quality Control reassignment had been a planning and scheduling engineer for Comstock production. Tr. 7992. He had no prior Quality Control work experience. Very quickly after Mr. DeWald's appearance as Quality Control manager in August of 1983, he evaluated Mr. Saklak as a "very aggressive individual" who had taken on added responsibilities under him, duties that would have been performed by an Assistant Quality Manager, "with great enthusiasm and zest." Mr. DeWald concluded that "Rick is a real asset to the Braidwood QC department." Int. Exh. 52. When Mr. Saklak became a Quality Control supervisor in July of 1982, he shared his supervisory position with another individual. At about the time Mr. DeWald became Quality Control Manager, Mr. Saklak became the sole supervisor of Quality Control inspectors. Tr. 8000.

38. LKC replaced its prior Quality Control Manager Thomas Corcoran with Mr. DeWald in August 1983, because Mr. Corcoran had been too quality conscious and not sufficiently construction oriented. Tr. 1220-27. Mr. DeWald

relied upon the Friday meetings, referred to above, as a primary means for communication with Quality Control inspectors. Tr. 1786. Management usually described those areas of inspection that were behind and those areas that needed more manpower allocated to them. Tr. 4241. Assistant Quality Control Manager Larry Seese would read the status reports that detailed the progress being made on projects to eliminate inspection backlogs and the projected dates of completion of those projects. Tr. 4243, 6871-73, 9663. John Seeders testified that at these meetings Mr. DeWald commented about being under schedule pressure from Edison. Tr. 7567. From these meetings, Seeders understood that the quantity of inspections was emphasized over inspection quality because the weld inspectors would comment that "DeWald wants numbers again" when Mr. DeWald pushed inspectors for greater productivity. Tr. 7566. Quality Control Inspector Terry Gorman also interpreted these weekly meetings as reflecting management's emphasis of quantity over quality in urging inspectors to perform more inspections. Tr. 5798. Mr. Gorman recalled Mr. DeWald's complaints that not enough work was being accomplished because too many people were sitting around the office when they should have been out in the field performing more inspections. Tr. 5776-77. Quality Control Inspector Robert Wicks testified that he believed quantity was emphasized over quality because Comstock management was trying to meet Edison-imposed deadlines. Tr. 7077-78. It was shoptalk among Quality Control inspectors that Comstock stressed quantity over quality. Tr. 7087. Several inspectors remembered Mr. DeWald's talking about a minimum required number of inspections to be performed as an attempt to eliminate inspection backlog. Tr. 6866-67, 9240-41.

39. Six inspectors testified that Comstock Quality Control management was pressuring inspectors for production under an Edison threat to cancel the Comstock contract if the inspection backlog was not eliminated by certain dates. Gorman, Tr. 5840-41; Holly, Tr. 5151-52; Bossong, Tr. 9857; Hunter, Tr. 8499-8500, 8744-47; Peterson, Tr. 5950-51; Seeders, Tr. 7567-69. Three inspectors acknowledged that the threatened loss of Comstock's contract was shoptalk among the Quality Control inspectors. Bossong, Tr. 9857; Gorman, Tr. 5840-41, 5871, 5884-85; Seeders, Tr. 7568. Mr. Seeders testified that such shoptalk was fairly common when Comstock was not meeting its deadlines. Tr. 7568. Inspector Danny Holley recalled a meeting in the summer of 1984 at which QA Manager Robert Seltmann indicated that if the backlog of inspections were not eliminated, it could mean that the livelihood of Comstock at Braidwood would be lost. Tr. 5151-52. Inspector R.D. Hunter testified that more than once at the weekly meetings during 1984, Mr. DeWald had stated that Comstock was in danger of losing its contract if it failed to satisfy certain promised completion dates. Tr. 8499-8500, 8655, 8744, 8747. Inspector Dean Peterson recalled a special meeting where assistant Quality Control Manager Larry Seese indicated that things were looking very critical for Comstock and

that everyone's help was needed to eliminate the backlog. Tr. 5950-51. Mr. DeWald acknowledged such a rumor that Comstock was in jeopardy of losing its electrical contract. However, he recalled the rumor circulating in January 1985. Tr. 1345-47. Ultimately, Comstock did lose its contract for a portion of the electrical work on Unit 2. The Gus K. Neuberg Company has replaced Comstock for a portion of the Unit 2 electrical installation and inspection work. Tr. 1349.

40. In order to monitor inspector productivity and manage the inspection backlog elimination program as well as the performance of inspections on current installations, Comstock's Quality Control management developed a status tracking system. Under this system, the scheduled completion of various inspection tasks, including the inspection backlogs that existed in the spring of 1984, was projected on the basis of the number of average inspections an individual inspector was expected to perform in a day, e.g., an average expected level of performance, goal, or quota. Int. Exh. 23; Seese Pref., ff. Tr. 2320, at 8-10; Seese, Tr. 2350-51; Saklak, Tr. 8116-18. For example, Mr. DeWald's early June 1984 backlog completion schedule was based on the average of five welding, equipment, and configuration inspections per day; six termination inspections per day; and seven conduit inspections per day on average. Int. Exh. 12. The status report figures showing the number of inspections actually performed were compiled from individual inspectors' daily reports, then passed through the inspectors' leads, who summarized and routed them to the status department. Comstock management posted the periodic status reports for Quality Control inspectors' information. Seese, Tr. 2498-99; DeWald, Tr. 1576-78. Comstock management acknowledged utilizing the status reports and tracking system to regulate inspector overtime assignments, and to transfer inspectors from one inspection area to another. Seese Pref., ff. Tr. 2320, at 9; Seese, Tr. 2350.

41. It is against this background that I consider alleged harassment, intimidation, and discrimination cited by Intervenors in their inspector harassment contention. First, I take up the matter of Worley O. Puckett, a Level III Weld Inspector, who, according to Intervenors, was fired by LKC because he "[made] numerous complaints about safety and quality deficiencies which he identified in the course of his duties at Braidwood." Second, I consider the case of John Seeders, an LKC inspector who allegedly was transferred out of LKC Quality Control Department to a clerk position in LKC's Engineering Department "in retaliation for his expression of quality concerns." Contention 2.C. Third, I discuss the complaints of harassment and intimidation made to the NRC by twenty-four LKC inspectors in March of 1985. Finally, I discuss additional instances of alleged harassment and intimidation not cited specifically in Intervenors' contention.

C. Alleged Instances of Harassment, Intimidation, and Production Pressure

1. Worley O. Puckett

42. In the spring of 1984, Edison and Comstock were responding to concerns expressed by the NRC regarding the continued effectiveness of the Comstock Quality Assurance/Quality Control problem to address the enormous backlogs of inspections and quality documents requiring review. Int. Exhs. 6, 7. To respond to these problems, Comstock had proposed additions to the Quality Control inspector workforce including the addition of one Level III Weld Inspector to address NRC-identified problems in the welding inspection area. Int. Exh. 9; DeWald Pref., ff. Tr. 1700, at 40-41; DeWald, Tr. 1763-64. On May 15, 1984, Comstock interviewed and hired Worley O. Puckett for this Level III position. Mr. Puckett's background as reflected in the interview and his resume demonstrated qualification for the Level III position. DeWald Pref., ff. Tr. 1700, at 42.

43. Mr. Puckett brought with him almost 20 years' experience as a pipefitter, shipfitter, and nuclear component welder in the U.S. Navy. Mr. Puckett graduated with honors from the Navy's year-long welding school and spent 4 years at the Specialized Nuclear Test Facility at Idaho Falls as a nuclear component welder and shop supervisor making repairs and installing components on nuclear prototype reactors and training nuclear welders and Navy officers on welding and repair techniques. Mr. Puckett also served as supervisor of Nuclear Submarine Tender Pipe Shop and Repair Facility, where he performed planning and estimating functions supporting the maintenance of thirteen nuclear submarines and surface craft. Int. Exh. 26.

44. During the course of Mr. Puckett's Navy nuclear welding work, Mr. Puckett had occasion to supervise and inspect the work of other nuclear welders both at the nuclear power training unit, Idaho Falls, and on the nuclear sub tender where from eighteen to twenty welders worked under his supervision. Tr. 6330-31. At Idaho Falls, Mr. Puckett supervised other senior enlisted men who were also certified nuclear component welders (Tr. 3332) who he understood were handpicked by Admiral Rickover for these specialized positions. Tr. 3332.

45. After retirement from the U.S. Navy, Mr. Puckett was hired at the Zimmer Nuclear Power Station in Moscow, Ohio, by the Henry J. Kaiser Company, where he worked in a variety of positions for some 9 years until the project was cancelled in January 1984. Int. Exh. 26; Tr. 6336-418. At the Zimmer facility, Mr. Puckett was initially hired and qualified as a Level II Mechanical Quality Assurance inspector, a position he held for approximately 18 months. Thereafter, he was promoted to the position of Lead Mechanical Inspector charged with performing visual weld inspections, mostly to the ASME Boiler and Pres-

sure Vessel Code. Mr. Puckett personally inspected 4000 to 5000 welds and supervised from ten to twenty other Level II inspectors. Tr. 6334-35. No NRC items of noncompliance were identified with respect to Mr. Puckett's weld inspection activities. Tr. 6340. Thereafter, Mr. Puckett transferred from the quality assurance to the construction department at Zimmer where he was promoted to the position of Chief Weld Engineer in which capacity he was responsible for all of the weld-related activities at the Zimmer project including operation of the weld test facility, tool room, and weld rod issuance facilities. Tr. 6347-48. Mr. Puckett was evaluated as meeting or exceeding all requirements in this position by project construction superintendent Sandlin. Appl. Exh. 43; Tr. 6352-57. Mr. Puckett had received similar good evaluations during his prior tenure at Zimmer. Tr. 6358; Int. Exh. 46.

46. In April 1982, Mr. Puckett received the first critical evaluation that he had received at any time in his Navy or civilian nuclear program experience. Tr. 6351. Mr. Puckett had been effectively displaced in the senior weld engineering position by Mr. Manfred Goedecke as part of a site-wide management restructuring in which new management was brought into virtually all departments including quality and construction. The new Zimmer project manager, Mr. Alberson, brought Mr. Goedecke with him from the Midland facility in Michigan. Tr. 6348-49. While he was evaluated as meeting requirements overall (Appl. Exh. 45), Mr. Puckett sought and received clarification of the adverse aspects of this evaluation. Appl. Exh. 46. Mr. Goedecke noted that Mr. Puckett had been responsible for a welding organization consisting of only one welding engineer, two aides, and a clerk which was in dire need of additional qualified personnel. Goedecke noted that Puckett was exceptionally industrious and possessed exceptional ability, knowledge, and understanding of general welding methodologies and techniques. He noted that Mr. Puckett had demonstrated an exceptional administrative ability and showed promising higher management potential. He recommended that organizational changes under way be made so that Mr. Puckett may have the opportunity for improvement and advancement. Appl. Exh. 46. Thereafter, Mr. Puckett was reassigned positions in the weld engineering department as the Zimmer project management was restructured and widespread corrective action programs were implemented, ultimately leading to the cancellation of the project. Mr. Puckett successively held positions of Project Weld Engineer and Lead Historical Weld Engineer through January 1984, when the project was shut down. Int. Exh. 26.

47. After Mr. Puckett left the senior weld engineering position in 1981 and had been replaced by Manfred Goedecke and his associate, Mr. Flaherty, the NRC Staff identified numerous items of noncompliance at Zimmer, including items of noncompliance in the Zimmer welding program. Tr. 6371-81; Appl. Exh. 49. For example, in an inspection conducted by NRC Inspector J.F. Schapker, among others (Mr. Schapker later investigated Mr. Puckett's

technical concerns at Braidwood and testified in this proceeding), the NRC imposed a civil penalty for a Severity Level III violation stemming from welder qualification document deficiencies and failure to adequately control weld filler metal in the test facility. Appl. Exh. 49, Transmittal Letter at 1-2. In Mr. Puckett's opinion, the deficiencies identified at Zimmer were the responsibility of Mr. Goedecke, who had directed the programs that were found at fault. Tr. 6381-90, 6393-413. Mr. Puckett was never disciplined or reprimanded for any involvement in the NRC's findings at Zimmer. Tr. 6413.

48. Mr. Puckett's experience with the NRC's enforcement activities at Zimmer served as a powerful standard and precedent for his evaluation of the Comstock welding inspection program at Braidwood. Based on his experiences with NRC enforcement at Zimmer, Mr. Puckett determined to prevent a recurrence of similar problems at Braidwood. In Mr. Puckett's opinion, problems he encountered during the course of his duties as the newly hired Level III weld inspector at Comstock were every bit as serious as those that had led to the cancellation of the Zimmer project. Tr. 5592-93. According to Mr. Puckett, however, after acting to prevent a recurrence of a QA breakdown at Braidwood and suffering retaliatory termination as a consequence, Mr. Puckett found that the NRC, and Inspector Schapker in particular, apparently had two different sets of rules — one for Zimmer and one for Braidwood. Under similar facts, the NRC treated Zimmer problems "as serious as a heart attack," but at Braidwood such concerns were dismissed as not serious. Tr. 5591-92, 6380-81, 6413, 6491, and 6589-90.

49. During the course of Mr. Puckett's brief tenure at Comstock, he undertook wide-ranging activities to review the work of the welding and welding inspection program at Comstock and to obtain the site certifications necessary for him to perform the duties of a Level III inspector. Mr. Puckett familiarized himself with the work of the Level II welding inspectors and solicited their opinions on needed changes in the inspection program. For example, with Level II Quality Control Inspector Therman Bowman, an experienced welding inspector, Mr. Puckett discussed the applicability of the AWS D1.1 Code to thin-gauge materials within the scope of the Sargent & Lundy specification L-2790 at the site as well as the applicability of the AWS D1.3 Code. Tr. 6970-71. Mr. Bowman suggested to Mr. Puckett that the field limit its use of the otherwise qualified E6013 electrode and instead utilize the more appropriate E7018 electrode for making cable pan to tube steel and unit strut welds. Mr. Bowman made the suggestion on the basis that special welding skill was required for use of the 6013 high-penetration rod on such light material. Mr. Puckett agreed with the suggestion and, subsequently, a procedural change was adopted accordingly. Tr. 6972-73.

50. Mr. Puckett toured the Braidwood facility generally and observed the quality of field work performed by Comstock. Early in his tenure at Braidwood, Mr. DeWald took Mr. Puckett on a tour of the facility. Mr. DeWald pointed

out welds to Mr. Puckett that Mr. DeWald had inspected when he previously worked as a Level II Weld Inspector. The welds were on a very large hanger but even through glancing at the welds, Puckett observed a number that he deemed unacceptable. The welds he observed had undercut, excessive spatter, slag, overlap, and craters below the nominal wall thickness. While Mr. Puckett acknowledged that the acceptability of welds is a matter of individual inspector judgment within limits, Mr. Puckett stated that he would not have had a weld inspector working for him who had accepted some of the welds he observed. Tr. 6214-20. Mr. Puckett expected that after he had become qualified, he would have returned to these areas and further dispositioned the welds he observed.

51. During his tenure, Mr. Puckett undertook the assignment of overseeing the Comstock welder test facility. Mr. Puckett qualified two other Level II Quality Control inspectors to run the facility and wrote a set of test facility operating rules to be provided to each welder candidate to ensure that the welder was aware of the rules during the test. Appl. Exh. 71. Mr. Puckett was concerned that there be adequate Quality Control inspector verification of the welder qualification process. Tr. 6186-97, 6202.

52. During his tenure, Mr. Puckett identified concerns regarding errors, inconsistencies, and alterations of Comstock's welder qualification records. Tr. 6136-41, 6150-51, 6162-64, 6176-79.

53. In the course of his tenure at Comstock, Mr. Puckett also developed a concern that Comstock did not have an adequate procedure or practice for the control of weld filler material in the field. At the time he was at Braidwood, Mr. Puckett observed that the craft was not required to turn unused weld rod or electrode into the weld rod withdrawal facility. Tr. 5210-11. Instead, the practice followed permitted a welder to draw a certain amount of rod and then to store unused electrodes in an uncontrolled manner overnight or over the weekend to be used at a later time. Rod at the time was being issued by craftsmen to craftsmen without supervision by Quality Control or engineering. Tr. 5612. Mr. Puckett further believed that the procedure itself should require Quality Control involvement in the issuance and control of filler material to ensure that it was properly controlled. Tr. 5613-14. Mr. Puckett brought these concerns to the attention of Messrs. DeWald, Seese, and Saklak who told him that the procedure was to be changed to take these concerns into account.

54. During the course of his tenure, Mr. Puckett identified a number of concerns about deficiencies in Comstock's welder qualification records. Tr. 6137-38, 6149-52, 6155, 6159-63. These concerns were identified by Mr. Puckett during the course of only a partial review which was under way at the very time of his termination. Tr. 5679; Appl. Exh. 68. In Mr. Puckett's opinion, the errors, alterations, and inconsistencies in the quality records made the actual qualifica-

tion of the welders indeterminate and would necessitate either the identification of sufficient objective evidence to properly correct the documents or the requalification of the welders. Even without seeking such objective evidence, Puckett was aware that the NRC had cited the Zimmer facility for serious violations of NRC regulations because of such inconsistencies of welder qualifications records. Tr. 5686, 5694, 6159-64.

55. In addition, Mr. Puckett had identified a number of problems and inconsistencies with Comstock's existing welding procedures which he believed required general rewriting and requalification using the more contemporary American Welding Society D1.3 Sheet Metal Code. Tr. 5456-63. According to Mr. Puckett, Comstock welding procedures as written were a mess. Instead of providing clear, written instructions for both the craftsman and the inspector as to the essential variables including base metals, filler materials, and specified techniques in the body of the procedure, the reader was forced to sheaf through innumerable confusing, contradictory, and redundant attachments to the procedure which, themselves, were the only source of specification of essential welding variables. In effect, the use of more than a dozen technique sheets for a particular procedure gave the Quality Control inspector the option of the reasoning, "if this one doesn't work, let's use this other one. If it doesn't work, use another one." Tr. 5455-56, 5472-83.

56. One of the duties assigned to Mr. Puckett by Quality Control Manager DeWald involved the review of L.K. Comstock's welding procedures. The vast majority of L.K. Comstock's welding activities involved "structural" carbon steel welding; only a small portion of L.K. Comstock's welding activities involved "stainless steel" welding. Tr. 2972-5509. Structural welding during the period of Mr. Puckett's employment with L.K. Comstock was governed by L.K. Comstock Procedure 4.4.3 (Rev. C). Appl. Exh. 10. L.K. Comstock Procedure 4.3.3 also sets forth the instructions that welders must follow when making welds. These instructions are contained on a "Welding Procedure Specification" form. Two of the welding procedure specifications, Attachments H and O to Procedure 4.3.3, permitted the welding of A-446 galvanized sheet metal to A-500 structural tube steel. These welding procedural specifications, Attachments H and O, combine the qualifications of underlying attachments called "Procedure Qualification Records" (PQRs). PQRs document the qualification testing of the procedure being qualified. Welding Procedure Specification H combined qualifications in Attachments H.1, H.2, H.3, and H.4, the welding procedure qualification test records qualifying the fillet welding of A-446 to A-500. Similarly, Attachment O combined the qualifications of Attachment O1, O2, O3, and O4, the PQRs documenting the qualification testing of flair bevel groove welds joining A-446 to A-500. Appl. Exh. 10; Tr. 3471-72, 3638.

57. On August 9, 1984, Mr. Puckett recommended to Mr. DeWald that all welding be stopped involving the welding of A-36 to A-446 using E7018

electrode. Appl. Exh. 52 at 1. In Mr. Puckett's view, L.K. Comstock did not have a procedure to weld A-36 to A-446, and all such welding previously done was indeterminate. Appl. Exh. 55. It should be noted that Attachments H and O qualify the welding of A-446 to A-500, not to A-36. L.K. Comstock Procedure 4.11.3 governs the issuance of Stop-Work orders. Tr. 2217-19; Appl. Exh. 3. Under § 2.1 of that procedure, only the Quality Control manager can order that work be stopped. Appl. Exh. 3 at 1 of 3. Thus, only Mr. DeWald had the authority to order the stoppage of the welding of A-446 to A-36 base metal. Consistent with this practice, on August 15, 1984, Mr. DeWald adopted Mr. Puckett's recommendation and issued a memorandum to Mr. Rolan, L.K. Comstock's Production Manager, directing that all structural welding using A-36 and A-446 be stopped pending completion of a valid procedure qualification test. Int. Exh. 31 at 8-9; Tr. 5540.

58. Mr. DeWald's Stop-Work order did not comply with LKC Procedure 4.11.3. Tr. 2229; Appl. Exh. 3. According to § 3.3 of the procedure, the Quality Control manager is required to complete a "Stop-Work Report" (Form 62). *Id.* A properly completed Form 62 describes precisely the activity to be stopped, the reasons for the stoppage, and the conditions that must be satisfied to lift the Stop-Work order. *Id.* at 4. The reason it is important to use the proper form is because Form 62 becomes part of a permanent document file and is entered into a report log, while memoranda, such as the one issued by Mr. DeWald, are not logged. *Id.* at 3-4; Tr. 2226-31.

59. After receiving Mr. DeWald's Stop-Work order, Mr. Rolan issued a memorandum on August 17, 1984, effective immediately, in which he directed all LKC craftsmen "to *STOP* immediately all welding of ASTM A-36 to ASTM A-446 material using E7018 electrode until weld procedure 4.3.3 is qualified in accordance with AWS D1.1 1975 Sect. 5, Part B." Int. Exh. 31 at 10. Mr. Rolan also directed craftsmen "to stop all welding operations on stainless steel until welders are qualified in all positions as indicated on memorandum of August 15, 1984 from Irv DeWald . . . ." *Id.*

60. On August 17, 1984, 4 days after recommending that work be stopped with respect to the welding of A-36 to A-446 base metals, Mr. Puckett caused to be generated NCR 3099. Tr. 5395; Schapker Test., A.107 at 45. Because Mr. Puckett was not yet certified, the NCR was written by a Level II Quality Control inspector at Mr. Puckett's request and under his direction. Tr. 5395, 5422-23. Although Mr. DeWald disputed the suggestion that only certified inspectors could write NCRs (DeWald Test., A.30 at 45), this fact was confirmed by NRC Inspector Jerome Schapker in the course of his inspection of LKC's welding program. Schapker Test., A.106 at 45.

61. On August 22, 1984, a meeting was convened to discuss NCR 3099. DeWald Test., A.30 at 48-50; Gieseker Test., A.26 at 22; Seltmann Test., A.15 at 18-19; Louden Test., A.4-5 at 2; *see* Int. Exh. 29. Present on behalf of LKC

were Mr. DeWald, Mr. Puckett, Mr. Seltmann, and Mr. Rolan; representing CECo were Edward Netzel, Anthony D'Antonio, Mr. Gieseker, and Mr. Tapella; representing S&L were James Louden and Stuart Klevens. Int. Exh. 29 at 1; Gieseker Test., A.26 at 22. The purpose of this meeting was to resolve the situation documented in NCR 3099 so that the Stop-Work order on A-36 to A-446 welding could be lifted. Gieseker Test., A.26 at 22.

62. Mr. Gieseker opened the meeting by stating his understanding of the problem and suggested a means to resolve the problem. *Id.* Mr. Gieseker proposed that LKC Procedure 4.3.3 (Rev. C) be revised to include a reference to A-36 on the appropriate Procedural Qualification Records (PQRs). *Id.* A PQR documents the results of a test conducted to establish that particular base metals when welded together conform to the requirements of the AWS D1.1 Code. Louden Test., A.9 at 3. The reason Mr. Gieseker made this proposal was because, in his view, since LKC already had a valid PQR for A-446 to A-500 weld combinations, and A-36 and A-500 were compatible materials, under § 5.5.1.1 of the AWS D1.1 Code, the PQR for the A-446/A-500 weld combination could be relied upon to establish the acceptability of A-36/A-446 weld combinations. Gieseker Test., A.26 at 21-22; Tr. 2939-3'

63. Although Applicant's witnesses testified that Mr. Puckett indicated that he would go along with Gieseker's proposed resolution if CECo were to put that resolution in writing (Seltmann Test., ff. Tr. 1960, A.15 at 19; DeWald Test., ff. Tr. 1700, A.30 at 49), it was clear that Mr. Puckett had reservations. According to Mr. Gieseker, Mr. Puckett very strongly took the position that it was inappropriate to attempt to qualify the welding of A-446 to A- 5 by relying upon AWS Code D1.1, 1975 edition, but that the welding of those materials should be qualified under the later edition of Code D1.1, which included Code D1.3, covering thinner materials. Tr. 2862-67.

64. The next day, August 23, 1974, a meeting of the Procedure Review Board was held. The purpose of the meeting was to revise LKC Procedure 4.3.3 (Rev. C) to include a reference to A-36 on the appropriate PQRs. Mr. Gieseker, Mr. DeWald, Mr. Seltmann, Mr. Puckett, and several other of the individuals who had attended the meeting held the previous day were present. According to Mr. Gieseker, Mr. Puckett reasserted his opinion that the A-36/A-446 weld combination had not been properly qualified. As a result of this incident, Mr. Gieseker testified that his impression of Mr. Puckett's usefulness as a Level III Quality Control inspector was "extremely low both because he seems to exhibit a poor understanding of the AWS Code, and because of his erratic behavior once he identified what he perceived to be a major problem." Gieseker Test., ff. Tr. 2771, A.26 at 22-23.

65. The AWS D1.1 Code section on which he relied, § 5.5.1.1, states, in pertinent part, as follows (Appl. Exh. 12):

> Qualification of a welding procedure established with a base metal included in 10.2 * * * shall qualify the procedure for welding any other base metal or combination of those base metals included in 10.2 that have a minimum specified yield point equal to or less than that of the base metal used in the test.

66. Structural base metals A-36 and A-500 are listed in § 10.2. Steel sheet metal A-446 is not. It is possible to interpret § 5.5.1.1 as Mr. Gieseker and other Applicant witnesses have, as authorizing the welding of A-446 (the sheet metal) to A-36 because there has already been a qualification by testing of the welding of A-446 to A-500. Since the qualification involved the base metal A-500 which is listed in 10.2 base metal A-36, which is also listed in 10.2 and has a lower yield point, may be substituted for A-500 under this theory.

67. It is also possible to interpret this provision as applying to procedures involving *only* the structural base metals listed in 10.2. Where the procedure involves a nonprequalified sheet metal such as A-446, every change in the welding procedure (e.g., the welding of that nonprequalified material to a different metal) must be qualified again by testing even if the new procedure involves merely the substitution of one base metal included in 10.2 for another that had been included in the initial procedure.

68. Whatever may have been the interpretation of Applicant's witnesses at hearing, it appears that the welding procedure at Braidwood to which LKC, S&L, and CECo were bound may have embraced the latter interpretation. The purpose and scope of Welding Procedure 4.4.3 was stated to be as follows (Appl. Exh. 10):

> 2.0 *PURPOSE/SCOPE*
>
> 2.1 This procedure is proposed to meet and assure the requirements of AWS D1.1-75, Structural Welding Code, and is applicable to the base metals specified in AWS D1.1-75, Sections 8.2 and 10.2 or as specified by a Welding Procedure Test Record.

69. A-446 (sheet metal) was not specified in AWS Code D1.1-75, §§ 8.2 and 10.2, and the joining of it with another metal would have to be specified by a Welding Procedure Test Record (i.e., PQR). Section 3.0 of Welding Procedure 4.4.3 similarly states further, as follows (*id.*):

> 3.0 *PROCEDURE*
>
> 3.1 *Base Metal*
>
> 3.1.1 Steel will comply with the specifications of AWS D1.1-75, Paragraphs 8.2 and 10.2 or as specified by a Welding Procedure Test Record.

70. Apparently, unless the material being welded, in this case, A-446, was listed in AWS D1.1-75, §§ 8.2 and 10.2, *each* procedure involving that metal must be specified by a welding procedure test record. There was no welding

procedure test record covering the welding of A-446 to A-36, which was a listed metal, but only Attachments H-1 to H-4 and O1 to O4, involving the joining of A-446 to A-500, a different listed metal. Welding Procedure 4.4.3 does not seem to allow for the hybrid of a Welding Procedure Test Record involving an unlisted metal (A-446) and a listed metal (A-500), and the subsequent substitution on the Welding Procedure Specifications of a different listed metal (A-36) for the original listed metal (A-500), without further testing.

71. Although Mr. Gieseker proposed adding A-36 to the PQRs underlying Attachments H and O, without pretesting the welding of A-446 to A-36, this proposal may have been improper for another reason. Applicant's expert, Sargent & Lundy's Mr. Louden, testified clearly and unequivocally that it would have been improper to add A-36 to the Procedure Qualification Records (PQRs), Attachments H-1, H-2, H-3, H-4, and O1, O2, O3, O4 that were combined in Attachments H and O, respectively, because the PQRs should really only tell exactly what was done to qualify the procedure, and the qualification tests used only A-500, not A-36. Tr. 3036-37.

72. Mr. Puckett was correct that these problems would have been obviated by adopting a later edition of AWS Code D1.1 which includes AWS Code D1.3. Code D1.3 specifically relates to sheet steel and lists A-446 as approved sheet steel within its ambit, similar to the listing of the structural steel base metals A-36 and A-500 in § 10.2 of Code 1.1-75. Appl. Exh. 14, AWS D1.3-78, § 1.2.1.1. Further, AWS Code 1.3, § 6.4 states, in pertinent part, as follows:

> 6.4 *PROCEDURAL QUALIFICATION REQUIREMENTS*
>
> • • •
>
> • • • where a sheet steel [e.g., A-446] is to be welded to a supporting steel member [e.g., A-500] listed in AWS D1.1, Structural Welding Code, that sheet steel may be welded to all other AWS D1.1 approved steels [e.g., A-36] of an equal strength or less, provided that the steel used in the qualification procedure has a yield strength of 50 KSI or less (*see* AWS D.1.1, § 5).

73. Moreover, adding A-36 to Attachments H and O, even if it were proper, would affect only a small portion of the welding involving A-446. At the meetings involving this issue, when it was proposed to add A-36 to Attachments H and O, Mr. Puckett indicated that Attachment O had not been qualified; that it had been rejected; that it had been resubmitted to Pittsburgh Testing Laboratory as a different type of weld; and that Comstock had not yet received the results of the testing. Tr. 5375. Accordingly, where Mr. Gieseker had proposed dispositioning NCR 3099 (Int. Exh. 28; Appl. Exh. 55) by indicating that revised Attachments H and O would be utilized to permit the welding of A-446 to A-36, he now lined through the reference to Attachment O on the disposition of NCR 3099. *Id.*; Tr. 5377. Although Applicant now wanted to rely upon only Attachment H, Mr. Puckett objected because Attachment H limited

the welds to a 3/8 minimum-size fillet weld. The welds that were intended to be done, A-446 to A-36, in almost all cases were in the 1/4-inch and 3/16-inch size where Attachment H could not be utilized because the welds were smaller than the 3/8-inch minimum size requirement. Tr. 5377, 5381, 5398-99, 5409. NRC Staff Inspector Schapker later confirmed that the bulk of the welding was on welds less than the 3/8-inch minimum. Tr. 11,331.

74. Whether or not D1.1-75 and Comstock Procedure 4.3.3 would have permitted adding A-36 to Attachments H and O, Mr. Puckett indicated that he had no objection to such addition, but that the main discussion at the meetings was with regard to the invalidity of Attachment O and the attempted use of Attachment H for the welding of the smaller welds. Tr. 5425, 6654-55. At hearing, Mr. Puckett indicated that he had not been aware that the disposition of NCR 3099 had been changed by striking through the reference to adding A-36 to Attachment O, and believed that that might have been done at or after the meetings to satisfy the concerns that he had raised with regard to improperly using the invalid Attachment O. Tr. 5428. Mr. Puckett had also been concerned that Attachment H would be used without the size limitation even though there had always been that limitation on Attachment H, because few people were aware of it. Tr. 5429.

75. Applicant asserts (Prop. Fdg. 287) that the record indicates that Attachment O was not in fact a rejectionable procedure on the date of the meetings regarding the A-446/A-36 issue. According to Applicant, revised Attachment O was approved by PTL on July 6, 1984, and S&L had authorized the use of the procedure while it was being revised. Applicant states further that, although Mr. Puckett disclaimed knowledge of the S&L authorization, it appears plainly on page 3 of the procedure (Appl. Exh. 10 at 3).

76. Applicant's assertion is inconsistent with the events that transpired and with a plain reading of the procedure. If Attachment O had been in effect, those dispositioning NCR 3099 would not have lined through "and O" on August 23, 1984, and would not have included the note "8/23/84: PER MTG ON 8/23/84, FIELD IS TO CONTINUE TO WELD TO ATTACHMENT H FOR THE WELD SIZES INDICATED IN ATTH. H. ATTH. O IS NOT TO BE WELDED UNTIL APPROVED BY CECO IN REV. D 4.3.3." Appl. Exh. 55 at 1; Int. Exh. 28 at 1. Nor would Mr. Gieseker have testified (Tr. 2968-70) that there had been that problem and that work was to remain stopped for the specific weld sizes not covered by Attachment H until Attachment O had been approved by CECo. And, while Procedure 4.3.3 (Rev. C) may have been approved on an interim basis with regard to all the other changes from Revision B, that status clearly did not apply to any welding under Attachment O. On page 2 of the Quality Control Division Welding Procedure Review (Appl. Exh. 10 at third page), comment E states as follows:

E) Procedure qualification Attachments O1, O2, O3 and O4 are unacceptable since the required effective throat is 1/8 inch yet none of the test data meet this requirement.

77. If the test data did not properly qualify the Procedural Qualifications Records, the PQRs were unacceptable. And, if the underlying PQRs were unacceptable, the welding procedure specification, Attachment O, which combined the attributes of the underlying PQRs, could not be considered valid. To use it would have violated the AWS Code. It was obviously based on this recognition, as insisted upon by Mr. Puckett, that Mr. Gieseker eliminated any reliance upon Attachment O from the disposition of NCR 3099.

78. In light of these disclosures, an unanswered question still remains: On what basis did Comstock resume its welding of less than 3/8-inch weldments if no valid procedure was in effect that would permit it? If we refer to the subsequent revision of Procedure 4.3.3, Rev. D, which was initiated on September 4, 1984, Attachment H does, indeed, contain the added words "and A-36," so as to authorize the welding of A-446 to A-36 for 3/8-inch or greater weldments. Attachment O, however, contains no reference to A-36 and continues to authorize only the welding of A-446 to A-500 (*id.*, Tr. 3701-02), notwithstanding that S&L expert Mr. Louden testified that it would be improper to weld A-446 to A-36 without procedural authorization (Tr. 3008-10, 3034-35) and that only Engineering could add a material to the welding procedure (Tr. 3041).

79. To justify the welding of A-446 to A-36 materials in weldments of less than 3/8 inch, notwithstanding that no weld procedure specification authorized such welding, Mr. Puckett's successor, Anthony Simile, testified (Tr. 3455-64) that no such procedure was necessary. According to him, the mere fact that a procedure specification existed for welding A-446 to A-500 permitted the welding of A-446 to A-36 without any particular specification. Aside from this testimony's directly contradicting the previous testimony of the Sargent & Lundy AWS Welding Code expert, Mr. Louden, it is inconsistent with the AWS Code D1.1 provisions. Even where a prequalified joint welding procedure (i.e., where metals, such as A-36 and A-500, are prequalified by listing in Code § 10.2 and the joints have been prequalified as described in § 2.6) is utilized, AWS Code § 5.1.2 requires the use of a written procedure specification showing the information required, as specified in the form shown in Appendix E to AWS Code D1.1. The suggested form contains the requirement of "Materials specification." Appl. Exh. 12. Similarly, where the welding procedure is not prequalified and it is necessary to established the welding procedure by qualification (i.e., by using a welding procedure qualification test reflected on the PQR), the procedure must be recorded as a procedure specification. *Id.* § 5.5.1. It would make no sense that, in the third case, where the joint welding procedure is not prequalified and is not even evidenced by a welding procedure test record, the

materials to be joined need not be listed in the welding procedure.[3] Moreover, even if we could accept such illogical testimony by Mr. Simile, it could not validate the joining of A-446 to A-36 with welds of less than 3/8 of an inch prior to the validation of Attachment O that occurred after Mr. Puckett had been terminated.

80. It might be noted that for all the criticism Mr. Puckett received for suggesting that AWS Code D1.3 (as contained in AWS Code D1.1 editions beginning in 1978) be adopted, the technical specification governing the welding at Comstock, L 2790, was amended on November 9, 1984, approximately 2 months after Mr. Puckett was terminated, to include the following provision (Appl. Exh. 19, Amend. 42 to Specification L 2790, at 4-3):

> *401.18.1* Welding shall be in accordance with the requirements of AWS D1.1. At the option of the Contractor, where base metals thinner than 1/8 inch are to be welded, the requirements of AWS D1.3 may be applied in lieu of AWS D1.1. Welders may be qualified to either * * * AWS D1.1 or AWS D1.3 (for materials less than 1/8" thick requirements).

Whether Comstock ever utilized that November 9, 1984 amendment to apply the AWS D1.3 Code to the welding of A-446 to A-36 is unclear. It is clear, however, that since A-446 sheet steel is listed in AWS Code D1.3, § 1.2.1.1, and since qualification testing had been performed with the welding of A-446 material to A-500, AWS Code D1.3, § 6.4, would have permitted the issuance of a welding procedure for the joining of A-446 to A-36 without further testing. Appl. Exh. 14, AWS Code D1.3. It appears to be the case that AWS Code D1.3 was utilized beginning with Revision F to Welding Procedure 4.3.3, initiated on December 5, 1984. Appl. Exh. 11. Mr. Puckett's successor, Anthony Simile, testified (Tr. 3466-67) that Sargent & Lundy found at that time that A-446 material was a prequalified material and waived any procedure qualification for weldability of this material. That material was listed with all other prequalified material on page 14 of 14 of that revision. Appl. Exh. 11. Page 14 of 14 reveals that A-446 material was included as a typed edition to the preprinted table of base materials derived from AWS Code D1.1-1975, and was described as "A-446 Gr. A, B, E."

81. However, as noted above, AWS Code D1.1-1975 does not include A-446 in its listings of prequalified materials in §§ 8.2 and 10.2, containing the only materials considered to be prequalified. All other materials were required to be qualified by testing under the requirements of § 5.2. Only AWS Code D1.3

---

[3] *See also* the published American Welding Society interpretation, DW-84-014(8), which suggests that the information categories shown on the forms in Appendix E to AWS D1.1, which included the category of "Material specification," must be completed as a minimum requirement. Board Exh. 5, *Welding Journal* of October 1984 at 64.

lists A-446 as an approved metal. It listed it, not surprisingly, in almost the same descriptive language as in revision F, page 14 of 14, as "A-446 Grades A, B, C and E." Appl. Exh. 13, § 1.2.1.2. Although Sargent & Lundy did not adopt Code 1.3, *in toto*, for sheet metal, as authorized by the November 9, 1984 amendment of specification L 2790, it appears to have adopted enough of that code to consider A-446 as a prequalified material (perhaps improperly).

82. Applicant (Prop. Fdgs. 297-299) and Staff (Prop. Fdgs. 148-151, 180-184) appear to rely heavily on the A-446 to A-36 matter as reflecting adversely on Mr. Puckett's competence and justifying his termination. In particular, they harp on his alleged inability to "resolve" the problem. If, however, we were to view Mr. Puckett's performance as incompetence, what are we to make of performance of the other principals in this incident — the responsible officials from Commonwealth Edison and Sargent & Lundy, and Mr. Puckett's successor, Anthony Simile? Although Sargent & Lundy's expert, Mr. Louden, and the NRC expert, Mr. Schapker, take the position that the welding of A-446 to A-36 would be improper unless the welding procedure in question includes A-36 as a specified material, Anthony Simile testified that it is unnecessary to list A-36. Mr. Louden testified at the hearing that it is improper to add a material such as A-36 to a procedure qualification record (PQR) if that material had not actually been tested. But the resolution of the problem proposed by Mr. Gieseker of Commonwealth Edison, and apparently approved by the other participants (from CECo, S&L, and LKC) at the meetings of August 22 and 23, 1984, was to include A-36 in the PQRs (not merely the welding procedure specifications). And, if Attachment O had actually been approved by PTL on July 6, 1984, and S&L had authorized use of the procedure while it was being revised, as Applicant alleges (Prop. Fdg. 287), then those who dispositioned NCR 3099 and resolved the entire incident after Mr. Puckett had been terminated, erroneously deleted any change to Attachment O from the disposition of NCR 3099 and erroneously failed to add A-36 material to Attachment O. Moreover, after Mr. Puckett had made his Stop-Work recommendation and instigated NCR 3099, his responsibility in the matter basically ceased. With regard to his quality control function, Mr. Puckett's proposed resolution was implicit in his raising the matter: adopt a welding procedure, by whatever means necessary, to cover the welding of A-446 to A-36. It is not a Quality Control function, but an Engineering function, to determine how such a welding procedure specification can be implemented — by testing a weld of A-446 to A-36, by relying upon prequalification provisions in the existing welding procedure and code, by adopting a revised edition of the code, or by any other means. Tr. 2922-23, 2928-29, 3041.

83. That Comstock, Commonwealth Edison, and Sargent & Lundy reacted so vigorously to Mr. Puckett's alleged continued disagreement with the proposed resolution of this problem when Mr. Puckett had no further official responsi-

bility in the dispositioning of the matters he raised, may reveal a heretofore unmentioned misgiving with Mr. Puckett: his refusal to acquiesce to the proposed disposition of the matters he raised did not preclude their being dispositioned along the lines suggested by Mr. Gieseker, but his continued presence and nonacquiescence prevented them from *withdrawing* the entire matter, rather than dispositioning it properly. While Staff glosses over DeWald's failure to complete the proper "Stop-Work Report" (Form 62) and his having issued an informal memorandum instead, as having "complied with the spirit but not the letter, of LKC Procedure 4.1.1.3" (Staff Prop. Fdg. 137), the violation was considerably more egregious. Had Mr. Puckett agreed to Gieseker's resolution of the matter, the informal Stop-Work memorandum, not having been logged as would be the formal "Stop-Work Report," could simply be withdrawn, with no documentation being brought to the NRC's attention. Mr. Puckett complicated matters by causing the issuance of NCR 3099 five days after he initiated the Stop-Work request. But even after that, the NCR could have been dispositioned on the basis of Gieseker's recommendation and no one would have been the wiser about the invalidity of Attachment O or the inapplicability of Attachment H to the bulk of the welding being done had Mr. Puckett acquiesced to Gieseker's suggestions. NRC Staff's treatment of LKC's failure to use the proper Stop-Work directive as benign is much more charitable than the circumstances warrant.

84. Mr. Puckett's job was terminated on August 27, 1984. At approximately 8:30 a.m. on August 28, 1984, Mr. Leonard McGregor, the NRC's Senior Resident Inspector (Operations) at Braidwood, received an anonymous note informing him that he should contact Mr. Puckett at the telephone number listed on the note. Appl. Exh. 72; Tr. 11,512. Mr. McGregor called Mr. Puckett and reached him at his home in Ohio. Appl. Exh. 72; Tr. 6461-63, 11,512. Mr. Puckett had driven all night and arrived home shortly before Mr. McGregor called. Tr. 6461-63.

85. In this conversation, Mr. McGregor was informed by Mr. Puckett that he had been terminated by LKC because he was "too quality conscious" and "started to make too many waves too soon." Appl. Exh. 72 at 1; Tr. 6461-66. Mr. Puckett also informed Mr. McGregor about his August 22, 1984 letter to Mr. DeWald in which he recommended to him that all welding be stopped. Appl. Exh. 72 at 1. Mr. Puckett also described to Mr. McGregor several alleged procedural irregularities in LKC's weld inspection program. Appl Exh. 72 at 1-2.

86. After he finished speaking with Mr. Puckett, Mr. McGregor composed a memorandum referring Mr. Puckett's situation through his branch chief, Robert Warnick, to Mr. Weil, the NRC's Region III Investigation and Compliance Specialist. Tr. 11,514; Weil Test., ff. Tr. 11,948, A.16 at 5; Appl. Exh. 72. In his memorandum, Mr. McGregor stated that Mr. Puckett "seemed very calm and sure about the findings he was reporting to me," and recommended

that the NRC "do a full examination of the electrical contractor . . . now, immediately . . . ." Appl. Exh. 73 at 3; *see* Tr. 11,514.

87. Subsequently, Mr. Puckett had a few more interviews with NRC personnel concerning his allegations. On February 25, 1985, Jerome Schapker was assigned to investigate Mr. Puckett's technical concerns. Testimony of Jerome Schapker, ff. Tr. 11,012, A.8 at 4. Mr. Schapker has been employed by the NRC Region III since January 1980. Schapker Test., Exh. 1. Currently, Mr. Schapker is employed as a reactor inspector in the Division of Reactor Safety. *Id.* Mr. Schapker is an expert in the areas of welding technology, nondestructive examination, and quality assurance, and has more than 19 years' experience in these fields. *Id.* Prior to reassignment to the regional office in Glen Ellyn, Illinois, in June 1985, Mr. Schapker served as the Senior Resident Inspector at two nuclear construction sites: Marble Hill Nuclear Generating Station in Nabb, Indiana, and Hartsville Nuclear Generating Station in Hartsville, Tennessee. *Id.* at 1.

88. Thereafter Mr. Schapker reviewed a transcript of an interview Mr. Puckett had had with NRC personnel and a memorandum listing Mr. Puckett's allegations prepared by NRC personnel. Schapker Test., ff. Tr. 11,012, A.11 at 5. Mr. Schapker then visited the Braidwood site and met with representatives of CECo and with Mr. Simile, from whom Mr. Schapker obtained copies of procedures and other documents needed by him to perform his inspection. *Id.* at 5-7. Thereafter, Mr. Schapker met with Mr. Puckett on March 12, 1985, for approximately 4 hours. During this meeting, Mr. Schapker reviewed each of the allegations that had been compiled by NRC personnel on the basis of prior interviews with Mr. Puckett. *Id.* Soon thereafter Mr. Schapker returned to Braidwood to commence the inspection of each of Mr. Puckett's concerns. All told, Mr. Schapker devoted 192 hours reviewing Mr. Puckett's concerns between March 5 and November 7, 1985.

89. On November 21, 1985, the NRC issued a report documenting the results of Mr. Schapker's inspection efforts. Appl. Exh. 51; Schapker Test., ff. Tr. 11,012, A.6 at 3. The report dismissed the A-446/A-36 allegation as being "substantiated with no adverse effect on the quality of the welds." Furthermore, it accepted the disposition of NCR 3099 on the basis of the qualifications performed with regard to Attachment H, which qualified the procedure welding A-446 to A-500, and the AWS D1.1-1975 Code provision allowing for the substitution of a prequalified metal (A-36) for another prequalified metal (A-500). Although the inspection report appeared to recognize that the alleged invalidity of Attachment O was part of the A-446/A-36 allegation, it dismissed this matter as follows:

> The weld procedure was in error in that the A-446 [sic] base material was not listed as required and that technique sheet "O" was referenced with rejected test results within the

procedure. The inspector reviewed the revised procedure and the NCR and found them to be acceptable. This item was satisfactorily resolved.

Nowhere in the inspection report was there recognition of Mr. Puckett's complaint that Attachment H only qualified a small portion of the welding being performed by Comstock at Braidwood, involving weldments of 3/8 of an inch or greater, and that no procedure qualified the welding of A-446 to A-36 for the smaller welds, Mr. Puckett's major complaint. Although Mr. Schapker was aware at the time he investigated the allegation that the welds being done were predominantly less than 3/8 of an inch (Tr. 10,972), he asserted that Mr. Puckett had never expressed his concern to Mr. Schapker about the welds of less than 3/8 inch in size not being covered by Attachment H (Tr. 10,970). Mr. Schapker's ignorance of this issue is somewhat remarkable since the deletion of any reliance upon Attachment O from the disposition portion of NCR 3099 is apparent on the face of that NCR, as is the limitation in the disposition of NCR 3099 to "THE WELD SIZES INDICATED IN ATTH. H." Appl. Exh. 55; Int. Exh. 28. Mr. Schapker had also concentrated on both Attachment H and Attachment O in his investigation (Tr. 10,970), and Attachment H had added to it "A-36," while Attachment O had not. It is not surprising, however, that Mr. Puckett might not have fully expressed his concerns with regard to the absence of a procedure for welding small welds of A-446 to A-36, since Mr. Schapker never reviewed the welding procedure with Mr. Puckett, including Attachments H and O to the body of the procedure, when he interviewed Mr. Puckett. Tr. 11,139. Furthermore, after the initial 4-hour interview with Mr. Puckett, Mr. Schapker spent the remainder of his field inspection, 192 inspector-hours, at the Braidwood site, discussing the matters with Comstock management. Appl. Exh. 51 at 4. Mr. Schapker never reviewed any of his proposed resolutions or conclusions with Mr. Puckett, and never gave Mr. Puckett the opportunity to correct any of Schapker's misconceptions about Mr. Puckett's allegations. Mr. Schapker became, in effect, a spokesman for Comstock management's position. In fact, although the NRC issued Mr. Schapker's inspection report on November 21, 1985, it did not mail that report to Mr. Puckett until December 4, 1985. Staff Exh. 6. That ensured that the report would not reach Mr. Puckett's home in Ohio until he was in transit to a deposition in Illinois on December 6, 1985, and that he would not see the inspection report until Applicant's counsel was ready to question him on it. Tr. 6485-86.

90. At hearing, Mr. Schapker's testimony was little more than an apologia for Applicant. Although Mr. Schapker's inspection report and his testimony appeared to substantiate almost all of Mr. Puckett's concerns, they denigrated the allegations as having no technical or safety significance. Included in this denigration of Mr. Puckett's allegations was Mr. Schapker's dismissal of the A-446/A-36 issue as involving only a "procedural violation," not an AWS Code

violation. Tr. 10,991, 11,330. However, when asked repeatedly by the Board whether it would have been an AWS Code violation for Comstock to have welded less than 3/8-inch welds on the basis only of Attachment H, Attachment H having been limited to 3/8-inch or greater welds and Attachment O being assumed to be invalid at the time, Mr. Schapker would not answer that question directly. Tr. 11,331-34.

91. With AWS Code 1.1-1975 (Appl. Exh. 12) now before us, the answer is clear: unless the welding procedures are exempted by virtue of the metals' and the welding procedures' having been prequalified under the AWS Code, § 5.2 requires that the welding procedures be qualified "by test." Since Attachment H did not reflect any testing of weldments of less than 3/8 inch and Attachment O was invalid at the time because it had relied upon testing that was inappropriate for the specifications authorized, the making of welds of less than 3/8 of an inch in size would have violated the code because it was neither prequalified nor qualified by testing.

92. On August 10, 1984, one day after Mr. Puckett recommended to Mr. DeWald that all welding be stopped with regard to the welding of A-36 to A-446, Mr. Puckett wrote another memorandum to Mr. DeWald. In this memorandum, Mr. Puckett recommended "that all work be discontinued utilizing Procedure 4.3.14 Rev. 09-17-80. This procedure is only qualified in the 5G position. AWS D1.1-75 Part B Para. 5.8.1.2 requires that it be qualified in all positions." Int. Exh. 31 at 12. LKC Procedure 4.3.14 governs stainless steel welding. Appl. Exh. 57. Under the AWS D1.1 Code, qualification in the "5G," or fixed horizontal position also qualifies a welder to weld in the "1G" (flat), "3G" (vertical), and "4G" (overhead) positions. Schapker Test., ff. Tr. 11,012, A.20 at 10. It does not, however, qualify a welder to weld in the "2G" or horizontal position. *Id.*, A.21 at 10. Mr. Puckett's concern was that despite their lack of qualification, welders were welding in the 2G position in the field. *Id.*, A.20 at 9-10; Tr. 5509-10.

93. Mr. DeWald authorized the Stop Work after pointing out to Mr. Puckett that it was his responsibility to find solutions to such concerns and, on August 17, 1984, the Stop Work was issued. Simile Prep. Test., ff. Tr. 3305, Group Exh. 1 at 6, 14; Appl. Exh. 54. On August 24, 1984, Puckett apparently had Quality Control Inspector John Minor issue NCR 3145 to document this concern. DeWald Prep. Test., ff. Tr. 1700, at 48; Gieseker, Tr. 2972.

94. The NCR was subsequently dispositioned on the basis of requalifying the weld procedure and welders to include the 2G (horizontal) position for welding, removing the previously installed horizontal welds, and replacing the welds after requalification. Appl. Exh. 51, Body of Report at 4.

95. On August 22, 1984, after his first meeting with Gieseker and other CECo, S&L, and LKC personnel regarding the A-446/A-36 issue, Mr. Puckett sent Mr. DeWald a third memorandum concerning stopping work on weld-

ing. This memorandum recommended that all welding, including A-36 to A-446, be stopped because Comstock was "dangerously approaching a complete breakdown" in its Quality Control Program. In the memorandum, Mr. Puckett stated that procedures involving A-446 "were qualified using the criteria of AWS D1.1-1975 and it should never have been done." That code, he explained, was never intended for thin-gauged materials like A-446, and all procedures involving A-446 "should have been qualified using the criteria of D1.3." Appl. Exh. 56; DeWald Prep. Test., ff. Tr. 1700, at 49; DeWald, Tr. 1751-52.

96. Mr. Puckett admitted that he did not expect Mr. DeWald to stop work based on his August 22, 1984 memorandum. Tr. 6250-51. Indeed, he conceded that the drastic recommendation to stop all welding was "a little strong" and was designed to attract strong attention within the organization. Tr. 6273, 6276. Mr. Puckett wrote it to get Mr. DeWald's attention so that the two men could discuss a broad range of issues troubling Mr. Puckett because Mr. Puckett believed Mr. DeWald was not paying sufficient attention to concerns he expressed orally. This discussion never took place. Tr. 6254, 6258-59, 6273.

97. To place these Stop-Work requests by Mr. Puckett in perspective, we must consider the testimony of Therman Bowman. Mr. Bowman was a Level II Quality Control inspector with a background of approximately 20 years of welding and a year in junior college studying welding metallurgy. Tr. 6767-68. Because of his experience in welding, Mr. Puckett had used him as a sounding board for some of his ideas. Tr. 6975. Mr. Puckett had discussed with him the problems concerning the application of AWS D1.1-1975 to the thin material being welded at Braidwood. Tr. 6969-72. Mr. Puckett had expressed to Mr. Bowman his opinion that certain of the procedures for the welding of different materials had not been properly qualified at the time and had discussed with him the application of AWS D1.3. Tr. 6970-71. Mr. Puckett had also discussed with Mr. Bowman the advisability of Mr. Puckett's requesting a Stop-Work directive as a possible solution. Tr. 6967. Mr. Bowman had had some experience with requesting a Stop-Work directive. Mr. Bowman had identified a recurring, nonconforming condition that was being repeated by craft despite Mr. Bowman's identification of it as improper. Although he had written three NCRs on that problem, the practice was not stopped until Mr. Bowman had approached the engineering group, threatening them with his recommending a Stop-Work procedure. Tr. 6956-57, 6968-69. Mr. Bowman's discussions with Mr. Puckett may have persuaded Mr. Puckett that a similar recommendation to stop work with regard to the problems Mr. Puckett encountered might also get the desired action. At hearing, Mr. Bowman believed that if Mr. Puckett had taken other measures that had proven unsuccessful in controlling the deficiencies that he had identified and that the measures that he had tried to correct the problem had not corrected it, then the only recourse he had would have been a Stop-Work request. Tr. 6958-59.

98. Considering the discussions that Mr. Puckett had had with Mr. Bowman and Mr. Bowman's past experience with recalcitrant management in which Mr. Bowman had had to resort to a threat of a Stop-Work recommendation before the discrepant condition would be corrected, it was not unreasonable or unjustified for Mr. Puckett to recommend any of the Stop-Work requests even when, as in the third request, the circumstances may not have required that work be stopped immediately. Comstock's past history must be taken into account in determining whether Mr. Puckett's Stop-Work requests were reasonable.

99. The Board heard extensive testimony with regard to Mr. Puckett's recommendation that AWS Code D1.3 be utilized for the welding of sheet materials at Braidwood other than with regard to the welding of A-446 to A-36, which we have already explored in depth. Applicant's witness Gieseker testified (Tr. 2866-67) that, while Mr. Puckett had agreed to the minor revision of the welding procedure proposed by Mr. Gieseker with regard to adding A-36 to the A-446 procedures, Mr. Puckett continued to believe that the real solution to the problem was the use of a later AWS Code D1.1 which included D1.3.

100. Much of Applicant and Staff's position that Mr. Puckett's job performance at Braidwood demonstrated his incompetence is based upon Mr. Puckett's persistence in recommending that Comstock adopt a later code. AWS Code D1.3 was promulgated for the purpose of addressing welding on thin-gauge materials, such as the galvanized metal used in cable pans which Comstock employed at Braidwood. Tr. 1752. Even Mr. DeWald, the Quality Control Manager who terminated Mr. Puckett, agreed that AWS Code D1.3 was a more appropriate code to use for that kind of work than the earlier version of AWS Code D1.1. Tr. 1753. However, Applicant's witnesses took the position that use of either the earlier version of AWS Code D1.1 or a later version which included AWS Code D1.3 was optional and that Mr. Puckett's behavior was "erratic" in continuing to advocate the conversion to the later AWS Code. Tr. 2867. In fact, they recognized that Mr. Puckett had agreed to the resolution of the narrow A-446/A-36 question on the procedural change suggested by Mr. Gieseker, but that Mr. Puckett thought "the real solution to the problem was use of this later code." *Id.* According to CECo's Mr. Gieseker, who apparently was a moving force behind Mr. Puckett's termination, it was "very straightforward' (Tr. 2931) and "quite evident" (Tr. 2867) in the electrical specification that Comstock had the option of using either D1.1 or D1.3. Gieseker's poor opinion of Mr. Puckett arose over the fact that he would "expect him to know that as a Level III" that Comstock had the option of using either code (Tr. 2866) and when Mr. Puckett came on board as the welding expert, one of the first things that he would undertake to do is ask himself "Exactly what codes am I supposed to be working to here?" and have resolved that concern (Tr. 2932). As Applicant's witnesses further testified (*see, e.g.*, Tr. 12,924-25) and as Staff agrees (Prop. Fdg. 145) if the company had the option of using either code edition, to switch from AWS

Code D1.1 to AWS Code D1.3 would entail a substantial but needless expenditure of time and resources.

101. While Applicant and Staff may have taken a position at hearing and on brief that Comstock's option to use either D1.1-1975 or D1.3 was clear, Applicant's actions at the time belie that claim. On October 17, 1984, CECo's Quality Assurance Welding Engineer requested a formal interpretation from the American Welding Society on precisely that question raised by Mr. Puckett of whether welding on material of less than $\frac{1}{8}$ of an inch could be accomplished under the D1.1 Code "even though later Editions state that it is not intended for materials less than one-eighth inch?" Board Exh. 3, Inquiry 3. The American Welding Society replied that "[t]he Code specified in the contract document applies unless modified by the Engineer." Board Exh. 4, Reply 3.

102. Applicant offered a number of witnesses to testify that "the contract between Commonwealth Edison and L.K. Comstock * * * required that welding be performed with AWS D1.1-1975." *See*, for example, Prepared Testimony of Kurtz, ff. Tr. 12,881, at A.4. On further examination, those witnesses clarified that testimony to indicate that, although the 1975 edition of AWS D1.1 was not specified *as such* in the Comstock contract documents, it was the 1975 edition that was applicable per the contract documents. *See, e.g.*, Tr. 12,885. The basis for this theory was that the contract documents specified that all references to the standards to be utilized are to be to the latest issues of the standards as of the date of the contract. As this testimony offered, the contract documents in question consisted of the purchase order by the contractor and incorporated Specification L 2790 and Form 1701, and were adopted prior to the issuance of D1.3. Consequently, the latest edition of the AWS Code in effect at that time was D1.1-1975. Prepared Testimony of Kostal, ff. Tr. 12,881, at A.5-A.11; Tr. 12,875-80, 12,887.

103. This testimony turned out to be inaccurate. It was at the time that the contract to Comstock's predecessor at the site, Ernst, was adopted that D1.1-1975 was the latest edition of the code. AWS Code D1.3 was incorporated into Code D1.1 on September 1, 1978. Tr. 12,891. Comstock did not have a completed contract with Commonwealth Edison until February 5, 1979, the date of execution of the purchase order. Tr. 12,903, 12,908. Had that contract incorporated the latest edition of the AWS standard on that date, as its express language indicated, it would have adopted D1.3 as the applicable code. Tr. 12,908-10. Similarly, the incorporated specifications, L 2790 and Form 1701, each of which contains similar language specifying the use of the latest edition of the code then in existence, had been amended with an effective date later than the adoption of AWS Code D1.3. Amendment 1 to L 2790, specified in the purchase order, was issued on February 15, 1979. Appl. Exh. 16 at A-1. Form 1701 had been withdrawn and was readopted on October 11, 1978. Tr. 12,946. Applicant's witnesses did not rely upon

the contract documents themselves to support their position that D1.1-1975 was the governing code for Comstock welding; they relied upon what they perceived to be the "understanding of Commonwealth Edison" (Tr. 12,917) at the time Commonwealth Edison and Comstock entered into the agreement, to adopt the same specifications to which Comstock's predecessor, Ernst, had been operating under, even though they did not specify such in the contract documents. Tr. 12,891-92, 12,905, 12,916-17.

104. It is clear that had Mr. Puckett familiarized himself with the contract documents when he assumed the position as a Level III, as Mr. Gieseker believed he should have, he would not have concluded that Comstock was not bound to Code D1.3 with regard to thin material. Applicant's witnesses, Treece and Kostal, admitted that viewing the completed contract as a whole would have put into effect the latest issued version of the AWS standards which would have included AWS D1.3. Tr. 12,908-10.

105. But, to be fair to Applicant, it does not appear that Mr. Puckett made his recommendations in the context of a review of the contract documents. Rather, it appeared that his recommendation was based upon his experience and expertise with regard to welding and the welding codes. And, considering that context, one must conclude that Mr. Puckett's recommendation to adopt the later code appears eminently reasonable. The situation of Comstock's welding sheet material under the older edition of Code D1.1 appeared to be an anomaly. Most of the time under AWS Code D1.1, contractors use prequalified procedures and stay with the materials listed in the code. AWS Code D1.1-1975 gave a prequalified status for only those materials listed, but none of the sheet metals were listed. Consequently, any company utilizing the earlier editions of Code D1.1 would have to end up doing qualifications for all the sheet metals, and the qualification requirements are very stringent. The problem Comstock encountered with qualifying A-446 to A-36 was an uncommon problem that resulted from Comstock's not using D1.3, which would have prequalified the sheet metal. Tr. 3014-15.

106. Nor does the factual evidence support Applicant's suggestion that Mr. Puckett's proposal to adopt Code D1.3 would have created a difficult burden. The welding procedures at the Zimmer Nuclear Plant were requalified from the earlier editions of AWS D1.1 to D1.3 in 1982 or 1983. Tr. 5444-45. At Braidwood the heating, ventilating, and air-conditioning (HVAC) contractor completely requalified its procedures and welders to D1.3. Tr. 12,927. It would have taken only a week of qualification of welders and the weld procedures to make that conversion (Tr. 2915), and there is no indication that welding under the older edition of D1.1 could not have gone forward while the conversion was being made. It is surprising that, in the 6 years between the adoption of D1.3 by the American Welding Society on September 1, 1978, and Mr. Puckett's recommendations in August of 1984, CECo, Comstock, and Sargent & Lundy

had continued to qualify the welding of sheet materials by tests rather than convert to AWS D1.3 and utilize prequalification listings.

107. NRC Staff's review of this issue was less than adequate. The NRC inspector believed that at "the time the contract was le[t] to Comstock" that the prevailing AWS Code was D1.1-1975. Furthermore, in his supplemental testimony (Schapker Test., ff. Tr. 11,012, at A.6-A.8), he treated AWS D1.1 as the welding standard at Braidwood and AWS D1.3 as a *separate*, more recent, code of record. According to his testimony, Applicant committed itself in the PSAR and FSAR to the AWS D1.1 Code. Further, the testimony states that, although an applicant may conform to the requirements of subsequent revisions of the applicable code, "before an applicant can deviate from a standard to which it has committed in its PSAR or FSAR, it must first obtain authorization from the NRC to do so." On its face, this testimony suggests that CECo and Comstock were bound to the earlier edition of D1.1 and could only adopt D1.3 by first obtaining authorization from the NRC. Furthermore, such deviations from the provisions of AWS D1.1 would be permitted only "if supported by acceptable engineering evaluations." *Id.*

108. Upon Board examination, the NRC inspector gave an entirely different picture. Comstock and CECo could freely change from AWS Code D1.1-1975 to a later edition of D1.1 which includes D1.3 for a number of reasons: (1) The FSAR referred to AWS D1.1 and did not specify the year of edition (Tr. 11,315); (2) Comstock had blanket authorization to deviate from the FSAR standards (Tr. 11,288); (3) a subsequent revision to the applicable code, such as the inclusion of D1.3 in later editions of D1.1, was not a deviation from a standard that would require prior authorization from the NRC to adopt (Tr. 11,288-90); (4) any change in the specifications to the contract, in this case L 2790, presupposes an acceptable engineering evaluation that permits a deviation from the codes specified in the FSAR (Tr. 11,090). Subsequently, the NRC inspector indicated that the FSAR did not explicitly reference Specification L 2790 and that the NRC would not even require a change to that specification in order to permit a revision to the AWS Code. Tr. 11,314-16.

109. At one point in his testimony, Mr. Schapker indicated that Mr. Puckett was justified in raising his concerns and should have insisted on their being corrected. What Mr. Schapker found fault with was Mr. Puckett's recommendations to stop work on the A-446/A-36 and AWS Code D1.3 issues, which Mr. Schapker believed did not require a Stop-Work directive because those issues were not "safety significant." Tr. 11,293-99. Mr. Schapker had earlier elaborated on his standard for issuing a Stop-Work order in his supplemental prepared testimony (ff. Tr. 11,012 at 3): "A stop work order * * * would not be necessary if the nonconformance involved only a procedural or technical error having no adverse impact on the affected structures, systems, or components."

110. Mr. Schapker's standard, requiring an evaluation of "safety significance" before a Stop-Work order might be issued is at variance with Comstock's Stop-Work Procedure, LKC Procedure 4.11.3 (Appl. Exh. 3). Section 2.5 of that procedure states, in pertinent part, as follows:

> 2.5 The following are typical operations in which stoppage may be considered:
>
> 2.5.1 A work operation proceeding in violation of hold instructions placed on drawings, *specifications, procedural requirements*, equipment, or material installation.

(Emphasis added.) In the five subsections (2.5.1–2.5.5) to § 2.5, only subsection 2.5.3, involving malfunctioning or inoperative equipment, contains any express or implied safety-significant items. It is difficult to believe that either Comstock or the NRC Staff could ever adopt a standard such as Mr. Schapker's which would permit discrepant work to continue at the option of a quality control inspector, who would make an engineering judgment as to the safety significance of the discrepant condition.

111. In summary of the three matters raised in Mr. Puckett's recommendations for Stop Work — the A-446/A-36 welds, the welding in the 2G position, and the adoption of AWS Code D1.3 — Mr. Puckett's analyses and recommendations had much merit. He may not have been fully correct in the final analysis (although he appears to be), but his raising of these issues cannot be faulted and certainly cannot be considered as reflecting adversely on his competence. Nor was there any suggestion that he was insubordinate with regard to the proposed dispositioning of these issues. The record is clear that, while Mr. Puckett may not have agreed with the proposed dispositions, he was willing to accept them provided that they were in writing. That these issues may not have had safety significance in the sense that the welds created were not done poorly should not have detracted from his raising the issues. Mr. Puckett was assigned the task of correcting the procedures (*see, e.g.*, Tr. 1827), and no restriction was placed on him with regard to raising only safety-significant issues.

112. In this regard, one must view the Staff inspection report on Mr. Puckett in perspective. The NRC inspector was not assigned the task of investigating Mr. Puckett's dismissal from Comstock to determine whether it was improper, but was asked to address the technical concerns that were expressed by Mr. Puckett. Schapker Prep. Test., ff. Tr. 11,012 at A.7. Therefore, the question of whether the technical concerns had immediate safety significance has more importance in the context of the inspection report than with regard to any impropriety in Mr Puckett's dismissal. Moreover, when the inspector wrote his inspection report he was not aware of the fact that Mr. Puckett had not approached the NRC with regard to these matters and was not raising them as "allegations." *See* Tr. 11,118-27. Some of these so-called "allegations" were, in fact, matters that Mr. Puckett was assigned by Comstock and had not yet fully resolved. As an

example, "Allegation 2" (Appl. Exh. 51 at 7-8) concerns heat traceability numbers on weld filler material withdrawal forms. The inspection report and the NRC inspector's testimony at hearing (*id.*, Schapker Prep. Test., ff. Tr. 11,012, at A.36-A.38) made it appear as though Mr. Puckett had initiated an allegation concerning the lack of consistent heat numbers between the material withdrawal forms and weld material certifications, and that the NRC inspector managed to trace the forms disclosing that there were no deficiencies in this area. In reality, Mr. Puckett had been assigned the heat traceability project, an issue raised in a prior inspection report, and had managed to trace most of the questionable documentation. The three heat numbers that Mr. Schapker traced and accounted for in his inspection report were the only three remaining after Mr. Puckett's efforts. *See* Appl. Exhs. 64, 65 (misdated April 15, 1984, rather than August 15, 1984), 66.

113. To buttress its position that Mr. Puckett was fired for incompetence, Applicant also relied upon deposition testimony of an unavailable witness, Manfred Goedecke, who had displaced Mr. Puckett as the Senior Weld Engineer at Zimmer and had become Mr. Puckett's supervisor. Appl. Exh. 187. Mr. Goedecke's initial performance evaluation of Mr. Puckett (Appl. Exh. 45) was the first critical evaluation that Mr. Puckett had received during his professional career. Five days later, Mr. Goedecke clarified the performance evaluation in a more extensive memorandum (Appl. Exh. 46), to acknowledge many of Mr. Puckett's exceptional abilities and to indicate that his deficiencies were attributable to the extensive work load that prevented Mr. Puckett from keeping up with new construction requirements. Mr. Puckett subsequently took a course taught by Mr. Goedecke on the AWS Code. The course was also taken by other persons in the engineering department, including graduate engineers and people that had previously qualified as certified weld inspectors to the AWS Code. Tests were administered after each day's lecture, of which there were at least fourteen in number, and Mr. Puckett scored the highest in the class. Tr. 6415-18. Thereafter, Mr. Puckett received his last performance evaluation at Zimmer from Mr. Goedecke, covering the period from April 15, 1982, until April 1, 1983. Appl. Exh. 47. The evaluation indicated that Mr. Puckett had "improved tremendously," had passed all examinations with excellent marks in the in-house course, and had attained knowledge from seminars and courses in the areas of code applications, procedure preparation, interpretation of codes, standards and specifications requirements, and the practical application of welding and nondestructive examination processes. The evaluation further indicated that Mr. Puckett "needs to reassume a supervisory position," and "will be placed in a supervisory position as soon as one becomes available."

114. Mr. Goedecke's testimony on deposition was generally disparaging of Mr. Puckett. Not only did Mr. Goedecke make negative remarks about

Mr. Puckett's professional ability, but he also volunteered negative information about Mr. Puckett's relatives who worked for Mr. Puckett at Zimmer. *See* Appl. Exh. 187 at 72-73, 155. The deposition testimony was surprising not only because it appeared to contradict Mr. Goedecke's most recent evaluation of Mr. Puckett but also because Mr. Puckett had had a cordial professional relationship with Mr. Goedecke throughout Goedecke's tenure at the Zimmer plant (Tr. 5316) and had maintained contact with Mr. Goedecke while at Braidwood (Tr. 6231-37). He and Mr. Goedecke had discussed by telephone some of the issues that Mr. Puckett had encountered at Braidwood. *Id.* Mr. Goedecke's deposition testimony appears to reflect more upon Goedecke's character than upon Mr. Puckett's competence. In any event, it is Mr. Puckett's competence at Braidwood, not at Zimmer, that we must evaluate.

115. At various times, Applicant offered other reasons for Mr. Puckett's termination. All of them were clearly pretextual. In response to Mr. Puckett's complaint of retaliatory discharge in violation of the Employee Protection Provisions of the Energy Reorganization Act, Comstock claimed Puckett was dismissed because of his low score on the weld inspector proficiency exam. The U.S. Department of Labor Area Directory rejected this assertion in favor of its conclusion that Mr. Puckett's protected activity was the basis for his firing. Int. Exh. 11. Mr. Puckett's score of 88 exceeded both the established passing score of 80 and even the score of 85 achieved by Level III Weld Inspector and Quality Control Manager Irving DeWald on the same exam. Tr. 1661-63; Int. Exh. 17.

116. In defense of Mr. Puckett's claim for unemployment compensation, Comstock asserted that yet another ground was relied upon for his firing: "falsification of his credentials during his interview." Int. Exh. 27. The Administrator of Ohio Bureau of Employment Services rejected this claim by Comstock as unsupported. *Id.* Mr. DeWald disclaimed any knowledge of this assertion by Comstock and agreed that Mr. Puckett had neither falsified his credentials nor inaccurately presented his work experience in his resume. Tr. 1650-57.

117. Applicant has failed to demonstrate that Mr. Puckett's resume (Int. Exh. 26) contained any misstatements, concealments, omissions, distortions, inaccuracies, falsifications, or exaggerations, or was, in any way, misleading. And, compared to the backgrounds of Mr. Puckett's predecessor and successor as the Level III supervisor of Quality Control weld inspectors, Mr. Puckett's credentials are more impressive. Mr. Saklak, who was the supervisor over the welding inspectors from August 1983 until Mr. Puckett became supervisor in May 1984 (Tr. 7995, 8018, 8043-45; Int. Exhs. 24 (at 3) and 34), had never been a welder or quality control inspector (Tr. 7990-97, 8190-91). Mr. Simple, Mr. Puckett's successor, had never done any welding (Tr. 7945), as contrasted to Puckett's 20 years of welding in the Nuclear Navy (Int. Exh. 6).

118. A considerable amount of testimony, involving a number of witnesses, documentary evidence, and physical evidence, was proffered by Applicant to suggest that Mr. Puckett was terminated because of his failure to become certified in welding by not having passed his practical examination by his 89th day on the job, when he was terminated. Similarly, Applicant and Staff devote a significant portion of proposed findings to Mr. Puckett's failure to achieve certification by virtue of not having passed that practical examination. Appl. Prop. Fdgs. 262-266; Staff Prop. Fdgs. 116-128. Mr. Puckett had passed one practical examination, on July 19, 1984. Although he correctly determined that the item in question contained no deficiency welds and thus met acceptance criteria, through no fault of his own that passing performance was invalidated when it was discovered that the inspected item did not contain any nonconforming conditions as required by LKC Procedure 4.1.3. DeWald Prep. Test., ff. Tr. 1700, at A.29, Tr. 1673-74. There is also some question as to whether Mr. Puckett passed another practical examination taken under the supervision of Joseph Hii. According to Mr. Puckett, the practical examination was graded by Mr. Hii who informed him that he had passed. When, after a few weeks had passed and Mr. Puckett had not yet received official confirmation of this fact, Mr. Puckett went to discuss the matter with Mr. DeWald. According to Mr. Puckett, Mr. DeWald informed him that he could not find his test papers and thus LKC had no record by which to demonstrate that Mr. Puckett had, in fact, passed the examination. Thus, he would have to take and pass yet another practical examination. Tr. 6442-49.

119. Mr. Puckett's testimony on this point was disputed by Mr. Hii. According to Mr. Hii, he did not grade any of Mr. Puckett's examinations, practical or written, and had no recollection of the incident described by Mr. Puckett "ever taking place." Hii Prep. Test., ff. Tr. 16,608 at A-15. Mr. Hii's testimony is somewhat undermined by the minutes of the Comstock's supervision staff meeting of August 22, 1984, which states: "Puckett failed his practical per J. Hii. 1st test paperwork lost. 2d. test failed. Took coupon test." Int. Exh. 282 at 1.

120. There is no dispute, however, that Mr. Puckett took another practical welding inspection examination. This examination was administered by Jeffrey Dominique, then LKC's Training Coordinator on August 22, 1984. Testimony of Jeffrey Dominique, ff. Tr. 16,512, A.8 at 4 and A.16 at 6. According to Mr. Dominique, soon after Mr. Puckett completed the examination he (Mr. Dominique) delivered Mr. Puckett's test papers to Mr. DeWald for grading. Dominique Test., A.16 at 6. Mr. DeWald graded what purports to be Mr. Puckett's test on August 22, 1984. Appl. Exh. 5; Rebuttal Testimony of Irv[ing] DeWald, ff. Tr. 16,512, A.5 at 2. Using Mr. Vogt's grading key (DeWald Test., A.29 at 4), Mr. DeWald determined that Mr. Puckett had answered incorrectly four of the sixteen questions. *See* Appl. Exh. 5. Since a score of 100% was required to

pass, Mr. DeWald determined that Mr. Puckett had failed. DeWald Test., A.29 at 44.

121. There are several questions surrounding the reliability of Applicant's testimony, particularly that of Mr. DeWald, on this matter, however. For example, Mr. Dominique testified that he delivered Mr. Puckett's test papers to Mr. DeWald for grading on August 22, 1984. Dominique Test., A.16 at 6. Mr. DeWald, however, did not grade Mr. Puckett's examination until 4 days later. DeWald Rebuttal Test., A.5 at 2. An additional question involves the weld coupons offered by Applicant which are purported to be the weld coupons utilized in Mr. Puckett's examination. On their face the weld coupons do not precisely correspond to the examination graded by Mr. DeWald inasmuch as the examination reflects that fourteen weld coupons were evaluated by Mr. Puckett even though Mr. Vogt's key indicates that there were sixteen weld coupons. Although Applicant produced fourteen weld coupons (Appl. Exhs. 168-171), Mr. Dominique, who was the custodian of the weld coupons, could not account for the whereabouts of the two missing coupons. Tr. 16,527. According to him, they "just disappeared." *Id.*

122. Moreover, although Mr. DeWald graded Mr. Puckett's practical examination, it was unusual for a Level III supervisor to grade those exams. That was usually done by a Level II, although Mr. DeWald would review the results and assign the grade. Tr. 16,644-45, 16,653-54. When Mr. DeWald graded Mr. Puckett's exam, Mr. DeWald had already decided to fire Mr. Puckett and Mr. Simile had already been contacted to replace Mr. Puckett. Tr. 16,548. At the time Mr. Puckett took the exam, he was assigned the task of going to the Quality Control vault to review all the welders' qualifications withdrawal forms that had been issued on the project since it started, to review all the welding procedures and make the required changes in them within a week. Although he complained that this was a "physically impossible" task, he was given no help. Tr. 6260. Under these circumstances, Mr. Puckett had no time to prepare for the practical, although well-experienced inspectors are usually given at least 10 working days and up to 6 or 8 weeks to train for the practical. Tr. 13,782-83. Furthermore, the calls that Mr. Puckett allegedly missed on his practical were discrepancies that were on the coupon near the welds, not on the welds themselves: slag near weld number 5 and an arc strike near weld number 9. *See* Appl. Exhs. 5, 6. But it is a matter of judgment, that varies from project to project, as to whether defects near the welds are close enough to be considered part of the judgment call on the weld itself. Tr. 16,549-53. From the testimony adduced at hearing, even Level III Weld Engineer Vogt who had written the test answers employed by Mr. DeWald in grading Mr. Puckett would have failed the practical on the answers he supplied. Tr. 3255-59, 3284-85.

123. More importantly, Comstock attached little or no importance to whether Level III supervisors passed their qualification tests and became cer-

tified. Mr. Saklak, Mr. Puckett's predecessor as Quality Control Supervisor over welding (from August 1983 until May of 1984) never became certified. Mr. Puckett's successor, Mr. Tony Simile, who supervised weld inspection activities from September 1984 onward, did not become certified until July 12, 1985, a period of over 10 months. Similarly, Mr. Saklak supervised other disciplines such as Cable Pull, Conduit, Cable Tray, Equipment, Terminations, and Calibrations for periods ranging from 4 1/2 months to 2 1/2 years, during the period of July 1, 1982, to March 29, 1985, before becoming certified, if at all. Int. Exh. 24 at 3. Similarly, other supervisors such as M. Kast, J. Hall, L. Phillips, R. Tuite, J. Hii, J. Walters, A. Simile, and K. Worthington supervised Quality Control disciplines for many months without becoming certified. *Id.*

124. During his tenure at Braidwood, Worley Puckett appeared to have been highly respected by the Quality Control inspectors who were familiar with his work. For example, welding inspector Danny Holley volunteered (Tr. 5273):

> Well, I could say Mr. Puckett was, you know — maybe I'm out of line, but the welding inspectors that were around when Mr. Puckett was here really respected his — his professionalism and his background and really felt that he was doing a good job.
>
> When he was let go, a lot of people, you know, brought to their own mind, "Why was he let go?"
>
> There was talk, like I said, that was going on around the office.

125. Mr. Puckett testified over a number of days at hearing. Despite grueling examination by Applicant's and Staff's counsel, who had been well prepared by their respective experts, Mr. Puckett demonstrated an extensive knowledge of the welding procedures and codes, and a clear grasp of the issues discussed. Although he did not speak as an educated man in the traditional sense and his syntax suffered, his positions and opinions were expressed clearly and logically. On the basis of his testimony, Mr. Puckett appeared to be a highly conscientious, knowledgeable, and competent welding authority — certainly as competent in his area as any of the other experts who testified. On the other hand, we have no way of knowing how much of Mr. Puckett's knowledge and insight into the welding procedures and issues before us was acquired after his termination.

126. Applicant has failed to sustain its burden of proving that Mr. Puckett was not terminated for raising quality concerns. In fact, the preponderance of evidence is that Mr. Puckett was terminated for raising legitimate concerns and requiring that they be dispositioned in writing. Nor is this an instance in which Applicant, Commonwealth Edison Company, has only derivative liability for Mr. Puckett's improper termination by its contractor, L.K. Comstock. In addition to the production pressure placed on Comstock by Commonwealth Edison because of Comstock's backlog in inspections and documentation at that

time, which made Comstock inhospitable to Mr. Puckett's proposed revamping of inadequate procedures, CECo had direct responsibility in Mr. Puckett's termination. Mr. Gieseker, a CECo official, had played a large part in the Stop-Work conferences that led to Mr. Puckett's termination, and had disparaged Mr. Puckett at those conferences. At one point, when the issue of the use of the AWS D1.1 Code arose, Gieseker told Mr. Puckett to "Shut up. I don't want to hear [any] more about it." Tr. 6262. The decision to terminate was a joint one between Comstock and CECo and was finalized in a conference on August 27, 1984, attended by D. Shamblin, CECo Project Superintendent for Braidwood; J. Gieseker; and Irving DeWald, Comstock Quality Control Manager. Int. Exh. 31 at 7, Memorandum of Meeting of August 27, 1984.

4. John Seeders

I accept, *in toto*, NRC Staff's Proposed Findings 38-100, as 127-189.

127. [38.] Intervenors allege that John Seeders, a former LKC Level II Quality Control inspector was threatened with termination, and ultimately transferred out of LKC Quality Control Department, because he complained to senior LKC management, CECo, the NRC, and others about alleged harassment and intimidation, and unreasonable production pressure visited upon him and other Quality Control inspectors by certain LKC Quality Control managers, namely Mr. Saklak, Mr. Seltmann, and Mr. Seese.

128. [39.] John Seeders has been employed in LKC's Engineering Department as an Assistant Field Engineer at the Braidwood facility since about July 1985. Tr. 7291. Before he was promoted to this position, Mr. Seeders worked in the Engineering Department as a Clerk from October 1, 1984, until October 1985. Tr. 7292. Prior to joining the Engineering Department in October 1984, Mr. Seeders was employed by LKC as a Level I Quality Control inspector for 6 months beginning in August 1982 and a Level II Quality Control inspector for approximately the next 2½ years ending in October 1984 (Tr. 7293, 7537-38) at which time he was transferred to the Engineering Department. Tr. 7292, 7488.

129. [40.] At the time of his transfer to the Engineering Department, Mr. Seeders was certified in both calibration and receipt inspections, although he was assigned primarily to perform calibration inspections. Tr. 1605-06, 7578, 7666, 7692. Larry Phillips was the inspector who was assigned by LKC to perform receipt inspections. Tr. 7341. He received his on-the-job training from a Quality Control inspector named Lisa Oakley. Tr. 7538. Ms. Oakley and Janet Peters Labou, respectively, preceded Mr. Seeders as the inspectors assigned to perform calibration inspections. Tr. 7540. During Mr. Seeders' tenure as calibration inspector, other inspectors were certified in calibrations: Mike Kast, Janet Peters, and Myra Sproull (Tr. 7341, 7541, 7579), but only Mr. Seeders,

however, was employed full time as a calibrations inspector. Tr. 1605-06, 7431, 7578, 7666. The others were assigned to other disciplines. *See* Int. Exh. 7 at 12.

130. [41.] In August 1984, Mr. Phillips was Mr. Seeders' lead inspector. Tr. 7543. Above Mr. Seeders and Mr. Phillips on the chain of command were Mr. Saklak and Mr. DeWald. Tr. 7547, 7665-66. Neither Mr. Phillips nor Mr. Saklak were certified in calibrations during the time they supervised Mr. Seeders. Tr. 4318-19, 7665-66. Mr. DeWald, as the Quality Control Manager, was certified to Level III in calibrations. Tr. 1994. Nor did Mr. DeWald play in overseeing the daily activities of Mr. Seeders. Tr. 1608, 7556-67.

131. [42.] In general, the duties of a calibration inspector entail evaluating periodically precision tools used by LKC craftsmen and Quality Control inspectors.

132. [43.] The purpose of LKC Procedure 4.9.1 (Rev. C), entitled "Control of Measuring and Test Equipment," is, as stated in § 2.1, "to assure that tools, gauges, instruments and other measuring and testing devices used in safety related areas are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within required limits." Appl. Exh. 24 at 1 of 7. Section 3.3.1 of the procedure states that "[i]t will be L.K. Comstock's Q.C. Department's responsibility to verify that all items specified to be recalibrated with a certain time frame has [sic] been accomplished and documented." Appl. Exh. 24 at 3 of 7.

133. [44.] Pursuant to § 3.3.2 of LKC Procedure 4.9.1 (Rev. C), LKC is to maintain adequate records which sufficiently identify all measuring tools and equipment used in safety-related areas. These tools are to be listed on an "Inventory Control Log" (Form 76) which is to contain an inventory control number; a description of the item; the name of the manufacturer; the serial number of the item, if any; and the "frequency of calibration."

134. [45.] Section 3.3.3 of the procedure requires that a calibration "Control Card" be maintained for each item of measuring and test equipment identified in the Inventory Control Log. The calibration inspector uses the control card to record the results of his calibration inspection and the date the item is next scheduled for recalibration. Tr. 3980. The actual calibration inspection is performed by craftsmen in the presence of the calibration inspector. Appl. Exh. 24 at 3 of 5.

135. [46.] In the event an item is "found to have an expired calibration date and/or found to be outside the acceptable tolerance," § 3.3.7 of the procedure requires the calibration inspector to initiate an ICR (Form 30) which, *inter alia*, "directs the Project Manager to remove the equipment immediately to the warehouse for storage and recalibration." Where an ICR is issued because an item exceeds the applicable acceptance tolerance, § 3.3.7.1 of the procedure requires that "an evaluation be made and validity of previous inspections or test results determined." Although LKC Procedure 4.9.1 is silent as to the person or

department that is to perform this evaluation (*see* Appl. Exh. 24 at 3 of 5), LKC Procedure 4.11.3, which governs ICRs, provides that corrective actions are to be taken by the Engineering and Production Departments. Appl. Exh. 40. After the tool is recalibrated with satisfactory results, it may be reissued to the field. Appl. Exh. 24.

136. [47.] The Quality Control Department is not responsible for dispensing tools to the field. Section 3.2.1 of the procedure states that "L.K. Comstock's warehouse foreman shall provide storage and document the issuance of items by recording the recipient's name, tool control number and date issued" on a "Tool & Instrument Sign Out Log" (Form 3). Appl. Exh. 24 at 2 of 7.

137. [48.] On May 31, 1984, Eugene Mazur of Commonwealth Edison Company's Quality Assurance Department completed an audit of LKC's Calibration Department. Appl. Exh. 27. In the course of that audit Mr. Mazur found, *inter alia*, that ICRs "were not generated to evaluate the validity of previous inspection or test results for all instruments/gauges found out of calibration." *Id.* at 5. What this means is that while ICRs had been generated in four instances for certain tools found out of calibration, the disposition of the ICRs did not indicate that an evaluation had been performed to determine whether the inspections or work performed using the out-of-calibration tool were acceptable. Seltmann Test., A.14 at 16-17.

138. [49.] A copy of Mr. Mazur's report was received by Mr. DeWald and Mr. Seltmann on May 29, 1984. *Id.* Mr. Mazur directed LKC to respond to the audit findings not later than June 12, 1984. *Id.* at 1. Specifically, Mr. Mazur directed LKC to determine whether there were similar instances in addition to those identified in the audit where LKC failed to generate appropriate ICRs for tools found to be out of calibration. *Id.* at 5. Ultimate responsibility for responding to the audit findings belonged to Mr. DeWald, since he was LKC's Quality Control Manager. However, the responsibility of preparing LKC's written response to the audit findings was given to Mr. Seltmann, LKC's Quality Assurance Manager. Tr. 1609, 2101, 7667.

139. [50.] On June 12, 1984, Mr. Seltmann transmitted a written response to Mr. Mazur's audit report. Appl. Exh. 27 at 8. In that response, Mr. Seltmann stated that LKC had taken the following action to preclude recurrence of the deficiency discussed above: "A training class was held on 6-9-84 with J. Seeders concerning the issuance of ICR/NCR for *all* tool discrepancies." *Id.* On July 3, 1984, CECo Quality Assurance notified LKC that this corrective action was not entirely satisfactory because it was prospective in nature and did not address the question of whether there remained any unidentified instances of (i) inappropriately dispositioned ICRs, or (ii) failures to issue ICRs for tools found to be out of calibration. DeWald Test., Attach. DeWald-5 at 9. LKC was directed to address this issue in a further response to be submitted to CECo Quality Assurance not later than July 20, 1984. Seltmann Test., A.9 at 11-12.

140. [51.] According to Mr. DeWald, he assigned Mr. Seeders the task of conducting a complete review of LKC's calibration records to satisfy CECo's concern. DeWald Test., A.25 at 35. Mr. DeWald, however, acknowledged that he could not recall whether he gave this assignment to Mr. Seeders himself or through an intermediary. *Id.* Similarly, Mr. DeWald could not recall the exact date Mr. Seeders was given the assignment but was sure Mr. Seeders had received it by July 12, 1984. *Id.* at 36; *see id.*, Attach. DeWald-6. Mr. Seeders disputed this assertion. Tr. 7668. According to Mr. Seeders, he and Mr. DeWald had no communications regarding this subject prior to September 28, 1984, the date Mr. Seeders was transferred to LKC's Engineering Department. *Id.*

141. [52.] Mr. Seeders testified that he had never been asked to assist in responding to an audit finding. Tr. 7732. According to Mr. Seeders, Mr. Seltmann asked to conduct a "partial review" of the calibration records. Tr. 7332-34, 7669-70. Mr. Seeders stated that he was neither given a copy of Mr. Mazur's report nor informed by Mr. Seltmann of the scope of the review he was to conduct. Tr. 7343-52, 7357-65, 7667-75, 7672-75.

142. [53.] Mr. Seltmann testified that he spoke with Mr. Seeders on July 20, 1984, the date that LKC's response was due, and asked him about the status of his work. Seltmann Test., A.10 at 12. According to Mr. Seltmann, Mr. Seeders had been directed by Mr. DeWald to perform a 100% review of all calibration records. *Id.* But, like Mr. DeWald, Mr. Seltmann could not recall the date Mr. DeWald gave this assignment to Mr. Seeders. Tr. 2100-02. It should also be noted that while Mr. Seltmann was aware that LKC's response to CECo's July 3, 1984 request was due by July 20, 1984, and that he was responsible for preparing LKC's response, he made no effort to determine whether LKC would be in a position to respond to the request until July 20, 1984, the response due date. Tr. 2109.

143. [54.] According to Mr. Seltmann, he was informed by Mr. Seeders on July 20, 1984, that the calibration records review had not begun but that Mr. Seeders was going to spend the next day (Saturday, July 21, 1984) working on it. Seltmann Test., A.10 at 12. Mr. Seltmann agreed and informed Mr. Seeders that he would speak with him the following Monday, July 23, 1984, "to obtain the results of Saturday's work." *Id.* Mr. Seltmann testified that he did not instruct Mr. Seeders to perform a "partial" review of the calibration records, although he admitted that he stated to Mr. Seeders that a partial review "might produce the information" needed to respond to CECo. *Id.* Mr. Seltmann also testified that he explained to Mr. Seeders that a partial review "might produce the information" needed to respond to CECo. *Id.* Mr. Seltmann also testified that he explained to Mr. Seeders the reason why the requested information was needed. Tr. 2102.

144. [55.] On Monday, July 23, 1984, Mr. Seltmann contacted Mr. Seeders to obtain the information the two had discussed the previous Friday. *Id.* Not only did Mr. Seeders not have the information Mr. Seltmann sought, but according to

Mr. Seltmann, Mr. Seeders acted as though their previous conversation "had not occurred or that he didn't remember it." *Id.* at 13. Because the calibration record review was not complete, Mr. Seltmann was forced to write CECo that date to inform it that LKC "has initiated a review of our calibration records to determine if other situations arise similar to the items found in referenced finding. The review is being performed by J. Seeders, Quality Control Inspector, as directed by L.F. DeWald." *Id.*, Attach. Seltmann-1. Mr. Seltmann also informed CECo that although the review had started on July 21, 1984, the completion was "indeterminate." *Id.* Mr. Seltmann promised CECo that he would update his response by August 13, 1984. *Id.* Mr. Seltmann sent a copy of this memorandum to Mr. DeWald and Mr. Seeders, among others. *Id.* Mr. Seeders denied receiving a copy of Mr. Seltmann's July 23, 1984 memorandum (Tr. 7343, 7674), but, other than the possibility that Mr. Seltmann did not in fact send it to him, could not offer any explanation as to why he would not receive a document addressed to him. Tr. 7734.

145. [56.] On Saturday, July 21, 1984, Mr. Seeders worked on the assignment. Tr. 3978, 7336. Mr. Seeders admitted, however, that he felt his primary responsibility was to complete his calibrations inspection duties, although he tried to work on the review as much as possible. Tr. 7683-84. He was assisted in this endeavor by Richard Snyder, who had been hired recently as a Quality Control inspector and was being trained in calibrations by Mr. Seeders. Tr. 3978. The two men spent the day reviewing calibration records. *Id.* Mr. Seeders prepared a five-page handwritten list of the tools he and Mr. Snyder had checked and the results of their review. Appl. Exh. 26. Although Mr. Seeders insisted that this handwritten list represented only a part of his efforts (Tr. 7338-39), he could not describe what additional efforts were undertaken by him in this regard or whether those efforts were memorialized in writing. Tr. 7338-41.

146. [57.] Over the next few weeks Mr. Seltmann periodically inquired of Mr. Seeders of the status of his review. Tr. 7425, 7673, 7685. According to Mr. Seeders, on several of these occasions he informed Mr. Seltmann that a 100% review of the calibration records was a monumental and time-consuming undertaking because there existed literally thousands of such records which would have to be examined to complete a 100% review. Tr. 7679-84. Mr. Seeders testified that he told Mr. Seltmann that it was not possible for him to remain current in his daily calibration inspection activities and complete the requested review in a short period of time unless he received assistance. Tr. 7680-81. According to Mr. Seeders, Mr. Seltmann was not sympathetic to his plight and insisted that the calibration record review be completed by himself, as there was no help available. Tr. 7682-85. Mr. Seeders admitted, however, that Mr. Seltmann did not direct or suggest that he falsify documents. Tr. 7427.

147. [58.] In addition to his normal calibration inspection duties, two other circumstances operated to complicate Mr. Seeders' task. One was the fact that

beginning about August 8, 1984, his lead, Mr. Phillips, was away on funeral leave which later was extended by several weeks to encompass Mr. Phillips' vacation. Tr. 7686-87. Mr. Seeders was responsible for handling Mr. Phillips' material receiving inspection assignments during his absence. Tr. 7686. The second circumstance was the fact that during this time Mr. Seeders also was responsible for providing training in the areas of receipt inspection and calibration to a number of individuals. Tr. 7434, 7694-95.

148. [59.] On August 14, 1984, the day after the date on which he had promised CECo that LKC would respond to the audit findings, Mr. Seltmann summoned Mr. Seeders to his office to discuss the status of Mr. Seeders' review of the calibration records. Seltmann Test., A.10 at 13; Tr. 7675, 7677. Also present in Mr. Seltmann's office was Mr. Saklak. Tr. 7575-76. Mr. Seeders had given the handwritten "partial review" to Mr. Saklak who in turn had handed it to Mr. Seltmann. Seltmann Test., A.10 at 13; Tr. 7677. After reviewing the document Mr. Seltmann indicated to Mr. Seeders that he was dissatisfied with his report. Seltmann Test., A.10 at 14; Tr. 7676-77. He then hurled the document back toward Mr. Seeders and told him to leave and get back to work. Seltmann Test., A.10 at 14, Tr. 7677, 7735. Mr. Seeders again responded that conducting a 100% review of the calibration records would be an enormous undertaking that he could not complete in a short period of time especially if he was still required to perform his normal calibration inspection duties. Tr. 7680-85. According to Mr. Seltmann, Mr. Seeders also stated that Mr. DeWald and Mr. Seltmann were responsible for any deficiencies in the Calibration Department. Seltmann Test., A.10 at 13-14.

149. [60.] Subsequent to this meeting, Mr. Seltmann drafted another memorandum to CECo Quality Assurance informing it that "[a]t this point in time, the review of our tool calibration records is partially completed. Mr. Seeders has issued a preliminary report and will submit a final report when completed. This report is expected by 8/24/84." *Id.*, Attach. Seltmann-2. Mr. Seltmann also sent a copy of this memorandum to both Mr. DeWald and Mr. Seeders. *Id.* It should be noted that while Mr. Seltmann's memorandum indicates that Mr. Seeders was still working on the calibration records review, neither Mr. Seltmann, Mr. Seeders, nor Mr. Saklak could confirm that Mr. Seeders was still assigned to this task as of August 14, 1984. Tr. 7423-27, 7809-12, 7983.

150. [61.] Three days later, in the morning of Friday, August 17, 1984, Mr. Seeders was observed by Mr. Saklak engaging in conversation with a newly hired Level III Weld Inspector named Worley O. Puckett. Tr. 6237-38; Seese Test., A.13 at 12; Tr. 7700. Mr. Saklak then approached Mr. Seeders and asked him, angrily, how he had time to waste talking to others but not have the time to do his work assignments. Tr. 6238-39, 6241, 7701. The exchange between Mr. Saklak and Mr. Seeders was witnessed by the following

bystanders: Donald Coss, Danny Holley, Richard Snyder, Mr. Puckett, and Robert Wicks. Tr. 6238, 6243; *see* DeWald Test., Attach. DeWald-5.

151. [62.] Mr. Saklak indicated to Mr. Seeders that he (Saklak) was going to have him reprimanded for loafing. *See* Tr. 7701-07. Mr. DeWald was not at work that day and therefore Mr. Seese, the Assistant Quality Control Manager was in charge. Tr. 2476. Mr. Saklak instructed Mr. Seeders to follow him into Mr. Seese's office where Mr. Saklak asked Mr. Seese to suspend Mr. Seeders for 3 days for idling on the job. Tr. 2476-79, 7376. Mr. Seeders told Mr. Seese that he was not loafing and that he had "work in his hand." Tr. 2484, 7701, 7705. Mr. Seeders also gave Mr. Seese the names of several witnesses who would verify his story. Tr. 2484, 7705-06; Appl. Exh. 4. Mr. Seese advised Mr. Saklak and Mr. Seeders that he would review the matter and meet with them again at 11:00 a.m. that same morning. *See* Aug. 20, 1984 Memorandum from Seese to DeWald at 1, DeWald Test., Attach. DeWald-5.

152. [63.] Because Mr. Saklak was not available, the 11:00 a.m. meeting was postponed until 1:00 p.m., and then postponed again until 4:45 p.m. *Id.* During this time Mr. Seese interviewed Myra Sproull, Mr. Coss, and Mr. Wicks (Seese Test., A.12 at 11), each of whom confirmed that Mr. Seeders "had work in hand" at the time he was approached by Mr. Saklak. Seese Memorandum to DeWald, *supra*. Mr. Seese also consulted with Thomas Paserba, LKC's Vice-President for QA/QC Services who happened to be visiting Braidwood that day; Kenneth Worthington, an LKC Quality Control Supervisor; and Mr. Seltmann (*id.*), each of whom indicated that the 3-day suspension requested by Mr. Saklak was not warranted. *Id.*

153. [64.] The meeting finally took place late that afternoon. Seese Test., A.12 at 10. Present during the meeting were Messrs. Seese, Seeders, Seltmann, and Saklak. Tr. 2072. Since Mr. Seeders had requested that a witness be allowed to attend the meeting (Tr. 7707), Mr. Seese asked Mr. Seltmann to attend as an "objective observer." Tr. 2072, 2761, 7707.

154. [65.] During this meeting Mr. Seeders "was read [his] charges." Int. Exh. 23; Seese Memorandum to DeWald, *supra*. Mr. Seese presented Mr. Seeders with a written reprimand which he invited him to read. Tr. 7707. Unbeknownst to Mr. Seeders, the reprimand had been prepared by Mr. Saklak. Tr. 7709. The reprimand issued to Mr. Seeders charged that "[f]or the past two months John Seeders' work and conduct has been degenerating to a point where supervision cannot get through to him. He is constantly displaying a downgrading attitude towards management moves and directives. . . ." DeWald Test., Attach. DeWald-5.

155. [66.] The reprimand presented to Mr. Seeders for his signature charged that Mr. Seeders: (i) failed to appear at July 26, 1984 training session which he was scheduled to conduct; (ii) used "foul language" and ridiculed the Quality Control program when conducting the rescheduled session; (iii) failed to follow

certain unidentified directives given him prior to August 7, 1984, by Mr. Phillips, his lead; (iv) failed to submit status reports for August 10 and 13, 1984; (v) "commented in a negative direction" to Mr. Saklak when Mr. Saklak requested him to explain in writing why he wanted to work overtime on August 18, 1984; and (vi) "failed to complete a total research of the calibration files . . . due on 8-13-84" and then denied "knowing anything about the full scope of work that needed to be done." DeWald Test., Attach. DeWald-5. The reprimand closed by stating that "Mr. Seeders needs to immediately correct his attitude and to perform in a professional manner. His work habits and attitude will be closely monitored for the next 90 days and any repeat action will be dealt with immediately and could lead to termination." *Id.*

156. [67.] Mr. Seese testified that the reason the reprimand was issued in that form was because he wanted to emphasize that the reprimand "wasn't a result of that morning's incident; however, it was a result of that attitude that his situation was worsening." Tr. 2479. According to Mr. Seese, Mr. Seeders was reprimanded because "we wanted him to stay with the company and just correct the attitude problem that we found unacceptable." Tr. 2479-80.

157. [68.] Mr. Seeders asked Mr. Seese whether he had talked to any of the witnesses that he had asked him to interview. Tr. 7706. According to Mr. Seeders, Mr. Seese replied to the effect that it did not matter what any of the witnesses said because if LKC did not like him they could get rid of him and his family would suffer. Tr. 7706; Int. Exh. 23. Mr. Seese, however, denied making this or a similar assertion. Seese Test., A.17 at 14.

158. [69.] Mr. Seeders refused to sign the reprimand. Tr. 7714; DeWald Test., Attach. DeWald-5. He testified that at the time he felt that LKC was "out to get rid of me." Tr. 7739. Instead, according to Mr. Seeders, he requested (but was denied) the opportunity to respond to each of the charges (Tr. 7714-18; an assertion disputed by Mr. Seese). *See* Seese Test., A.17 at 14. Mr. Seeders also stated to Mr. Seese that LKC did not treat its employees like professionals (Tr. 7418), and indicated that he wanted to put his response to the reprimand in writing. Seese Test., A.18 at 14. Mr. Selumann said he should address his concerns to Mr. Marino. *Id.*, A.20 at 15. Mr. Seese suggested he address his concerns to Mr. DeWald instead. *Id.* Prior to this incident, Mr. Seeders had not been involved in any confrontation with Mr. Seltmann, Mr. DeWald, or Mr. Saklak. Tr. 7739.

159. [70.] Although he testified that he had intended to put his concerns in writing to Mr. DeWald "for some time" (Tr. 7739), Mr. Seeders took Mr. Seese's advice and that evening composed a letter to Mr. DeWald. Tr. 7423. Corresponding copies of that letter were directed to Robert Schulz, the NRC's Senior Resident Inspector (Construction) at Braidwood; Mr. Marino; Richard Cosaro, Mr. Shamblin's predecessor; and Mr. F. Black, an attorney in private practice. Tr. 7445-47; Int. Exh. 23. In his letter, Mr. Seeders complained

of a number of actions taken by LKC management which he considered improper. Among Mr. Seeders' complaints were the following: (i) that Mr. Seltmann and Mr. Saklak had ordered him to falsify documentation; (ii) that Mr. Saklak had improperly and arbitrarily denied his requests to work overtime; and (iii) that Mr. Saklak had threatened, without justification, to deprive him of receiving training in other inspection disciplines. *Id.* Mr. Seeders also stated in his letter that the morale of other Quality Control inspectors was deteriorating due to unkept promises of LKC management regarding compensation and cross-training. *Id.* Mr. Seeders stated that these acts of alleged harassment, intimidation, and production pressure did not cause him to compromise the quality of his work, stating: "I have never have nor will I ever falsify documentation." Int. Exh. 23 at 1. Mr. Seeders closed his letter by asking Mr. DeWald to look into his concerns and notify him of the actions taken to resolve them. *Id.* Mr. Seeders hand-delivered a copy of his letter to Mr. DeWald that following Monday, August 20, 1984. Tr. 7744.

160. [71.] After reading Mr. Seeders' letter, Mr. DeWald met with Mr. Rolan, Mr. Seese, Mr. Seltmann, and Mr. Saklak. Tr. 1610. Each of them was given a copy of Mr. Seeder's letter and asked to prepare a response. DeWald Test., Attach. DeWald-5. Later that afternoon Mr. Seese, Mr. Seltmann, and Mr. Saklak each provided Mr. DeWald a written statement. *Id.* In his "private and confidential" memorandum to Mr. DeWald, Mr. Seese summarized the events leading up to and through the meeting at which the reprimand was issued and concluded "that the warning meeting was conducted in a positive tone and that the management team acted properly during this affair." *Id.* For his part, Mr. Seltmann informed Mr. DeWald of his involvement with Mr. Seeders in connection with the calibration records review needed to respond to the CECo Quality Assurance audit. *Id.* Mr. Seltmann denied that he had attempted to pressure or had harassed and intimidated Mr. Seeders into completing the calibration records review by the due date. *Id.* Mr. Seltmann explained his differences with Mr. Seeders thusly: "From the initiation of Mr. Seeders' review to the present anticipated completion date of 8/24/84, is approximately four (4) weeks time." *Id.* Similarly, Mr. Saklak informed Mr. DeWald that he was not guilty of any of the charges of misconduct leveled against him by Mr. Seeders. *Id.* In Mr. Saklak's view, Mr. Seeders' allegations were either false or the result of a misinterpretation of his remarks. *Id.*

161. [72.] According to Mr. Seeders, on August 13, 1984, Mr. Saklak told Mr. Seeders that he would be in charge of both calibration and material receipt inspections, in addition to training other inspectors in these areas. Tr. 7431, 7437. Mr. Saklak informed Mr. Seeders that other inspectors would do the "legwork" while Mr. Seeders would only have to sign off the documentation as he was the only inspector certified in those areas at that time. Tr. 7431-32.

162. [73.] Mr. Seeders understood Mr. Saklak's instruction to mean that he should send other inspectors who were not certified in the area out to do the inspection, while he (Seeders) would fill out the paper work and sign it off. Tr. 7692. When Mr. Seeders objected to this instruction as a violation of NRC regulations, Mr. Saklak told him that "[s]ometimes you have to play a little chess in the business to keep your job." Tr. 7692-94. Myra Sproull had only been "book certified" in calibrations and was not experienced or confident enough to handle calibration duties on her own. Tr. 7432. When Mr. Seeders refused to accept this assignment, Mr. Saklak told him that he would never be trained in any other inspection disciplines. *Id.*; Tr. 7695, 7700. Unbeknownst to Mr. Seeders at the time, he was scheduled for training in concrete expansion anchor (CEA) inspections on August 14-15. Tr. 7432-33. Mr. Seeders testified, however, that Mr. Saklak did not tell him to falsify documentation or to violate procedures for material receipt and calibration inspections. Tr. 7437.

163. [74.] It would not have been possible for Mr. Seeders to be trained in CEA as he was conducting calibration and material receipt inspections and training others in those areas as well. Tr. 7433-34. Mr. Seeders alleged that Mr. Saklak harassed him and assigned such a large work load in an attempt to run him off the job. Tr. 7435-37. Mr. Seeders testified, however, that Mr. Saklak did not tell him to falsify documentation or to violate procedures for material receipt and calibration inspections. Tr. 7437.

164. [75.] As noted above, in May 1984, Mr. Shamblin replaced Mr. Cosaro as Applicant's Project Construction Superintendent. Tr. 7815; Gieseker Test., A.5 at 5; Shamblin Test., A.2 at 1. Consequently, Mr. Seeders' letter was received by him rather than Mr. Cosaro. In response to the letter, Mr. Shamblin appointed one of his deputies, James Gieseker, a CECo Project Construction Engineer, to meet with Mr. Seeders "to try to understand his concerns better." Shamblin Test., A.21 at 18; *see* Gieseker Test., A.6 at 6. Mr. Gieseker met with Mr. Seeders on two occasions. *Id.* The first meeting took place on August 21, 1984. Appl. Exh. 92; Tr. 7765-66. At this meeting, Mr. Seeders explained to Mr. Gieseker "that he wanted to inform CECo of harassment that he felt was being directed at him and other Quality Control inspectors by LKC Quality Control supervision, and of the fact that he had written a letter about the problem to Mr. DeWald." Gieseker Test., A.7 at 6. Mr. Seeders complained to Mr. Gieseker that there was a morale problem in LKC's Quality Control Department which Mr. Seeders attributed "to pressure being placed on QC management, who in turn, passed it on through QC supervision to the inspectors." *Id.* Mr. Seeders also confided to Mr. Gieseker that he was fearful of losing his job because of his current difficulties with Mr. Saklak. *Id.* Mr. Gieseker advised Mr. Seeders that he would meet with him again after he had discussed his concerns with Mr. Shamblin. *Id.* Before the meeting concluded, however, Mr. Gieseker assured

Mr. Seeders that he had acted properly in bringing his concerns to Mr. DeWald's attention. *Id.*

165. [76.] The next day, Wednesday, August 22, 1984, Mr. Gieseker met with Mr. Shamblin to brief him on his meeting with Mr. Seeders. Gieseker Test., A.8 at 8; Shamblin Test., A.25 at 22. Mr. Shamblin indicated to Mr. Gieseker that CECo was aware of the morale problem in LKC's Quality Control Department and the actions being taken by CECo to address it. *Id.* The following day, Mr. Gieseker met with Mr. Seeders for a second time. Gieseker Test., A.9 at 9. Accompanied by Lawrence Tapella, a CECo Project Construction Engineer, Mr. Gieseker explained to Mr. Seeders that CECo understood that "LKC was undergoing a particularly stressful time on the project" due to a number of problems, including the temporary loss of the Training Coordinator, the backlog in the approval by CECo of inspector certifications, and ongoing corrective action programs. *Id.* Mr. Gieseker stated to Mr. Seeders that CECo had taken a number of actions to address these problems such as assigning CECo personnel to LKC's Quality Control Department and expediting the certification process. *Id.* With respect to the latter item, CECo had agreed that LKC could implement the $0.50 raise awarded a Quality Control inspector for additional certifications as of the date that his certification package was approved by LKC reviewers rather than the date of CECo's approval of that certification package as was the former practice. Shamblin Test., A.28 at 25. Mr. Gieseker also assured Mr. Seeders again that he had acted properly in bringing his concerns to his management's attention and that he was to feel free to come to CECo to discuss the matter further if he felt the need to do so. Gieseker Test., A.9 at 10.

166. [77.] After becoming aware of Mr. Seeders' letter, Mr. Shamblin directed Mr. DeWald "to investigate the matters involving Mr. Seeders' work situation and the alleged harassment he had experienced" (Shamblin Test., A.25 at 22), and inform him of the results of LKC's investigation. *Id.* Mr. DeWald commenced an investigation in late August 1984 and issued his report on September 25, 1984. DeWald Test., Attach. DeWald-5; Tr. 1600-30. This investigation consisted of interviews by Mr. DeWald of Mr. Puckett, Mr. Snyder, Donald Coss, Ms. Sproull, Mr. Phillips, Donald Schirmer, Norman Kimble, and Janet Peters Labou, all of whom were LKC Quality Control inspectors and some of whom were witnesses to the confrontation between Mr. Saklak and Mr. Seeders. *Id.* Mr. DeWald also spoke with and received written statements from Mr. Seese, Mr. Seltmann, and Mr. Saklak. DeWald Test., Attach. DeWald-5. According to Mr. DeWald's September 25, 1984 report (*see* DeWald Test., Attach. DeWald-5), Mr. DeWald met with Mr. Seeders on August 21, 1984, to discuss his concerns and allegations and to "obtain a possible root cause for the issuance of the subject letter." *Id.* Mr. Seeders stated that after he had written his letter, Mr. DeWald called him in to his office and suggested to him that he retract or "reword" his letter, which Mr. Seeders refused to do. Tr. 7743. In any

event, it is clear that Mr. Seeders was not afforded an opportunity to respond to any information provided to Mr. DeWald by others that may have been adverse to him. *Compare* Tr. 7743 *with* DeWald Test., Attach. DeWald-5.

167. [78.] After completing his investigation, Mr. DeWald concluded that Mr. Seeders' allegations lacked merit and that no disciplinary action against any member of LKC's Quality Control management team was warranted because none had acted improperly. Tr. 1630; DeWald Test., Attach. DeWald-5. Specifically, Mr. DeWald concluded that the reason Mr. Seeders wrote his August 17, 1984 letter was "to combat the written warning that he was given for his poor cooperative attitude prior to the warning." *Id.* In Mr. DeWald's view:

> [T]he entire issue has stemmed from previous assignment given to Mr. Seeders for completion of which he blatantly [sic] failed to do and when contacted as to his progress of the assignment did not have a response, and when management redirection was given he instantly became defensive for his lack of attention to the assignment, therefore, becoming disrespective [sic] and blaming other individuals being the cause of the problem in the area of which he is responsible. The harassment, intimidation and blackmail accusations are Mr. Seeders' version of retaliation because he has been given a warning due to his attitude problem toward management when given direction.

DeWald Test., Attach. DeWald-5. Mr. DeWald advised Mr. Shamblin orally of the results of his investigation (Shamblin Test., A.26 at 23), and provided him a copy of the report shortly after September 28, 1984. *Id.*; Gieseker Test., A.19 at 15.

168. [79.] It should be noted that in every instance in which a concern or allegation expressed by Mr. Seeders in his letter was disputed by either Mr. Seese, Mr. Seltmann, or Mr. Saklak, Mr. DeWald credited the respondent and discredited Mr. Seeders. *Compare* Int. Exh. 23 *with* DeWald Test., Attach. DeWald-5. This was so even when Mr. DeWald had neither personal knowledge of the matter nor evidence to corroborate the respondent's statement. For example, Mr. Seeders alleged that Mr. Saklak threatened him with denial of training in concrete expansion anchors (CEAs) if he did not complete the calibration records review, perform his normal calibration inspections, handle Mr. Phillips' material receipt inspections, and provide training to four other Quality Control inspectors. Int. Exh. 23 at 1. According to Mr. Seeders, Mr. Saklak is alleged to have said that "sometimes you have to play chess in this business to keep your job." *Id.* To which Mr. Seeders is said to have responded: "I didn't know that chess and blackmail are the same thing." *Id.* In his memorandum to Mr. DeWald, Mr. Saklak denied that he threatened Mr. Seeders with denial of CEA training (and the concomitant loss of a $0.50 per hour increase in salary) but admitted that he "related scheduling cross training to a game of chess in that both require planning ahead in order to be successful." *See* DeWald Test., Attach. DeWald-5. Even though Mr. DeWald was aware that Mr. Saklak's temper

sometimes "would get the better of him and he would say things he normally would not say otherwise" (DeWald Test., A.21 at 26), he accepted Mr. Saklak's explanation at face value and simply discredited Mr. Seeders. *See* DeWald Test., Attach. DeWald-5.

169. [80.] In the same vein, Mr. DeWald accepted the statements of Mr. Seese and Mr. Seltmann suggesting that Mr. Seeders was being disingenuous in disclaiming knowledge of the scope of the calibration records review assignment. *Id.* Mr. DeWald acknowledged that he personally did not direct Mr. Seeders to perform a 100% review of the calibration records and could not recall who did. *Id.* Nor did Mr. DeWald know what deadline, if any, had been given Mr. Seeders. *Id.* Yet, Mr. DeWald agreed with Mr. Seese and Mr. Seltmann that Mr. Seeders "blatently [sic] failed" to complete a 100% review of the calibration records which he had been assigned to perform. *Id.*

170. [81.] Mr. Seeders was relieved subsequently of further responsibility for completing the review of the calibration records. Tr. 8196. The record is unclear as to the date Mr. Seeders was relieved of the assignment. Tr. 7427, 7813. Nor is the record clear as to who issued the order although it appears that it was either Mr. Seltmann or Mr. Saklak. Tr. 8196. It also appears that Mr. Seeders was relieved of the assignment sometime between August 14, 1984, and August 24, 1984. The earlier date was when Mr. Seeders turned in to Mr. Seltmann his "partial" report; the latter date was when Mr. Seltmann wrote to CECo Quality Assurance to advise it of LKC's progress in connection with the calibration records review since his August 14, 1984 memorandum. Gieseker Test., A.14 at 13.

171. [82.] In his August 14, 1984 memorandum, Mr. Seltmann informed CECo Quality Assurance that as of that date all LKC Calibration Control Cards (Forms 77) had been reviewed and all identified discrepancies were being researched in the individual tool packages in the QC Records Vault and in the ICR and NCR files. Gieseker Test., A.14 at 13. Mr. Seltmann also informed CECo Quality Assurance that the calibration records review was at that time being performed by Mr. Snyder who at that time had not yet received his calibrations certification although he had completed all of the requirements (*see* Tr. 3962-65), and two other calibration inspectors — Ms. Sproull and Mr. Coss. *Id.*, A.15 at 13; *see* Seltmann Test., A.13 at 16. This is not inconsistent with Mr. Snyder's recollection. Tr. 4046-47. Mr. Snyder testified that around August 17, 1984, he, Ms. Sproull, and Mr. Coss were requested by Mr. Saklak to go to the vault and review all the tool packages. Tr. 4046. Mr. Saklak did not inform them that the purpose of the review was to enable LKC to respond to CECo Quality Assurance audit finding. Tr. 4047. Nor, according to Mr. Snyder, did Mr. Saklak give them any written instructions relating to the scope of their

work assignment, only the oral instruction to go to the vault and research the tool records for problems. *Id.*

172. [83.] In the course of their review, Mr. Snyder, Ms. Sproull, and Mr. Coss identified a number of troubling types of discrepancies that called into question the integrity of LKC's calibration records. Seltmann Test., Attach. Seltmann-3; Gieseker Test., A.17 at 14; *see* Tr. 4046, 4053-4130; *see* Appl. Exh. 28. For example, they found numerous instances where no ICR or NCR was generated for a tool that had been determined to be out of calibration in violation of § 3.3.7 of LKC Procedure 4.9.1 (Rev. C). Tr. 4064; Seltmann Test., A.14 at 17; *see, e.g.*, Appl. Exh. 28 at 2. Mr. Snyder and Ms. Sproull also found several instances where an out-of-calibration tool had been released for use in the field even though an ICR or NCR had been generated. Seltmann Test., *supra*; *see, e.g.*, Appl. Exh. 28 at 12. Another type of discrepancy identified by Mr. Snyder and Ms. Sproull was the failure to evaluate the acceptability of work performed using out-of-calibration tools, which was a violation of § 3.3.7.1 of the procedure. Tr. 4044; Appl. Exh. 28 at 18.

173. [84.] These and other findings were documented by Mr. Snyder and Ms. Sproull in a September 7, 1984 "interim report" to Mr. Seltmann. Appl. Exh. 28; Tr. 4100, 4332. Ten days later, on September 17, 1984, Mr. Seltmann provided an update to CECo Quality Assurance on the status of the calibration records review and indicated that a further update would be forthcoming on September 21, 1984. Gieseker Test., A.14 at 130. Mr. Snyder and Ms. Sproull completed their research prior to October 9, 1984, for on that date Mr. Seltmann notified CECo Quality Assurance that the review had been completed and that LKC was in the process of evaluating the results. Gieseker Test., A.14 at 13.

174. [85.] Two weeks before Mr. Seltmann's October 9, 1984 communication to CECo Quality Assurance, he submitted a September 25, 1984 memorandum to Mr. DeWald regarding the adequacy of LKC's tool calibration program. Seltmann Test., A.14 at 16 and Attach. Seltmann-2. In his memorandum, Mr. Seltmann related to Mr. DeWald a discussion he had with a CECo Quality Assurance auditor on September 13, 1984. *Id.* According to Mr. Seltmann, Mr. Felz, the CECo auditor, indicated to him that he had found five (5) instances in which an ICR had not been issued for a tool found to be out of calibration or where an evaluation had not been performed to assess the acceptability of previous inspections or test results conducted with an out-of-calibration tool. *Id.* at 1-2. According to Mr. Felz, these five instances represented 40% of the items he had sampled. *Id.* at 2. Mr. Seltmann also described in detail several other deficiencies in the calibration records identified by Mr. Snyder and Ms. Sproull. *Id.* at 4. Mr. Seltmann closed his memorandum by stating to Mr. DeWald that because of the problems documented in his memorandum, he had "strong concerns surrounding our calibration program as I would suspect you would also." *Id.* at 6. Mr. Seltmann recommended to Mr. DeWald "that

corrective action be taken immediately to resolve the discrepancies noted from reoccurring in the future" and advised him that "this requires your utmost attention in order to get this program back on track." *Id.* Mr. Seltmann and his concerns "stem[med] from actions taken by QC Inspectors, J. Seeders, and his implementation of our calibration Procedures 4.9.1 and 4.9.4." *Id.* Copies of Mr. Seltmann's memorandum were sent to Mr. Marino, Mr. Rolan, Mr. Shamblin, and Thomas Trumble. *Id.* Mr. Trumble is LKC's Corporate Administrator. *See* Int. Exh. 11; Tr. 1564. According to Mr. DeWald, Mr. Trumble is contacted when "legal aspects" (such as termination) are involved. Tr. 1564.

175. [86.] Mr. Seltmann was disturbed particularly by the findings of Mr. Snyder and Ms. Sproull because Mr. Seeders had received remedial instruction as to the requirements of LKC Procedure 4.9.1 (Rev. C) on June 9, 1984. Attach. Seltmann-3 at 3. The record reflects that Mr. Seeders had in fact received 10 minutes of instruction from Mr. Seese on that date. Tr. 1997; *see* Personnel Instruction Log attached to Seltmann-3. Mr. Seltmann pointed out to Mr. DeWald that notwithstanding this additional training, Mr. Seeders had "failed to adequately comply with the procedural requirements of 4.9.1, Paragraphs 3.3.7 and 3.3.7.1." Attach. Seltmann-3 at 3. As Mr. Snyder testified, when a deficiency is identified, corrective action must be taken to prevent recurrence. Tr. 1682-84, 4452. Mr. Snyder agreed that one way to minimize the recurrence of a particular deficiency is to remove or replace the person who made the error, in this case Mr. Seeders. *Id.*

176. [87.] In October 1984, NCR 3419 was issued to document the deficiencies identified by Mr. Snyder and Ms. Sproull. Gieseker Test., A.20 at 16-17. NCR 3419 required LKC to conduct a comprehensive review and evaluation of the calibration records and, where necessary, reinspections to ensure that work performed in the field with out-of-calibration tools is acceptable. *Id.*, A.21 at 17-18; Tr. 1605-06. These corrective actions were sufficient to remedy the documented deficiencies. Gieseker Test., A.21 at 18, 19-20.

177. [88.] On Friday, September 28, 1984, three days after he had received Mr. Seltmann's memorandum, Mr. DeWald attended a meeting in Mr. Shamblin's office. Present were Mr. Shamblin, Mr. Gieseker, Mr. DeWald, Mr. Seltmann, and Mr. Schulz. Gieseker Test., A.19 at 15; DeWald Test., A.25 at 38; Seltmann Test., A.13 at 15-16; Shamblin Test., A.40 at 34. Two of the purposes of this meeting were to discuss Mr. Seeders' August 17, 1984 letter and the problems with LKC's calibration records. Seltmann Test., A.13 at 15. During this meeting Mr. DeWald apprised the others in attendance of the problems that had been discovered in the Calibration Department. DeWald Test., A.25 at 38; Gieseker Test., A.19 at 14-15. Mr. DeWald indicated to the others that he planned to terminate the Quality Control inspector responsible for those problems, Mr. Seeders. *Id.* He was dissuaded from doing so, however, by Mr. Shamblin. Tr. 1591; Shamblin Test., A.42 at 34-35.

178. [89.] Mr. Shamblin suggested that Mr. Seeders instead be transferred out of the Calibrations Department to some other position that was less critical. *Id.* Mr. Shamblin was aware that Mr. Seeders previously had complained of harassment but did not oppose Mr. DeWald's plan to remove Mr. Seeders from his position because he was sure that the two events were not related. Tr. 16,448-50. Mr. Shamblin testified that although he believed termination was not unwarranted in the circumstances, he recommended that Mr. Seeders be transferred to LKC's Engineering Department because he believed Mr. Seeders "might be able to perform satisfactorily in a less challenging position." *Id.* According to Mr. Shamblin, LKC was hiring additional personnel for its Engineering Department to perform essentially clerical functions. Since these positions required some familiarity with the Braidwood site and LKC's organization and operating procedures. Mr. Seeders appeared to be ideally suited for the position. *Id.* Mr. DeWald decided to adopt Mr. Shamblin's recommendation. DeWald Test., A.26 at 368; Tr. 1591. Mr. Schulz, the NRC Senior Resident Inspector (Construction) at Braidwood, was asked to give his views on the actions being contemplated with respect to Mr. Seeders but declined to do so, stating that it was improper for the NRC to get involved in personnel matters. Gieseker Test., A.19 at 16.

179. [90.] Later that same day, Mr. DeWald met with Mr. Rolan and "arranged for the transfer to take place if Mr. Seeders would agree." DeWald Test., A.25 at 38. After meeting with Mr. Rolan, Mr. DeWald summoned Mr. Seeders to his office. Tr. 7488; DeWald Test., A.25 at 38. Also in attendance was Mr. Seltmann. Tr. 7488. Mr. DeWald presented Mr. Seeders with a typewritten notice of termination which he had prepared the day before, September 27, 1984. Tr. 1594-95. The document set forth in detail the reasons Mr. DeWald believed warranted Mr. Seeders' termination. Appl. Exh. 94. The notice stated that Mr. Seeders was being fired because of his "unattention [sic] and substandard work practices." Appl. Exh. 94 at 2. Mr. DeWald relied heavily on the violations of procedure for which Mr. Seeders was blamed by Mr. Seltmann in his September 25, 1984 memorandum to Mr. DeWald and the 40% deficiency rate found by Mr. Felz, the CECo Quality Assurance auditor. *Id.*

180. [91.] Mr. DeWald explained to Mr. Seeders that he had the option of accepting a transfer to a clerk position in LKC's Engineering Department or be terminated for substandard work performance. Tr. 1595. Under § 20-60-30 of LKC's personnel rules, a copy of which is provided to all LKC employees (DeWald Test., A.16 at 20), "unsatisfactory job performance" is grounds for termination. DeWald Test., Attach. DeWald-1. According to Mr. Seeders, Mr. DeWald did not give him a chance to explain why he failed to issue certain ICRs. Tr. 7637, 7721-23. Mr. Seeders then asked Mr. DeWald whether he could have until the following Monday to make his decision. Tr. 7638. Mr. DeWald refused and insisted he make a decision immediately. Tr. 7638. Because he needed

to provide for his family, Mr. Seeders accepted the transfer. Tr. 7724. Mr. DeWald then arranged for Mr. Seeders to meet with the men who would be his new supervisors, Mr. Rolan and Mr. Klena (DeWald Test., A.25 at 38; Tr. 7724), and later wrote Mr. Seeders a memorandum confirming his transfer to the Engineering Department. Appl. Exh. 95. Mr. DeWald informed Mr. Seeders that his transfer would be effective Monday, October 1, 1984, and offered Mr. Seeders his best wishes in his new assignment, an assignment in which Mr. DeWald felt Mr. Seeders would excel. *Id.*

181. [92.] The following Monday, October 1, 1984, Mr. Seeders reported for duty to LKC's Engineering Department. Tr. 7639. This job action, while neither a promotion nor a lateral transfer, did not result in any decrease in Mr. Seeders compensation nor did it affect his employee benefits. DeWald Test., A.25 at 38. The transfer, however, subjected Mr. Seeders to § 20-06-30 of LKC's new employee policy pursuant to which any employee may be terminated without cause or notice within the first 90 days of his employment. *Id.* Ordinarily, transferred employees whose tenure exceeds 90 days transferred are not subjected to this provision. *See* DeWald Test., Attach. DeWald-1; Tr. 1875. According to Mr. DeWald, the reason that provision was applied in Mr. Seeders' case is because Mr. Rolan insisted on it. Tr. 1875.

182. [93.] As stated earlier, Mr. Seeders made a copy of his letter available to NRC Senior Resident Inspector Schulz. Tr. 7746. According to Mr. Seeders he delivered a copy of his letter to Mr. Schulz in person. Tr. 7746. Mr. Schulz forwarded a copy of Mr. Seeders' letter to his superior, William Forney, and Charles Weil, the Investigation and Compliance Specialist for Region III. Testimony of Charles Weil, A.5 at 2; Staff Exh. 18.

183. [94.] On August 29, 1984, Mr. Weil sent Mr. Seeders a letter in which he acknowledged receipt of his August 17, 1984 letter and informed him that the NRC would investigate his concerns. Weil Test. at A.6; Staff Exh. 12. Mr. Weil also asked Mr. Seeders to telephone him collect if he had any questions or additional concerns. Staff Exh. 12 at 1.

184. [95.] On August 27, 1984, Mr. Weil sent a memorandum to Eugene Pawlik, the Director of the Region III Field Office of the NRC's Office of Investigations (OI). Weil Test., A.7 at 2. In that memorandum Mr. Weil informed Mr. Pawlik of Mr. Seeders' allegations and transmitted a copy of Mr. Seeders' letter. *Id.* OI is customarily informed by Mr. Weil of allegations received by Region III so that OI can determine whether an investigation should be conducted. Tr. 12,059-60. Mr. Pawlik responded to Mr. Weil's memorandum orally on August 27, 1984, and notified him that OI did not plan to investigate Mr. Seeders' allegations because Mr. Seeders did not state that the alleged harassment and intimidation "affected his work and forced him to do something contrary to procedure or regulation." Staff Exh. 19 at 1; Weil Test., A.8 at 2. OI generally does not investigate allegations received by NRC offices unless

there is some indication that criminal misconduct has occurred. Tr. 11,982-83, 12,061. Mr. Pawlik, however, asked Mr. Weil to keep him informed as to the Staff's inspection efforts and to notify him of any additional information that might warrant OI's involvement. Tr. 11,977-78.

185. [96.] On August 27, 1984, Mr. Weil issued a memorandum referring Mr. Seeder's allegation to Charles E. Norelius, Region III Director, Division of Reactor Projects (DRP). Weil Test., A.7 and A.9 at 2-3; Staff Exh. 19. The DRP in turn assigned the matter to Mr. Schulz. Weil Test., A.9 at 3.

186. [97.] Mr. Schulz met with Mr. Seeders and four other Quality Control inspectors suggested by Mr. Seeders on September 21, 1984. Tr. 7747, 7752; Int. Exh. 91. The meeting was held in Mr. Schulz's office. Tr. 7747-48; Int. Exh. 91 at 1. The Quality Control inspectors explained to Mr. Schulz that the morale among the LKC Quality Control inspectors was not good "due to poor management" (Int. Exh. 91 at 1), and LKC's compensation of Quality Control inspectors. Tr. 7750-53. Mr. Schulz attempted to elicit from the inspectors specific information concerning the possible falsification of documents and instances of harassment or intimidation but none of the inspectors, including Mr. Seeders, could provide any. Tr. 7755-57; Int. Exh. 91. Consequently, Mr. Schulz concluded from his discussion with Mr. Seeders and the four other Quality Control inspectors that "there does seem to be a serious morale problem, but it cannot be substantiated that this morale problem affects safety-related installations." Int. Exh. 91 at 2. Mr. Schulz, on his own initiative, however, met with CECo site management to inform them that there were morale problems in the LKC Quality Control Department. Int. Exh. 91 at 2.

187. [98.] On January 21, 1985, Mr. Weil sent Mr. Seeders a copy of the NRC's report regarding his allegations and asked him to telephone him collect if he had any questions, concerns, or comments. Staff Exh. 13. Although he received these materials (Tr. 7746), Mr. Seeders did not respond to this request. Weil Test., A.15 at 4. Mr. Weil also sent a copy of the NRC's report to OI Director Pawlik (Weil Test., A.9 at 3), who responded on January 25, 1985, that he did not "anticipate any OI investigation on the issues addressed." Staff Exh. 20.

188. [99.] On September 13, 1985, Mr. Weil again wrote Mr. Seeders. Weil Test., A.14 at 4. This letter was prompted by information Mr. Weil had received from the U.S. Department of Labor in connection with another matter then pending before that agency. Weil Test., A.14 at 4; *see* Int. Exh. 93. The Department of Labor (DOL) had provided Mr. Weil a copy of a statement that Mr. Seeders had given to a DOL investigator investigating claims made by another LKC Quality Control inspector. *Id.* In that statement, Mr. Seeders again stated that he had been asked to falsify documentation by his superiors. *Id.* In his September 13, 1985 letter, Mr. Weil informed Mr. Seeders that the NRC's investigation of his concerns was being reopened and asked Mr. Seeders to

provide him with any information he had bearing on the question of document falsification. *Id.* Again, Mr. Seeders did not respond to Mr. Weil's request. Weil Test., A.14 at 4.

189. [100.] Mr. Weil wrote Mr. Seeders for a third and final time on March 6, 1986. *Id.* Again, Mr. Weil asked Mr. Seeders to provide him with any information he had concerning attempted document falsification at Braidwood. *Id.* For the third time Mr. Seeders failed to respond to Mr. Weil's request. *Id.*

190. Although Mr. Seeders may not have been treated fairly by his supervisor, Mr. Saklak, and by other Comstock management in reviewing his dispute with Mr. Saklak, he was not transferred for raising quality concerns. That one of the reasons for his transfer may have been unreasonable behavior on the part of his supervisor, Saklak, is not the Board's concern because we are not here to examine Comstock's management practices, except to the extent that they affect quality control requirements. The major reason for Mr. Seeders' transfer was the poor quality control practices within his department, and L.K. Comstock was justified in transferring him for that reason. However, Comstock is not blameless for the poor quality practices that existed in the Calibration Department. Not only did they assign poorly trained Seeders to be the sole calibrations inspector, but they also assigned Mr. Saklak to supervise the department when he was uncertified and unqualified in that discipline. The lack of certification of Comstock Quality Control supervisors was in violation of LKC Procedure 4.1.2 and later became the subject of NCR 4528. Int. Exh. 24. Despite the problems encountered in the Calibration Department because of lack of knowledgeable supervision, not only by Mr. Seeders but also by his successor, Richard Snyder (*see* Tr. 4218-19), Comstock was inexplicably permitted to disposition NCR 4528 by eliminating the requirement from its procedures that the Quality Control supervisor obtain certification prior to assuming his responsibility. *Id.*

3. Richard Snyder

191. As noted, *supra*, Quality Control Inspector Richard Snyder had gone to see Senior Resident Inspector McGregor on March 13, 1985, to discuss a concern he had regarding possible noncompliance by LKC with two provisions of LKC Procedure 4.1.2 (Rev. B). Int. Exh. 41; Tr. 11,557. One of these provisions, § 1.21, required that Quality Control supervisors "shall be trained and knowledgeable in the assigned areas of responsibility and certified to Level II capability in those areas." Int. Exh. 41 at 2. According to Mr. Snyder, Mr. Saklak, the Quality Control Supervisor responsible for calibration inspections, was not certified to Level II in calibrations. Mr. Snyder also indicated to Mr. McGregor that LKC was in violation of § 1.22 of LKC Procedure 4.1.2 (Rev. B), which required lead inspectors to be certified to Level II in each area for which they

held lead responsibility. Tr. 4318, 11,559-67; Int. Exh. 41 at 2. According to Mr. Snyder, Mr. Nemeth, the lead inspector for calibrations, was not certified to Level II in that discipline. Upon receipt of this information, Mr. McGregor referred the matter to his supervisor in the Region III offices. *Id.* Mr. Snyder's allegation was listed as Allegation No. RIII-84-A-0062. Region III OI Director Pawlik declined to launch an investigation into the matter because wrongdoing was not alleged. Appl. Exh. 117.

192. Mr. Mendez was assigned to inspect Mr. Snyder's allegation. Mendez Test., ff. Tr. 10,490 at A.8. In conducting his inspection, Mr. Mendez reviewed LKC Procedure 4.1.2, LKC certification records, and LKC organization charts and confirmed that Mr. Saklak was not certified to Level II in all of the areas for which he had supervisory responsibility. *Id.* at A.21; *see* Staff Exh. 17. Mr. Mendez found that Mr. Saklak's lack of certification violated LKC Procedure 4.1.2. Mendez Test. at A.22. Mr. Mendez also confirmed that Mr. Nemeth and one other lead inspector were given lead responsibility before they had obtained Level II certification in their respective lead disciplines in violation of LKC Procedure 4.1.2. *Id.* at A.24.

193. Mr. Mendez and Mr. Neisler explained that these violations of LKC Procedure 4.1.2 had no safety significance because neither the Quality Control supervisors nor lead inspectors performed inspections or approved an inspection performed by another Quality Control inspector. Mendez/Neisler Test., ff. Tr. 10,490, at A.22, A.42.

194. The NRC inspectors apparently ignored the requirement that Quality Control supervisors be "trained and knowledgeable" in their disciplines and the adverse impact Mr. Saklak's lack of training and knowledge may have had on the Calibration Department. They did not examine the question of whether Comstock's violation of its procedures in appointing an unqualified supervisor, Richard Saklak, whose main function was to speed production, caused or contributed to the Calibration Department problems for which John Seeders had previously been transferred.

4. March 29, 1985 Incident

I accept NRC Staff's Proposed Findings 190-228, *in toto*, with the exception of the second sentence in Proposed Finding 201, the last two sentences in Proposed Finding 220, and the second sentence in Proposed Finding 224, as representing a fair and comprehensive presentation of the March 29, 1985 incident as follows:

195. [190.] On the afternoon of Thursday, March 28, 1985, Mr. Snyder, who by now had assumed Mr. Seeders' former position as calibration inspector, engaged Mr. Saklak in a discussion. Tr. 4182. The discussion centered on a

question posed by Mr. Snyder to Mr. Saklak regarding the appropriate action to be taken with respect to an out-of-calibration weld machine. Tr. 4181-87.

196. [191.] Under § 4.0 of LKC Procedure 4.9.1 (Rev. C), the then-applicable calibration procedure, a weld machine was scheduled to be calibrated every 6 months to ensure that it did not deviate more than 5 amps from the established tolerance. Appl. Exh. 24 at 4 of 7. If the weld machine exceeded this tolerance range, an ICR was required to be issued; pending disposition of the ICR, the weld machine was not to be used in the field. Appl. Exh. 24 at 3 of 7. Under § 3.0 of LKC Procedure 4.11.2 (Rev. B), it is the responsibility of the Engineering Department to establish the conditions that must be fulfilled before the weld machine can be used again in the field. Appl. Exh. 38 at 1-2 of 4; *see* Tr. 4192. After the appropriate corrective action has been taken and verified by the Quality Control Department, a representative of the Quality Control Department (typically a calibration inspector) signs the ICR indicating that the ICR has been closed. Appl. Exh. 38 at 3 of 4.

197. [192.] Sometime prior to March 28, 1985, LKC Procedure 4.9.1 (Rev. C), was revised to delete weld machines from the class of tools requiring calibration. Seltmann Test., A.16 at 20. LKC determined that it was not necessary to calibrate weld machines because all safety-related welds made by LKC welders were now required to undergo a Quality Control inspection. Tr. 4189. Since each weld was to be inspected, it was felt that any deficient weld caused by an out-of-calibration weld machine would be identified and corrected. Tr. 4189. In addition, weld inspectors periodically monitored welders to ensure that weld machines were operating correctly. Tr. 4191. However, as of March 28, 1985, neither CECo nor S&L had approved LKC's request to revise the calibration procedure to delete weld machines. Seltmann Test., A.16 at 20-21. Accordingly, as of that date, an ICR was required to be generated for an out-of-calibration weld machine, and the ICR was to be processed in accordance with LKC Procedure 4.11.2. *Id.*

198. [193.] In their discussion on March 28, 1985, Mr. Saklak suggested to Mr. Snyder that he close out an ICR that he (Snyder) had written on a weld machine earlier that day. Tr. 4182. According to Mr. Snyder, Mr. Saklak took the position that because the calibration procedure was being revised to delete weld machines from the class of tools requiring calibration, it was not necessary to generate an ICR since the Engineering Department would indicate that all welds made with the machine were visually inspected. Tr. 4185, 4994. Mr. Snyder disagreed, and informed Mr. Saklak that because the revised procedure was not yet effective, an ICR was required to be issued and acted upon by the Engineering Department, and that he (Snyder) could neither make the required engineering evaluation nor close out the ICR without it. Tr. 4190. According to Mr. Snyder, Mr. Saklak remarked to him: "No wonder we have such a backlog of documents around here; you won't evaluate them or close them

out." Appl. Exh. 109 at 1. Mr. Snyder, accompanied by his lead, Mr. Nemeth, then went to discuss the matter with Mr. Seltmann who agreed with Mr. Snyder's interpretation. Tr. 2096-98.

199. [194.] Mr. Snyder and Mr. Nemeth left Mr. Seltmann's office and returned to their work station. Tr. 4196. When Mr. Saklak saw them return, he approached Mr. Snyder and, apparently perturbed that Mr. Snyder had "gone over his head" (Tr. 2097, 4196, 4467), said to him "you make me so pissed off that if beatings were legal you would be dead!" Tr. 4196. Although he did not then fear for his personal safety, Mr. Snyder was stunned and "shocked" by Mr. Saklak's outburst. Tr. 4196, 4198. Mr. Saklak is a very large man, standing about 6 foot 3 inches. Tr. 4196.

200. [195.] A short while later, Mr. Nemeth informed Mr. Seltmann of the outburst he had just witnessed. Seltmann Test., A.16 at 21. Mr. Seltmann, however, took no action that day to investigate the incident. Tr. 2097-98. Mr. DeWald was not informed of the incident until 1:00 p.m. the next day and it was Mr. Seese who informed him. Tr. 1872. Mr. Seese informed Mr. DeWald that a group of Quality Control inspectors had gone to see the NRC Senior Resident Inspectors earlier that morning to complain about Mr. Saklak's behavior. Tr. 8172. Although by 10:00 a.m. they were aware of the incident involving Mr. Saklak and Mr. Snyder, neither Mr. Seltmann nor Mr. Seese acted on the information they had received. Tr. 2098. After Mr. Seese briefed Mr. DeWald, Mr. DeWald met with Mr. Snyder who described the "chain of events" and with Mr. Nemeth and Timothy Stewart, both of whom confirmed Mr. Snyder's story. DeWald Test., ff. Tr. 1700, A.23 at 30-31.

201. [196.] Mr. Snyder, for his part, had resolved to bring the matter to the attention of the NRC. Tr. 4201. Although he did not know whether Mr. Saklak intended to cause him physical harm (Tr. 4198), Mr. Snyder did not feel he should ignore the incident because he knew that this was not the first time Mr. Saklak had abused a Quality Control inspector. Tr. 4197, 4202, 4224-32. Consequently, Mr. Snyder discussed the incident with some of his colleagues who agreed to accompany him to the offices of Mr. McGregor and Mr. Schulz, the Senior Resident Inspectors at Braidwood. Tr. 4205-06. Based on his previous experience, Mr. Snyder considered Mr. McGregor to be a fair and concerned individual. Tr. 4593.

202. [197.] At approximately 8:15 a.m., the next morning, Friday, March 29, 1985, Mr. Snyder, accompanied by five other Quality Control inspectors "walked into the NRC Braidwood office with numerous allegations which 'effect' the quality of work being accomplished by the electrical contractor," LKC. Int. Exh. 42 at 1; Tr. 4210, 11,567. Mr. McGregor advised the inspectors of their right to remain anonymous but informed them that the NRC would like to know their identity in order to obtain further information from them if

necessary and to advise them of the results of the meeting. Int. Exh. 42 at 1; Tr. 11,567.

203. [198.] During this meeting, Mr. Snyder informed the NRC inspectors of the threat made against him the previous day by Mr. Saklak. Tr. 4211, 11,569. Other inspectors complained to the NRC about Mr. Saklak's conduct as well. Appl. Exh. 11, Tr. 11,569, 11,736. In addition, the Quality Control inspectors raised a number of other complaints against LKC Quality Control management in this meeting. Appl. Exh. 109. Among these complaints were that CECo's "Quality First" Program was not effective; that unqualified persons were awarded lead inspector positions; that certain of LKC's Quality Control management team harassed and intimidated Quality Control inspectors; and that management was more concerned with the quantity rather than the quality of the inspectors' inspections. *Id.*; Tr. 11,569.

204. [199.] After the meeting adjourned, Mr. McGregor and Mr. Schulz contacted their superiors in the regional office to bring to their attention the events that transpired that morning. Weil Test., A.63 at 16; Tr. 11,569-70. Participating in that conference call were Mr. Warnick, Mr. Weil, and Mr. Forney. Weil Test., A.16 at 16. The NRC inspectors informed the Region that six LKC Quality Control inspectors had complained to them about harassment and intimidation from Mr. Saklak and an overemphasis on quantity at the expense of quality of LKC's Quality Control management. Mr. McGregor and Mr. Schulz also reported to the region "that the LKC quality control inspectors were threatening a walkout the following Monday." Weil Test., ff. Tr. 11,948, A.16 at 16.

205. [200.] Mr. McGregor and Mr. Schulz also recommended to the Region that someone from the regional office be sent to Braidwood immediately to take sworn statements from the Quality Control inspectors. *See* Tr. 11,582. Mr. McGregor and Mr. Schulz also recommended that the Region consider issuing an order stopping LKC from performing further work pending an inspection of the quality of work already performed. Appl. Exh. 109. The inspectors believed these actions appropriate because they had previously notified CECo of discontent in LKC's Quality Control Department and CECo apparently had failed to take sufficient action to address the problem. Tr. 11,740-56.

206. [201.] After speaking with Mr. McGregor and Mr. Schulz, Mr. Warnick, Mr. Weil, and Mr. Forney discussed the matter among themselves and decided that CECo should be notified of the substance of the Quality Control inspectors' allegations. Weil Test., ff. Tr. 11,948, A.65 at 16. [~~This course of action was consistent with the policy of the NRC which "recognizes that an applicant has a strong interest in learning of and taking appropriate action to correct any problems which may affect the operation of its nuclear facility." *Id.*; see Appl. Exh. 119 at 1.~~] The Region determined that it would be appropriate to notify CECo of the substance of the allegations that had been made "because

the allegations involved CECo personnel and the information to be provided Applicant did not appear to be of such character as to enable Applicant to compromise a subsequent NRC inspection or investigation." Weil Test., A.66 at 17; *see* Appl. Exh. 119. Mr. Weil was therefore asked "to advise the six LKC quality control inspectors of the NRC's proposed course of action and ascertain whether any of them desired to remain anonymous." *Id.*, A.65 at 17.

207. [202.] Mr. Weil then called Mr. McGregor to ask him to arrange a telephone conference with the six Quality Control inspectors. Tr. 11,570. McGregor in turn contacted some of the inspectors and asked them to attend a meeting in his office during their lunch break. Tr. 4265. Mr. McGregor indicated that any other inspectors who wanted to attend should feel free to do so. Tr. 4265, 11,571.

208. [203.] At approximately 12:00 p.m., the conference call began. Tr. 11,571-74; Weil Test., A.67 at 18. Mr. Weil was informed at that time by Mr. McGregor that eighteen Quality Control inspectors, in addition to the original six, were present in the NRC office. Weil Test., ff. Tr. 11,948, A.67 at 18; *see* Tr. 11,573.

209. [204.] As stated above, the purpose of the telephone conference was to advise the six Quality Control inspectors of the action Region III proposed to take and determine whether any of them wished to remain anonymous. Weil Test., A.65 at 17; Tr. 11,971-72. Accordingly, Mr. Weil spoke with each of the original six Quality Control inspectors and asked whether there was any objection to the NRC notifying CECo of the substance of the allegations. Weil Test., A.68 at 18; Tr. 11,972. None of these Quality Control inspectors expressed any disagreement or objection with this proposal to Mr. Weil. *Id.* Mr. Weil also asked each of these inspectors whether they wished to remain anonymous and was informed by each that confidentiality was not desired. *Id.* Mr. Weil then afforded the other Quality Control inspectors in attendance an opportunity to speak; ten of those Quality Control inspectors took advantage of this opportunity and made statements. *Id.*

210. [*new*] Senior Resident Inspector McGregor testified that at some point during the meeting a request was made for a show of hands to determine how many Quality Control inspectors agreed that Comstock Quality Control management was emphasizing quantity over quality. Mr. McGregor recalled that the twenty-four inspectors' agreement with the statement was unanimous, without abstentions or denials, and that he or Mr. Schulz relayed that agreement to the Region during the conference call. Tr. 17,534-35.

211. [205.] The telephone conference lasted between 30 and 40 minutes. Tr. 4269. Mr. Weil then notified OI Director Pawlik of the allegations received from the Quality Control inspectors and was informed by Mr. Pawlik

that an "investigation by OI:RIII was not warranted" based on the information then available. Staff Exh. 23.

212. [206.] At approximately 1:15 p.m. that afternoon, another telephone conference was held, this time between officials of Region III and Commonwealth Edison Company (CECo). Tr. 11,579. Present on behalf of the Region were Mr. Forney, Mr. Williams, Mr. Weil, and Rogelio Mendez, an NRC inspector. Weil Test., ff. Tr. 11,948, A.74 at 19; Testimony of Rogelio Mendez and John Neisler, A.9 at 4. Present on behalf of Commonwealth Edison Company were Thomas Maiman, CECo Vice-President and Manager of Projects; Eugene Fitzpatrick, CECo Assistant Manager of Quality Assurance; Lewis Kline, CECo Licensing Assistant; and Mr. Shamblin. Prepared Testimony of Thomas Maiman, ff. Tr. 3806, A.6 at 4.

213. [207.] CECo was informed by Mr. Forney of the substance of the allegations that the NRC had received regarding LKC's Quality Control management. Tr. 11,578-79, 11,762-73; Maiman Test., ff. Tr. 3806, A.7 at 5; Weil Test., ff. Tr. 11,948, A.74 at 19; Mendez Test., ff. Tr. 10,490, A.74 at 4. None of the identities of any of the Quality Control inspectors who had spoken with the NRC was disclosed to CECo. Weil Test., A.74 at 19; Tr. 12,007.

214. [208.] Mr. Forney informed CECo that the NRC attached a high degree of importance to the allegations and asked what action CECo intended to take in response to them. Tr. 11,579; Maiman Test., ff. Tr. 3806, A.7 at 5. Mr. Maiman stated that CECo shared the NRC's concern and would "promptly investigate and report back to the NRC later that afternoon with a plan of action." *Id.*

215. [209.] Immediately following this conversation, Mr. Maiman met with Mr. Shamblin, Mr. Fitzpatrick, and Thomas Quaka, CECo Quality Assurance Superintendent, to discuss the allegations. *Id.*, A.8 at 5. They subsequently contacted Mr. DeWald and Mr. Seltmann who informed them that they were aware of the incident involving Mr. Snyder and Mr. Saklak. *Id.* at 6. Mr. Maiman directed Mr. DeWald "to temporarily remove Mr. Saklak from his supervisory position pending further investigation." *Id.* Mr. Maiman also directed Mr. Shamblin to schedule a meeting for 8:00 a.m. the following Monday with LKC's Quality Control management and inspectors "for the purpose of reemphasizing CECo's commitment to quality and its ongoing desire to listen to and act upon quality concerns of inspectors or others." *Id.* Mr. Fitzpatrick also suggested that CECo send LKC a letter reminding LKC of its contract obligation to comply fully with all quality requirements and informing LKC that CECo intended to investigate all concerns brought to Quality First by LKC Quality Control inspectors. *Id.* In addition to these measures, Mr. Shamblin was directed by Mr. Maiman to develop a longer-range plan "to adequately investigate and address the allegations and to improve the working relationship between the LKC Quality Control inspectors and LKC management." *Id.*

216. [210.] Mr. DeWald met with Mr. Saklak later that afternoon and told him not to report for work the following day. DeWald Test., ff. Tr. 1700, A.23 at 32. Mr. DeWald notified Mr. Paserba of the incident, and the two men met with Mr. Shamblin the next day to discuss the matter. *Id.* Mr. Paserba subsequently contacted Mr. Marino, who met with Mr. Saklak on Wednesday, April 3, 1985, and terminated his employment with LKC. *Id.*; Tr. 8033. Mr. Saklak's termination papers indicate that he was "laid off due to lack of work" rather than fired. Tr. 8037; Int. Exh. 40. According to Mr. Saklak, he was not informed by Mr. Marino of the reasons for his termination (Tr. 8036), although he acknowledged that he surmised it had something to do with the incident involving himself and Mr. Snyder. Tr. 8147-48. For its part, CECo "barred" Mr. Saklak from future employment in any safety-related capacity on any CECo facility. Int. Exhs. 38, 39; Tr. 3883-89.

217. [211.] At approximately 4:30 p.m. on March 29, 1985, CECo contacted the NRC to notify it of the actions it had taken in response to the allegations. Tr. 11,596-600; Appl. Exh. 111; Mendez Test., ff. Tr. 10,490, A.11 at 5.

218. [212.] The events of March 29, 1985, were memorialized in three memoranda, two of which were authored jointly by Mr. Schulz and Mr. McGregor and the other by Mr. Weil. The first McGregor/Schulz memorandum, dated March 29, 1985, and addressed to Mr. Warnick and Mr. Weil, documented the meeting held that morning with Mr. Snyder and the five other Quality Control inspectors who accompanied him. Tr. 11,575; Appl. Exh. 109. Mr. Schulz and Mr. McGregor concluded this memorandum by repeating their recommendation that the Region (i) consider issuing an order directing LKC to stop work, and (ii) send someone to Braidwood to take sworn statements from the LKC Quality Control inspectors. *Id.*; Tr. 11,578, 11,582, 11,586-88. The second Schulz/McGregor memorandum, also dated March 29, 1985, and addressed to Mr. Williams and Mr. Warnick, summarized the second telephone conference between the NRC and CECo. Tr. 11,576; Appl. Exh. 111. Mr. McGregor and Mr. Schulz concluded this memorandum by observing that "the residents were satisfied with CECo's comprehensive and extremely swift corrective actions taken this afternoon." *Id.* at 4.

219. [213.] Mr. Weil's memorandum, which was dated April 5, 1985, reported the information received, and actions taken, by the regional officials with respect to the events of March 29, 1985, including his lunchtime conference with the LKC Quality Control inspectors. Appl. Exh. 110; Weil Test., ff. Tr. 11,948, A.69 at 18. Both of the Schulz/McGregor memorandums were attached to Mr. Weil's memorandum which was addressed to Charles Norelius, the Director of the Division of Reactor Projects (DRP) for Region III. *Id.* Copies of Mr. Weil's memorandum also were sent to the following NRC personnel: OI Director Pawlik; the DRS Deputy Director; the Technical Assistant to the DRS

Director; the Braidwood Senior Resident Inspectors; and the Regional Administrator. Weil Test., A.70 at 18.

220. [214.] On April 8, 1985, copies of Mr. Weil's April 5, 1985 memorandum, with the attached Schulz/McGregor memorandum, were sent to each of the LKC Quality Control inspectors who attended either of the two meetings with the NRC for whom Mr. Weil had an address. *Id.* In his letters, Mr. Weil thanked each addressee for his assistance and asked that he review the enclosed materials "which document [the NRC's] understanding of your concerns," and contact the NRC if he had any changes, corrections, clarifications, or comments to make to any of the matters set forth therein. *Id.*, A.72 at 19; *see, e.g.*, Staff Exh. 1 at 1. Only one Quality Control inspector, Richard Martin, made any changes to any of the statements contained in Mr. Weil's memorandum. Weil Test., A.73 at 19; *in camera* Staff Exh. 16 at 2-3.

221. [215.] Not a single copy of Mr. Weil's memorandum or either of the Schulz/McGregor memorandums was made available by Mr. Weil or, to the best of his knowledge, by any other NRC Region III employee to any CECo employee or LKC management official. Weil Test., ff. Tr. 11,948, A.71 at 19.

222. [216.] On April 12, 1985, Rogelio Mendez was assigned to conduct an inspection relating to the allegations raised on March 29, 1985, by the LKC Quality Control Program that had been received recently by the NRC. *Id.* These allegations were assigned to Mr. Mendez because he was the NRC's lead electrical inspector for Braidwood. Mendez Test., ff. Tr. 10,490, A.9 at 4.

223. [217.] Mr. Mendez received his degree in electrical engineering from the University of Illinois in 1976. *Id.*, Exh. 1. For nearly 6 years he has been employed by NRC Region III as a reactor inspector. *Id.* As a reactor inspector, Mr. Mendez is responsible for performing inspections of electrical and instrumentation systems to ensure that those systems comply with regulatory requirements. *Id.*, A.2 at 1. Mr. Mendez previously conducted inspections regarding allegations received against electrical contractors at the Marble Hill and Perry nuclear construction sites. *Id.*, A.14 at 6.

224. [218.] Mr. Mendez first became aware of the LKC Quality Control inspectors' allegations on March 29, 1985. *Id.*, A.9 at 4. At approximately 1:00 p.m. that day, Mr. Mendez's supervisor, Mr. Williams, asked him to attend the telephone conference during which the NRC informed CECo of the substance of the allegations it had received from the LKC Quality Control inspectors. *Id.* Mr. Mendez also attended the second telephone conference during which CECo notified the NRC of the actions it had taken and planned to take in response to those allegations. *Id.*, A.11 at 5.

225. [219.] Mr. Mendez arrived at Braidwood on April 30, 1985, to begin his inspection. *Id.*, A.16 at 7; Tr. 11,604. By this time, CECo had completed its own investigation of the LKC Quality Control inspectors' allegations. Tr. 10,501.

226. [220.] The regional management did not adopt the recommendation of Mr. McGregor and Mr. Schulz and direct LKC to cease operations pending an investigation of the Quality Control inspectors' allegations. As Mr. Neisler, himself a former Senior Resident Inspector, explained, a Stop-Work order was not warranted because the Quality Control inspectors' allegations did not indicate that the quality of the installed hardware had been affected adversely. Tr. 10,903-04. A Stop-Work order generally is a remedy exercised in connection with operating plants "where there is a danger of radioactive releases." *Id.* This danger is not present in the case of a construction site. *Id.* [~~The NRC also had valid reason for not sending an inspector to Braidwood immediately to look into the Quality Control inspectors['] allegations. As noted earlier, it is the policy of the NRC to notify licensees of "potential safety concerns raised by allegations" and allow the licensee an opportunity to address these allegations "subject to further audit by NRC." Appl. Exh. 119 at 1. The Region III management's actions were consistent with this policy. Tr. 11,957-58.~~]

227. [221.] When he arrived at Braidwood, Mr. Mendez met with Mr. McGregor to discuss the allegations. Tr. 10,898, 11,605. Mr. McGregor suggested the names of some Quality Control inspectors that Mr. Mendez should interview (Tr. 10,898) and arranged for him (Mendez) to meet with Charles Schroeder of CECo's Licensing Department. Tr. 11,606. Mr. Mendez asked Mr. Schroeder to make available to him CECo's records documenting the results of its investigation of the allegations. Mendez Test., ff. Tr. 10,490, A.16 at 8. After reviewing these record, Mr. Mendez requested that sixteen LKC Quality Control inspectors be made available for interviews. *Id.*

228. [222.] The sixteen LKC Quality Control inspectors interviewed by Mr. Mendez were: Danny Holley, Larry Perryman, Larry Bossong, Richard Snyder, Richard Martin, Dean Peterson, Robert Wicks, Michael Mustered, Hershel Stout, Terry Gorman, Therman Bowman, Mark Klachko, Julie Bullock, Sam Rissman, Ranco Rolan, and Kermit Williams. Tr. 10,503-04, 10,745, 10,773. With the exception of Mr. Sproull, Ms. Bullock, Mr. Williams, and Mr. Rissman, all of these Quality Control inspectors gave testimony in this proceeding.

229. [223.] To assist him in his interviews, Mr. Mendez prepared a detailed questionnaire containing about fifty questions. Mendez Test., A.15 at 7. In formulating this questionnaire, Mr. Mendez used the March 29, 1985 Schulz/McGregor memorandum (Appl. Exh. 109) and the April 5, 1985 Weil memorandum (Appl. Exh. 110) as well as the materials relating to the other allegations he had been assigned. Mendez Test., A.15 at 7. These questions were designed to elicit from the Quality Control inspectors information to enable Mr. Mendez to determine whether there was merit to the allegations and if so, whether the integrity of any safety-related activity conducted by LKC had been compromised as a result. Tr. 10,883-87. The inspectors were aware that

Mr. Mendez was conducting an inspection of the allegations that had arisen from the events of March 28-29, 1985, and were encouraged to speak candidly. *See, e.g.*, Tr. 4478. Mr. Mendez, as a representative of the NRC, assured each Quality Control inspector that none of the information he or she provided would be used against him or her. Tr. 10,736. All but two Quality Control inspectors, Kermit Williams and Terry Gorman, appeared responsive and eager to cooperate. Tr. 10,547-48.

230. [224.] On August 27, 1985, John Neisler was assigned by his Section Chief, Raymond Love, to report to Braidwood and assist Mr. Mendez in conducting the inspection. Neisler Test., A.13 at 6. [~~Mr. Neisler was assigned to assist Mr. Mendez because in July 1985 the NRC had assured the Atomic Safety and Licensing Board that its inspection of the LKG QC inspectors' allegations would be completed by September 1985. Tr. 10,752; *but see* Tr. 11,612-14.~~]

231. [225.] Mr. Neisler currently is employed as a reactor inspector by the Region III office of the NRC. Tr. 10,897; Neisler Test., A.3 at 2. Prior to assuming this position, Mr. Neisler served as senior resident inspector at the Callaway Nuclear Plant in Missouri. Neisler Test., ff. Tr. 10,490, Exh. 2. In total, Mr. Neisler has been employed by the NRC for nearly 10 years. Mr. Neisler has substantial experience in inspecting allegations of all types. *Id.*, A.14 at 6.

232. [226.] Since Mr. Mendez had already developed the inspection plan for the inspection, there was no need for Mr. Neisler to develop a separate one. *Id.*, A.17 at 8. Instead, when Mr. Neisler arrived at Braidwood, he and Mr. Mendez discussed the allegations and how he could most effectively assist Mr. Mendez in completing the inspection. *Id.* The two men agreed that Mr. Neisler would inspect the allegations identified as "Concerns" 1-3, 5-7, 9, and 13-16. *Id.* Mr. Neisler interviewed six Quality Control inspectors: Mr. Walters, Mr. Bullock, Mr. Bowman, Mr. Peterson, Mr. Holley, and either Mr. Snyder or Mr. Hunter. Tr. 10,511.

233. [227.] Between them, Mr. Mendez and Mr. Neisler devoted 152 hours inspecting the LKC Quality Control inspectors' allegations during the period April 30 to September 5, 1985. Staff Exh. 17 at 4. On November 4, 1985, the NRC issued a report (Inspection Report Nos. 50-456/85-21; 50-457/85-22) documenting the results of their inspection. Mendez Test., ff. Tr. 10,490, A.7 at 3; *see* Staff Exh. 17. After completing their inspection of the Quality Control inspectors' allegations and reviewing the actions taken by CECo to address these concerns, Mr. Mendez and Mr. Neisler concluded that:

> The problems between LKC management and the Quality Control inspectors generally stemmed from a lack of communication between management and employees, and the bullying tactics of one Quality Control supervisor [Mr. Saklak] who was removed from the construction site. These concerns have been resolved or are in the process of resolution by the licensee.

Staff Exh. 17 at 25. According to Mr. Mendez and Mr. Neisler, these problems "could have been avoided had LKC management communicated more effectively with its Quality Control inspectors and taken stronger or earlier action" against Mr. Saklak. Mendez/Neisler Test., ff. Tr. 10,490, A.90 at 33.

234. [228.] On November 8, 1985, Mr. Weil mailed a copy of Inspection Report Nos. 50-456/85-21, 50-457/85-22, to each of the LKC Quality Control inspectors for whom he had a home address. Weil Test., A.78 at 20. The preceding day, November 7, 1985, Mr. Weil provided a copy of the inspection report to OI Director Pawlik. *Id.; see* Staff Exh. 23.

235. In the objectionable portion of Proposed Findings 201 and 220, NRC Staff asserts that the decision by NRC Staff management, contrary to the recommendations of Senior Resident Inspectors McGregor and Schulz, to notify CECo about the substance of the Quality Control inspectors' allegations and to defer sending an NRC inspector to Braidwood, was consistent with NRC policy. That policy is referred to as being one in which licensees are to be notified of potential safety concerns raised by allegations and allowed an opportunity to address those allegations subject to further audit by NRC. Staff relies upon a memorandum from NRC's Executive Director for Operations, dated April 24, 1984, to regional administrators. Appl. Exh. 119. The "principal guidance" offered by the Directive is that the licensee/vendor should be advised of potential safety concerns as soon as feasible in order to take action to protect the health and safety. Two exceptions were given to the guidance to inform the licensee: where the release of information would compromise the identity of a confidential source and where the licensee could compromise an investigation because of knowledge gained from the release of information, especially if wrongdoing is involved.

236. It was within this guidance, and appropriate, for NRC Staff to advise CECo about the Saklak/McGregor matter in order to take immediate action against Mr. Saklak. Mr. Saklak was immediately removed from his position as a result, and that action was appropriate.

237. However, what immediate corrective action Staff expected with regard to the numerous complaints about the climate of production pressure that could not await the immediate dispatch of an investigator to take sworn statements from the complaining Quality Control inspectors and begin his field inspection, is unclear. Moreover, the second exception to the EDO's guidance, where wrongdoing is involved, was applicable. There could hardly be a clearer case of alleged wrongdoing as when twenty-four inspectors arrive *en masse* to make what appears to be a unanimous complaint about improper production pressure. To be sure, NRC was informing CECo, not L.K. Comstock management about the complaints, but NRC had no reason to believe that CECo would not immediately inform LKC about the allegations or that CECo was not itself implicated in the production pressure. As the facts were demonstrated later at

this hearing, there was a consistent belief among the Quality Control inspectors at the time and representations made to them by LKC management to the same effect, that the production pressure originated with CECo. According to the testimony, the beliefs of the Quality Control inspectors and the statements of Quality Control management were to the effect that Edison pressured LKC management under a threat to cancel the construction contract if the inspection backlog were not eliminated by a certain date and that LKC management, in turn, pressured the Quality Control inspectors.

238. No plausible reason based either on the EDO guidance or the particulars of the situation has been offered by Staff to support its not having dispatched an investigator immediately to investigate the Quality Control inspectors' complaint, whether or not CECo was informed of the allegations. NRC Staff's failure to investigate immediately was not only a negligent act considering the circumstances, but it may have resulted in the full facts underlying the inspectors' complaints not being eventually disclosed.

239. The apparent reason for the delay in the NRC's investigation of the March 29, 1985 incident had little to do with the EDO Directive. It was because NRC management decided, despite the magnitude of Quality Control inspector complaints at the March 29 meeting of improper production pressure and harassment, that the inspector complaints were because of a labor-management dispute, and NRC management wanted to give Commonwealth Edison the benefit of the doubt. Tr. 10,608, 10,730. That prejudgment of the issues to be investigated was conveyed to Inspector Mendez by his Section Chief when he was assigned his inspection task, and in the end became his own conclusion. *Id.* Commonwealth Edison issued its report on April 25. Mr. Mendez began his investigation on April 30 and had CECo's report at that time. Tr. 10,731.

240. The objectionable portion of Staff's Proposed Finding 224 asserts that Mr. Neisler was assigned to assist Mr. Mendez because the NRC had assured the Licensing Board that its inspection of LKC Quality Control inspectors' allegations would be completed by September 1985. However, Leonard McGregor, the Senior Resident Inspector at Braidwood at that time, testified to the contrary, that Mr. Neisler was assigned because Mr. McGregor had complained to Mr. Mendez's superior that Mr. McGregor and his fellow Senior Resident Inspector Schulz believed Mr. Mendez's draft report "whitewashed" the Quality Control inspector problems. Tr. 11,612-14.

241. Mr. McGregor's explanation is the more credible, in light of the testimony of Mr. Mendez and Mr. Neisler at hearing, which indicates serious deficiencies in the methodology of the inspection and in the substance of even the final report co-authored by Mr. Mendez and Mr. Neisler. Mr. McGregor never reviewed the final report produced after Mr. Neisler joined Mr. Mendez on the inspection. Tr. 11,614.

242. Although the twenty-four inspectors were complaining about harassment, intimidation, and production pressures, during their inspection, Mr. Mendez and Mr. Neisler were unaware of two significant allegations about retaliatory termination and retaliatory transfer over quality concerns that had recently been brought to the NRC's attention — by Worley Puckett and John Seeders in August and September of 1984. This, despite the Department of Labor's notification to the NRC by letter dated November 6, 1984 (Int. Exh. 11), that it had found in Mr. Puckett's favor, and the clear indication in the NRC memorandum of March 29, 1985, concerning the meeting with twenty-four inspectors that a person named John was "railroaded out" of his job through no fault of his own (Int. Exh. 42 at 2). Even though they were assigned to review the inspector's complaints, Mr. Mendez and Mr. Neisler never inquired about who "John" was and never determined that he was John Seeders. Tr. 10,662, 10,708-09, 10,711-12, 10,719, 10,879.

243. Neither were Mr. Mendez and Mr. Neisler aware of internal NRC documents predating the March 29, 1985 incident by a few months, indicating other Quality Control inspector complaints about Quality Control management. Included in these documents was a September 25, 1984 memorandum from R.D. Schulz, a Senior Resident Inspector at Braidwood to the Chief of Project Section 1A (Int. Exh. 91) about a visit to his office by five Comstock Quality Control inspectors complaining, among other things, of low or nonexistent morale due to poor management. Tr. 10,660. Nor had they seen the memorandum of December 28, 1984 (Int. Exh. 92), in which Mr. Schulz met with the CECo project manager and construction superintendent to discuss the issue of Comstock site Quality Control management intimidation and harassment. They were not even aware of the meeting. Tr. 10,705, 10,708. Mr. Mendez had not even made any specific inquiry of Mr. McGregor or Mr. Schulz to ask about past difficulties with Commonwealth Edison or Comstock. Tr. 10,658.

244. In conducting the interviews with Quality Control inspectors, Mr. Mendez took no precautions against having the Quality Control managers complained about, Mr. DeWald, Mr. Seese, Mr. Simile, etc., learn the names of the inspectors being interviewed and the exact times of interview. The procedure adopted was to notify Commonwealth Edison of the person to be interviewed at the NRC site residents' office, who in turn would give the name to L.K. Comstock management. LKC management would, in turn, call that person off the job and inform him that the NRC wanted to speak to him. Tr. 10,734-44.

245. The inspection report itself, Staff Exh. 17, demonstrates a superficial inspection of the allegations raised by the Quality Control inspectors. For example, in Concern No. 1, in which the LKC inspectors complained about lack of qualification and certification of their Quality Control supervisors because they "could not depend on the Quality Control supervisors to answer questions in the areas where Quality Control inspectors were uncertain of QC related

matters," the NRC inspectors merely referred to corrective actions being initiated by CECo. *Id.*, Body of Report at 3-4. Those corrective actions, however, were directed toward eliminating the requirement that Quality Control supervisors be certified before attaining their position, and did not address the Quality Control inspectors' main complaint, of the lack of knowledge and guidance that could be offered by their supervisors. *See* Min. Fdg. 124, *supra*.

246. Similarly, Concern No. 6 (Staff Exh. 17, Body of Report at 17-18) involves the Quality Control inspectors' allegations that the Braidwood Quality First Team was not responding to their concerns. Instead of addressing the question of general lack of responsiveness of Quality First, which would have disclosed that Quality First's activities had been suspended over a period of time, the NRC inspectors merely reviewed certain of the technical complaints that had been made by the Quality Control inspectors to Quality First and determined that they were being acted upon. It was not until the hearings in this proceeding that the NRC inspectors learned that Commonwealth Edison Company management had directed Quality First to put all complaints by Comstock's Quality Control inspectors on hold, beginning in February of 1985, and did not permit Quality First to resume its activities until after the twenty-four Quality Control inspectors had gone to the NRC on March 29, 1985. Tr. 10,808-09.

247. That the investigation of the March 29, 1985 incident by Mr. Mendez and Mr. Neisler was not a model of incisive investigatory work is not surprising considering their lack of training for such a task. They were trained as technical people, and performing investigations was not within the scope of their duties. Tr. 10,590-91. Nor can they be faulted for not having received from NRC management the relevant background material concerning prior allegations and harassment, and for having received the prejudgment by their management that the Quality Control inspector complaints were attributable to labor-management problems.

248. The disagreement between Senior Resident Inspectors Schulz and McGregor on the one hand and the NRC management on the other was not confined to the issue of the investigation of the March 29, 1985 incident. A July 11, 1985 memorandum from Schulz to McGregor memorialized Mr. Schulz's complaints that an NRC branch chief had instructed CECo officials not to give information to Mr. Schulz on a discrepant condition that had been discovered by Mr. Schulz, complained that the NRC management did not produce documents to GAP (Government Accountability Project) in response to an FOIA request that had been forwarded to management by Schulz, complained about NRC management's handling of the March 29, 1985 incident, and complained about NRC management's assigning Intervenor interrogatories to persons not familiar with the issues for the purpose of restricting the flow of information, rather than to the Senior Resident Inspectors at Braidwood who were more familiar with the issues. Int. Exh. 90. On February 7, 1985, Senior Resident Inspectors

Schulz and McGregor complained about NRC management's recent decision not to include them in an ACRS conference on Braidwood. Int. Exh. 104; Tr. 17,506. McGregor testified at hearing that his Section Chief had restricted him from looking at a Commonwealth Edison Company rework of a Corrective Action Letter. Tr. 11,459. On July 1, 1985, Mr. Schulz's superior, W.S. Little, Director, Braidwood Project, recognized in a memorandum of that date to Mr. Schulz, Mr. Schulz's unhappiness with the Region's handling of the Braidwood corrective action programs. Int. Exh. 105.

249. At the time of hearing, Mr. Schulz was no longer employed by the NRC. Although the Board encouraged the parties to seek to bring him before the Board as a witness, Mr. Schulz was reluctant to appear. Intervenors' counsel submitted that it was because of fear of retaliation in his position within the nuclear industry; counsel for Staff and Applicant disagreed. All, however, were reluctant to compel him by subpoena to appear, and the Board did not wish to have him appear under those circumstances. *See* Discussion, Tr. 1102-34.

250. NRC Staff also objected to making Mr. McGregor available, but the Board requested his presence. Tr. 2272-93. Mr. McGregor testified that Mr. Schulz had left the NRC when his performance appraisal had been held up for 3 months and Mr. Schulz was fearful that he would receive an unsatisfactory rating. Schulz sought another position and, when he found it, received his satisfactory evaluation 3 months late, with the explanation that the delay was attributable to an administrative error. Tr. 11,651-54.

251. Mr. McGregor began testifying on August 27, 1986. After a few days of testifying, on September 4, 1986, Mr. McGregor abruptly requested that he be excused from testifying further until he could consult with his private attorney because questions being asked of Mr. McGregor by Applicant's counsel related to a criminal investigation of him being conducted by NRC Office of Inspector and Auditor (OIA). The Board had previously been unaware of such an investigation. The investigation apparently concerned allegations, later found to be unsubstantiated, that Mr. McGregor had recorded conversations with Commonwealth Edison officials. At a time when the licensing hearings were expected to be concluded by June of 1986, Mr. McGregor had been assured that the criminal investigation of him would be formally concluded in the week of July 4, 1986. The field investigation that found the charges to be unsubstantiated had apparently been concluded by June of 1986. By September 4, 1986, Mr. McGregor was concerned that questions directed to him by Applicant's counsel on cross-examination that touched on the subject matter of the criminal investigation at a time when the investigation was not yet formally concluded, had an intimidating effect on his testimony. The Board temporarily excused Mr. McGregor from further testifying at that point and requested further information from Staff with regard to the conclusion of the criminal investigation. Tr. 11,898-915. NRC Staff counsel indicated that he

would endeavor to determine why the investigation had not been completed by July 4, 1986, as promised. Tr. 11,912-13.

252. Thereafter, both on and off the record, the Board requested that the criminal investigation be formally concluded at an early date if only formalities were involved, so that we could continue with Mr. McGregor's testimony. *See*, for example, Tr. 17,006, 17,063, 17,065-66. It was not until the middle of November of 1986 that Mr. McGregor was formally notified that he was exonerated and he was able to resume testifying. *See* Tr. 17,197. Apparently, during the hiatus in McGregor's testimony, another investigation had also been conducted that might have inhibited his testimony, although he was not a subject of it. The Office of Inspector and Auditor began investigating the identity of the person or persons who had leaked internal NRC documents to Intervenors during the course of the hearings that, apparently, had been improperly withheld from Intervenors and the Board under discovery rules, FOIA requests, and Board notification procedures. Mr. McGregor apparently was not implicated in the disclosure of those documents.

253. The investigation was misdirected. More appropriate investigations could have been directed toward ascertaining whether the charges brought against Mr. McGregor and a failure to timely complete his formal exoneration were an attempt to intimidate Mr. McGregor, whether documents had been deliberately and improperly withheld from the Board and the parties, and whether Mr. Schulz's performance evaluation had been improperly delayed because of any disagreement with NRC management on his inspection activities.

5. Larry Perryman

254. Quality Control Inspectors Larry Perryman, Larry Bossong, and three others were assigned in March 1985 to work on a cable pan hanger walkdown program. The walkdown program was part of a corrective action for discrepancies in cable pan hanger fabrication and installation involving actions by Comstock, Edison, and Sargent & Lundy (S&L), that was specified in the disposition of Edison NCRs 708 and 709. Tr. 3416-17, 3423-25, 9720, 9805-06; Appl. Exh. 106; Simile Pref. Test., ff. Tr. 3305, Attach. 3 at 25.

255. The task of Comstock Quality Control inspectors was to compare the as-built configuration of hangers actually found in the field which had been fabricated by Systems Control Corporation (an offsite vendor) with the design drawings for the hangers. Simile Pref. Test., ff. Tr. 3305, at 20; Tr. 3416-17. The Quality Control inspectors, assisted by the S&L engineer, were to mark in red pencil any differences between the as-built hanger configurations found in the field and the design on the design drawings. Tr. 3417-18, 3421-22. These red-line drawings prepared by the Quality Control inspectors were called "Rev. O" drawings. Tr. 9680, 9846-64. Thereafter, Sargent & Lundy

engineers were to perform a design evaluation of any deviations between the as-built hanger configurations found in the field and the design on the design drawings. Acceptable hanger configurations were depicted by S&L on a different set of drawings called "Rev. A" drawings. Tr. 9680, 9865. Comstock Quality Control inspectors would then reinspect the hangers to determine whether the as-built configuration of the installed hanger corresponded with that shown on the Rev. A drawing. The inspectors were to use checklists to indicate acceptance or rejection of the hangers. Tr. 3418, 3421-22; Simile Pref. Test., ff. Tr. 3305, at 20. The Rev. O drawings were accompanied by hanger configuration checklists (Forms 7) which were normally utilized in performing configuration inspections. Under LKC Procedure 4.8.12, signing off on a Form 7 indicated acceptance of a hanger. Under this special program, the inspectors were expected to use such a Form 7 to document and verify the accuracy of the as-built hangers as reflected in the red-lined drawings. Tr. 9674-80, 9865. Mr. Bossong, Mr. Perryman, and the other inspectors objected to this use of the configuration checklist Form 7, believing that it might be improperly understood as reflecting final Quality Control verification of the adequacy of the hanger's configuration instead of simply verifying that the Rev. O drawing reflected the as-built condition. Tr. 3424-25, 9675-81, 9866-69. Mr. Perryman was even fearful that he might later be accused of falsifying the quality document. Tr. 9690-91.

256. Because management was unresponsive to their concerns, Mr. Perryman, Mr. Bossong, and the other inspectors requested transfers from the walk-down program to the in-process inspection duties to avoid future misinterpretation of their signatures on these checklists. Tr. 3428-32, 9720-22, 9682-86, 9759-62, 9679, 9865, 9869; Appl. Exh. 105; Int. Exh. 35.

257. Repeated requests for transfer by Mr. Perryman and Mr. Bossong were denied. Tr. 9684-85, 9762, 9873-75; Int. Exh. 35. The requests were renewed. Tr. 9685, 9762, 9880; Int. Exh. 35. Management denied these transfer requests asserting that such a transfer was not possible at this time for the duration of this short-term project not scheduled for completion until August 1. This was DeWald's response of May 15, 1985, to Mr. Perryman's May 13 fourth request for a transfer. Int. Exh. 35. Mr. Perryman again made written request for a transfer to Comstock management on May 17, 1985, explaining his concerns (Int. Exh. 35):

> I'm requesting transfer out of the cable pan walkdown due to management and misleading information on the part of LKC management and the QA department. I was informed that I was verifying the as-built dimension information of the hangers and that this information was not to determine actual acceptance in any way, shape or form other than my own review at a later date for these hange[r]s to an approved design document. Any intention of use of the Form 7's I have signed up to this date other than dimensional verification, was not my intent. At this time, I wish to make corrections to my Form 7's in accordance to procedure 4.13.1 to reflect this fact.

Ultimately, after these repeated expressions of concern and after Perryman had discussed this matter with the NRC (*see* Tr. 10,582-86), management acceded to the inspectors' complaints and adopted a clarification to the walkdown procedure on May 30, 1985, providing for a notation on the Form 7 checklists limiting their construction as requested by the inspectors. Appl. Exhs. 107, 108; Tr. 3547-48, 9767-69, 9878-80. But the clarification to the procedure was not made until Mr. Perryman and other inspectors began withholding their completed Form 7 checklists. They withheld them for a week before the change was made. Tr. 9679-80, 9776-78. On May 31, 1985, Mr. DeWald responded to Mr. Perryman's May 17, 1985 transfer request as follows: "Transfer from walkdown is granted, supplement has been revised to include your concerns." Int. Exh. 35. In fact, Comstock management, Tony Simile in particular, determined to punish the dissenting inspectors for maintaining their quality concerns. Mr. Simile advised Mr. Perryman, Mr. Bossong, and the others that their transfers had been granted but told them they would not like where they were going. Tr. 9691-92, 9723-24, 9778, 9870. *But see also* Tr. 3435. One inspector declined this transfer to the unsought and undesirable second shift. His objection was sustained. Mr. Perryman also objected; however, his objections were not honored. Tr. 9723-25. Aware that Mr. Perryman's mother was dying of cancer and that a transfer to night shift would interfere with his ability to care for her, Mr. Simile determined to nonetheless transfer Mr. Perryman for his complaining. Tr. 9692.

258. Whether or not management intended to misuse the Rev. O drawings later as Quality Control acceptance of the adequacy of the hanger configurations, Mr. Perryman and the other inspectors were justified in insisting that the procedure be clarified so that their documentation could not be misconstrued. Since the use of the Form 7's for the Rev. O drawings was violative of LKC Procedure 4.8.12, management's refusal, at first, to accede to the reasonable quality concerns of the inspectors was more than a mere technical violation — it was substantive. By, in effect, forcing the inspectors to withhold their completed Form 7's, Comstock put the inspectors to the unacceptable choice of later facing charges of fraud (for documenting inspections never performed) or being terminated for not fulfilling their job obligations. Mr. Perryman and the others' complaints about the procedure were protected activities under 10 C.F.R. § 50.7. On the evidence adduced, Mr. Perryman's transfer to second shift was in retaliation for his having engaged in protected activities, and violated § 50.7.

6. *Therman L. Bowman*

259. Therman L. Bowman is a Level II Quality Control Inspector certified in welding, configurations, conduit, cable pull, and terminations. Tr. 6770. One reason Mr. Bowman went to the NRC at noon on March 29, 1985, was to report

his concerns about LKC management's response to his reporting of a base metal reduction problem in a structural weld. Tr. 6770, 6791-96; *see* Appl. Exh. 110 at 3. Mr. Bowman testified that LKC management's attitude toward the inspectors was shifting away from good quality control practices and that the people they depended on for supervision and direction were drifting away from what the inspectors believed to be good practices. Tr. 6830-31.

260. Another reason Mr. Bowman went to the NRC was to support the other inspectors' complaints about Mr. Saklak. In Mr. Bowman's view, Mr. Saklak had crossed over the line of good judgment in dealing with inspectors. According to Mr. Bowman, Mr. Saklak's threat against Mr. Snyder was "the straw that broke the camel's back." Tr. 6826, 6831.

261. Mr. Bowman and Mr. Saklak did not get along. Mr. Bowman considered Mr. Saklak to be aggressive, browbeating, and arrogant. According to Mr. Bowman, Mr. Saklak had a very high opinion of his own thoughts and how things should be done, and tried to impose his opinions upon the inspectors. Mr. Bowman recalled suggesting to other inspectors, including Mr. Holley and Mr. Gorman, that the way to deal with Mr. Saklak was to stand up to him and let him know that you wouldn't back down. Tr. 6774-75, 6784-86, 6949.

262. Mr. Bowman testified that a base metal reduction incident illustrated LKC management's poor attitude toward inspectors. The base metal problem that Mr. Bowman identified was the removal by grinding of auxiliary steel from the web of two "I-beams." The web is a vertical member between two horizontal flanges. After discovering the problem, Mr. Bowman researched current drawings, determined that the auxiliary steel had been installed by LKC, and wrote an NCR. While Mr. Bowman was in the office trying to identify the steel, his lead, Mr. Walters, questioned why he was not out in the field. When told of the problem, Mr. Walters replied that any damage to the I-beam belonged to another contractor's inspecting group. Mr. Bowman took the information on the location of the problem to Mr. Walter's supervisor, Daryl Landers, and explained his concern. Mr. Landers replied, "Keep up the good work or we will take you off overtime." Mr. Bowman interpreted the first part of the comment as a sarcastic remark and the second part as an implied threat. Mr. Bowman related the Walters-Landers matter to Quality First. After Mr. Landers found out that Mr. Bowman had gone to the NRC on March 29, 1985, with the other inspectors, Mr. Landers indicated that his statement was meant as a joke. Tr. 6796-811, 6833-78.

263. Later on the day of the incident with Walters and Landers, Mr. Worthington (Bowman's supervisor, above Walters and below Landers) approached Mr. Bowman and told him to deal with the problem in any manner he saw fit, and if he needed to write an NCR, to do it. Mr. Bowman wrote the NCR and later testified that the I-beam was repaired even though he did not close the NCR himself. Al Parker, the area engineer for LKC, later informed Mr. Bowman that

the problem occurred due to the carelessness of a workman in removing the angle clips to the web of the beam in the process of removing and replacing the auxiliary steel because of interferences with other components. Tr. 6813, 6816-17.

264. Mr. Walters' and Mr. Landers' responses to Mr. Bowman constituted an improper, albeit minor, attempt to discourage Mr. Bowman from documenting a discrepant condition.

7. Gregory Archambeault

265. Gregory Archambeault began working as a Quality Control inspector at Braidwood on January 6, 1986. He was hired by BESTCO and assigned to work as an electrical inspector for Comstock. Tr. 12,141-42.

266. Prior to his employment at Braidwood, Mr. Archambeault had been employed at four other nuclear sites as a certified Level II inspector. Mr. Archambeault performed cable-pulling inspections at two of those other sites, termination inspections at two sites, and a full range of electrical inspections at one of those sites. Int. Exh. 109; Archambeault, Tr. 12,144-46.

267. After he arrived at Braidwood, Mr. Archambeault underwent a series of training activities including classroom and on-the-job training. After that training, he was examined as to his qualifications in the area of cable pulling; he passed his examinations and was certified as a Level II inspector. Tr. 12,147.

268. Mr. Archambeault was initially assigned for training purposes to the night shift at Braidwood, but it was his understanding that he would be moved to the day shift as a matter of course. According to Mr. Archambeault, Tom Skidmore, the Braidwood Site Representative for Archambeault's employer, gave no indication to Mr. Archambeault that he would be regularly working the night shift, and Larry Bossong, the second-shift steward, assured him that the second-shift assignment was only for training purposes. Tr. 12,142, 12,691. Mr. Bossong later denied making any promises to Mr. Archambeault about being allowed to transfer to first shift. Bossong Prep. Test., ff. Tr. 16,252, at A.8, A.9; Tr. 16,260-61, 16,264-65. The Work Referral slip filled out by Mr. Bossong and signed by Mr. Archambeault on the day hired indicates "Possible 2nd Shift." Attachment to Bossong Prep. Test., ff. Tr. 16,252; Tr. 16,264-65.

269. Mr. Archambeault has a wife and children, and working the night shift caused a hardship in his family. Tr. 12,142, 12,691.

270. Shortly after his certification in February 1986, Mr. Archambeault identified a number of quality concerns in the cable area that ultimately led him to lodge complaints with Comstock and the NRC of production pressure taking precedence over quality considerations. The first set of problems identified by Mr. Archambeault surfaced during a cable pull that he performed with a trainee in the upper cable spreading room at Braidwood soon after his

certification. Mr. Archambeault and the trainee noticed a number of what he termed "gross violations" involving cable bend radii, cable separation, damage to cables, and cables dangling out of cable trays. Archambeault, Tr. 12,231-32. Int. Exh. 115. Mr. Archambeault immediately brought the problems to the attention of his lead, Don Schirmer, and his supervisor, Mr. Harry Revels, who told him (Archambeault) to write a memo documenting the discrepancies. Mr. Archambeault pointed out to Mr. Revels that such discrepancies should be reported by means of a nonconformance report (NCR), but Mr. Revels insisted that Mr. Archambeault instead write an informal memorandum. Mr. Revels' explanation to Mr. Archambeault was that before writing an NCR Mr. Revels wanted to check with Sargent & Lundy to see if this problem had already been addressed. Mr. Archambeault was unaware of any procedure or regulation that permitted him to delay writing an NCR until someone had checked with Sargent & Lundy. Tr. 12,233-34, 12,244-45.

271. Mr. Archambeault also indicated to Mr. Revels that he believed that the individual cables should be identified for future corrective action. Mr. Revels replied to Mr. Archambeault that such individual identification wasn't within the scope of Comstock's duties and that Comstock did not have the man-hours to undertake it. Tr. 12,246.

272. Mr. Revels told Mr. Archambeault that he would have Mr. DeWald, Mr. Simile, and some other personnel "look at the problem." In the days that followed, Mr. Archambeault repeatedly questioned Mr. Revels about how the matter would be handled. Mr. Revels responded each time that Mr. DeWald, Mr. Simile, and others "didn't have the time to look at it today." Mr. Revels did not give Mr. Archambeault any kind of response about how the problem would be handled until some weeks later when he arranged for Mr. Simile and cable engineers from Comstock and Edison to accompany Mr. Archambeault to observe the problems. Mr. Simile agreed that the discrepancies were significant and ordered Mr. Archambeault to write an NCR. However, Mr. Simile directed Mr. Archambeault not to identify individual cables but rather to write a "generic" NCR, which Mr. Archambeault did. Tr. 12,248-52; Int. Exh. 116.

273. Mr. Archambeault continued to be troubled by the failure to identify the individual cable discrepancies, and, on his free time over the next 2 weeks, he compiled a comprehensive list of the individual discrepancies that he had seen. Tr. 12,255-56; Int. Exh. 117.

274. After Mr. Archambeault wrote up the NCR, dated March 19, 1986, he continued to work the night shift. Tr. 12,272. Archambeault's understanding was that any shift changes had to be initiated through the Local 306 union steward, Mr. George Nemeth. Tr. 12,274. On June 2, 1986, Mr. Archambeault wrote a note to Mr. Nemeth indicating his understanding that he had been hired to work the day shift and requesting a transfer to that shift. Int. Exh. 118. He never received a response from Mr. Nemeth. Tr. 12,275.

275. Soon after Mr. Archambeault made his request to Mr. Nemeth, another Quality Control inspector, Dennis Loos, was transferred from second shift to first shift, even though he did not request such a transfer. Tr. 12,278.

276. Mr. Archambeault subsequently made verbal requests for transfer to both Mr. Nemeth and his supervisor, Harry Revels. Mr. Revels responded that he had nothing to do with shift transfer decisions. Mr. Nemeth told Mr. Archambeault to submit another written request. Tr. 12,279-80.

277. During the last week of May 1986, Mr. Archambeault continued to be disturbed by Comstock's failure to deal adequately with the cable damage he had found in the upper spreading room. He came to the conclusion, after talking with other inspectors and observing Comstock operations, that there was generally an emphasis on quantity over quality at Comstock. He drafted a letter to the NRC detailing his concerns, but before he sent it he tried to resolve the problems through Mr. Revels by showing Mr. Revels a copy of his letter in the hope that Comstock would be spurred to some action. Mr. Revels gave no indication that he would respond to Mr. Archambeault's concerns. Tr. 12,364-68.

278. On June 3, 1986, Mr. Archambeault was performing a cable-pull inspection when he noted a cable separation violation involving forty-two safety cables. Mr. Archambeault began to take the steps required to initiate a Cable Separation Conflict Report. Mr. Archambeault reported the problem to Harry Revels who checked Sargent & Lundy documentation on those cables. Before Mr. Archambeault could write the Cable Separation Conflict Report, he was reassigned by his lead, Don Schirmer, to a "hot pull" that was about to take place. Tr. 12,281-87.

279. Mr. Archambeault told Mr. Schirmer that he was unhappy with the reassignment because he understood that procedures required him to complete his reporting on the previous pull before he was assigned to another pull. Mr. Archambeault "felt that production was overshadowing quality" in this instance and made clear to Mr. Schirmer that he felt his reassignment to the new cable pull was inappropriate. Nevertheless, Mr. Schirmer insisted that Mr. Archambeault assist with the new pull. Tr. 12,886-88.

280. The "hot pull" occupied Mr. Archambeault for the rest of that day and he was not able to return to his reporting on the separation problems until the next day, June 4. *Id.*; Int. Exh. 119.

281. The "hot pull" reassignment convinced Mr. Archambeault that it was time to go to the NRC. Later on June 4, Mr. Archambeault contacted Charles Weil of the NRC's Region III staff to convey Mr. Archambeault's growing concerns about an emphasis on production over quality concerns at Comstock. Specifically, Mr. Archambeault reported his concerns with the condition of the spreading room cables and the attitude that had been revealed by Comstock's reassigning Mr. Archambeault to the hot pull before he was able to com-

plete his reports on the cable separation problems. Archambeault, Tr. 12,311-12. Mr. Archambeault also reported numerous other related concerns. For example, Mr. Archambeault reported to Mr. Weil that the majority of BESTCO Quality Control inspectors were frustrated by Comstock's indifference to quality problems. Mr. Archambeault passed on a number of comments by BESTCO inspectors that reflected their lack of morale as a result of Comstock's attitude. Mr. Archambeault stated that the general consensus among Quality Control inspectors was that those who performed their jobs conscientiously "would be blacklisted" or "looked down upon" or "moved around." In support of that belief Mr. Archambeault reported to Mr. Weil that Quality Control Inspector Rick Martin had been reduced to a document reviewer from a field inspector "because he did his job too well." Other specific problems reported to Mr. Weil were an instance involving a cable pulled in violation of procedures while the inspector was still performing his pre-pull walkdown, instances of nonconformance reports being written but "never closed in a timely fashion," examples of cable tray overfill conditions, problems with erroneous cable markings, and other problems at Comstock indicating a serious indifference to quality. Tr. 12,312-21; Int. Exh. 122.

282. On July 10, 1986, Mr. Archambeault made a second written request to Mr. Nemeth and a Mr. Cartelli for a transfer to the day shift. Tr. 12,328; Int. Exh. 123. That request was not granted. Tr. 12,330.

283. At some point after July 10, the NRC undertook a series of inspection activities of Archambeault's concerns. Tr. 12,330-34.

284. Again, on August 7, 1986, Mr. Archambeault submitted a third written request for a transfer to the day shift. Archambeault, Tr. 12,335. On August 27, 1986, Tony Simile denied Mr. Archambeault's transfer request. Tr. 12,335-36; Int. Exh. 126.

285. During the time that Mr. Archambeault had formal transfer requests pending, up through mid-August 1986, four Quality Control inspectors had been transferred from the second shift to the first shift. Dennis Loos was transferred in late spring, and Ron Nelson, Ken Willoughby, and Les Peters were transferred to the day shift in the latter part of July and early August, after Mr. Archambeault had submitted his second formal transfer request. When the three openings occurred in the first shift, Mr. Revels approached five inspectors to ask if they would be interested. One inspector, John Thomas, declined the transfer. Of the remaining four who expressed a willingness to be transferred, Mr. Archambeault was the only one who was passed up, even though he was qualified to perform any of the open inspection jobs. Tr. 12,355-58.

286. Of the four other inspectors who were transferred, apparently only Mr. Willoughby made a written transfer request. Mr. Loos did not request a transfer at all, and Mr. Nelson and Mr. Peters apparently made only oral requests. Tr. 12,363-64.

287. Mr. LeSage then set up a meeting between Mr. Archambeault, Edison representatives Mr. Gieseker and Mr. Dougherty, Mr. Nemeth and Mr. Cartelli. At that meeting Mr. Archambeault voiced his concerns, and the participants agreed to set up a second meeting the next day including representatives from Comstock and the NRC. Nothing was resolved at that second meeting. Tr. 12,381-83.

288. Mr. Archambeault was granted his transfer to the day shift after his deposition in this case in early September 1986. Tr. 12,497-98.

289. Subsequent to Mr. Archambeault's testimony, his Quality Control Supervisor, Tony Simile, gave his side of the story. Mr. Simile was responsible for ensuring that each of Comstock's three staffs is equipped with enough Quality Control inspectors to accommodate inspection needs. He testified that he was unaware of Mr. Archambeault's written request for transfers to the first shift, made in June and July of 1986, until September of that year, and did not see the August 7, 1986 written request until August 27, 1986. Mr. Simile testified that, prior to a meeting on August 19, 1985, in which Mr. Archambeault brought up the fact that he wanted to be transferred to the first shift, Simile's only knowledge of Mr. Archambeault's desire to transfer was his inclusion with two other shift inspectors by Mr. Harry Revels in June 1986 of inspectors who were interested in being transferred to first shift. Mr. Simile indicated that the other two inspectors had previously spoken to him about being transferred to first shift and he (Simile) had promised them that he would transfer them. Simile Prep. Test., ff. Tr. 16,180.

290. Mr. Simile did not recall whether he had heard of Mr. Archambeault's raising concerns with the NRC (on June 4, 1986) when Mr. Simile decided to transfer the other two inspectors, rather than Mr. Archambeault, on June 18, 1986. Mr. Simile acknowledges that during the summer of 1986 he discussed with Harry Revels, Mr. Archambeault's request for transfer in the context with the concerns that Mr. Archambeault had raised with the NRC. According to Mr. Simile, what he had expressed to Mr. Revels was that, if he transferred Mr. Archambeault, the newspapers might construe that action as an effort to remove Mr. Archambeault from an area in which he raised quality concerns and, on the other hand, if he did not transfer Mr. Archambeault, it would be interpreted as punishing him for having raised those concerns. He indicated that this conversation took place after he had already transferred the other two inspectors to the day shift. *Id.* at A.13-A.14.

291. Applicant did not call either Mr. Nemeth or Mr. Cartelli to confirm Mr. Simile's testimony that Mr. Archambeault's written requests for transfer were not transmitted to Mr. Simile. It would be odd if those written requests had not been transferred to Mr. Simile since Mr. Simile was responsible for staffing the three shifts (*id.* at A.4), while Mr. Cartelli and Mr. Nemeth were GE-MCIS project manager and union steward, respectively (*id.* at A.16), who would have

no authority over Comstock's operations. Furthermore, Mr. Simile's testimony about his concern over transferring Mr. Archambeault being misconstrued as an effort to remove him from an area in which he raised quality concerns is implausible, in view of Mr. Archambeault's previous oral request for transfer of which Mr. Simile was aware, even if Mr. Simile was unaware of the two prior written requests. Mr. Simile's explanation does little to change the appearance that Mr. Revel's statement to Mr. Archambeault, at the instigation of Mr. Simile, that a transfer of Mr. Archambeault would appear to the NRC or newspapers to be retaliation against Mr. Archambeault was a cynical attempt to inform Mr. Archambeault that his request for transfer would not be granted as punishment for expressing concerns to the NRC.

292. Mr. Simile also defended Comstock's position with regard to the first concern raised by Mr. Archambeault, concerning the numerous violations that Mr. Archambeault had observed in the upper cable spreading room for which, eventually, a "generic" NCR was written. According to his thesis, a "generic" NCR should have been written in that case, without containing a listing of individual cables that were discrepant, in order for the engineers to consider other cables that might be discrepant because of the same problem. Nowhere in his testimony was he able to offer a reason why a listing of the individual cables that were already found to be discrepant would preclude the engineers from examining other, related cables for the same condition. Moreover, as he conceded, any engineering disposition of a discrepant condition that appears to have some generic problem would be reviewed for its generic basis. The only conceivable reason for omitting the individual cable descriptions from the NCR would be to facilitate a dispositioning of the NCR without requiring a correction of the individual discrepancies already identified by Mr. Archambeault. *See* Tr. 16,230-48. In fact, the only list ever compiled of discrepant cables that Mr. Archambeault had observed was compiled voluntarily by Mr. Archambeault within 2 weeks after he had written the NCR. It has never been asked for by Comstock nor provided. Tr. 12,255-56; Int. Exh. 117. There is no indication that these discrepancies, involving over sixty cables with multiple discrepancies (*id.*), have ever been individually addressed.

293. With regard to the incident involving Mr. Archambeault's having been temporarily assigned to the "hot pull," Comstock appears to have acted properly. The exigencies of the situation, the short period that Mr. Archambeault was taken away from his current assignment, and the absence of any indication that Mr. Archambeault's superiors otherwise interfered with his reporting of the cable separation violations (which he had already reported to his lead, Harry Revels, but had not yet already written up), suggests that any interference with Mr. Archambeault's documenting a quality problem was unintentional and not violative of the company's procedures. Similarly, except for the cable spreading room violations, discussed above, it does not appear that the other quality

concerns expressed by Mr. Archambeault have been substantiated as involving Comstock improprieties.

8. *Richard Martin — Cable-Pulling Inspection Incident*

294. Richard Martin began performing cable-pulling inspections on the second shift in October 1985. In early 1986, craft laborers and craft supervision had complained that their cable-pulling activities were being delayed by unavailability of cable-pulling inspectors. Rumors circulated on the second shift that Comstock was going to replace the second-shift cable-pulling Quality Control supervisors in an attempt to "clean house" and eliminate any delays or potential conflicts with the crafts. Tr. 12,698-701.

295. On April 28, 1986, Mr. Tuite and Mr. Lechner took over as second-shift cable-pulling supervisors. They held a meeting with all the second-shift cable-pulling inspectors. At that meeting, Mr. Tuite assured the Quality Control inspectors that he was not "out to get" them and that he and Mr. Lechner were there to make sure that Quality Control did not get unfairly blamed for delays that were really the fault of the production side. On the subject of inspectors who required assistance in performing their Quality Control inspection of cable pulling, Mr. Tuite said that if an inspector needed help or assistance on a pull he should get it whether it involves two, five, or even seven inspectors as long as the request is reasonable. Tr. 12,701-03.

296. A cable-pulling inspector is responsible for verifying that cable installation by the craft conforms with LKC Welding Procedure 4.3.8 (Rev. G). Tr. 12,200, 12,148-49, 12,704. Unlike most other types of inspections, a cable-pull inspection is an "in-process" inspection which conforms with LKC Welding Procedure 4.8.8 (Rev. E). Tr. 12,162-63. The reason the inspector's presence is necessary is because violations of the cable installation procedure may occur during the installation process but may not be apparent after the cable is installed. Tr. 12,183-84, 12,209-10. For example, if the craftsmen coil or twist the cable too tightly, the minimum bend radius set forth in the governing procedure may not be met, thus possibly damaging the cable. Tr. 12,765-66. This damage would not be visible upon later examination because the cable itself is enclosed in thick rubber insulation. *See* Int. Exh. 135, Part 2.

297. It had been a common practice on second shift for Quality Control inspectors to assist one another in conducting cable-pull inspections. On lengthy cable pulls involving multiple bends in multiple rooms, the common practice was to have the Lead Quality Control inspector follow the head of the cable down the length of the pull while other inspectors stationed themselves at various bends and in various rooms to ensure proper labelling and to assure that the cable was not binding or subjected to stress or bend radius violations. Additional inspectors

were also used in places where the cable dropped or rose through risers from one elevation to another. Tr. 12,704-06.

298. The number of inspectors that were needed to assist on a pull depends on the number of rooms, principally, but also on other factors such as the number of bends. For example, a cable-pull involving a run of three different rooms might require anywhere from one to four people to assist the lead inspector, depending on the number of bends. Mr. Tuite and Mr. Lechner's predecessor, Mr. Fray, always found a way to accommodate Quality Control inspectors' requests for assistance in inspecting a pull. There were twelve to thirteen cable-pull inspectors on second shift so that there were generally people available to use as assistants on a given cable pull. Tr. 12,706-09.

299. The first evening that Mr. Tuite and Mr. Lechner were assigned to second-shift cable pulling, Mr. Martin was assigned to a complex cable pull of approximately 350 feet that went through seven different rooms and around approximately twelve bends of risers. Mr. Martin performed a walkdown and determined that he would need at least three and possibly four inspectors to assist him. Tr. 12,711-14. When he requested assistance from Mr. Lechner, Mr. Lechner replied that "we were going to be doing pulls differently, and that we were going to pulling — doing pulls by ourself." Mr. Lechner told Mr. Martin that inspectors on the day shift normally worked without assistance and that Mr. Martin "could just go ahead and do the pull by [him]self." Tr. 12,714-15. When he denied Mr. Martin assistance, Mr. Lechner was aware of the length and complexity of the pull. Mr. Lechner denied the request in spite of the fact that there were perhaps four or five inspectors who had no other pulling assignments and were free to assist Mr. Martin. Tr. 12,715-16.

300. Because Mr. Martin had misgivings about one inspector's ability to monitor such a complex pull, he wrote Mr. Lechner a note which he described "an official memo" asking for the assistance of three inspectors on the pull. Mr. Lechner refused the request and when Mr. Martin insisted that the pull required more than one inspector, Mr. Lechner replied "Fine. You just sit there. We'll get somebody else to do it." Mr. Lechner than assigned Don Schirmer to take over the pull. Tr. 12,718. Mr. Schirmer performed the pull with the assistance of a trainee. *Id.*

301. As stated above, determining the number of inspectors needed to assist the principal cable-pull inspector depended on the complexity of the pull and was made by the principal inspector after conducting his or her pre-pull walkdown. After making this determination, the principal inspector would inform his or her lead who usually authorized him or her to "grab" whichever inspectors were available. In the event that there were not enough other cable-pull inspectors available, the practice was either to postpone the pull until enough help was available or perform the pull using the "pull and coil" method. Tr. 12,706-08. Under the "pull and coil" method, the cable is

pulled and inspected in sections. At each interval, the remainder of the unpulled cable is coiled while the pulled section is being inspected. As each section is completed, the cable is uncoiled and the pulled section inspected. Tr. 12,708, 12,770-71. Mr. Martin was familiar with the "pull and coil" method but never used it himself because he thought it an inferior type of inspection since the increased coiling of the cable heightened the possibility of a minimum bend radius violation. Tr. 12,744-45, 12,765-66, 12,771. According to Mr. Martin, Mr. Lechner did not indicate that the inspection could be performed using the "pull and coil" method, or that there were no inspectors available to assist Martin. Tr. 12,715-16.

302. Mr. Martin had been assigned to a particular craft foreman, Mr. Murphy, all of whose cable pulls Mr. Martin inspected. On the evening of April 28, 1986, after Mr. Lechner assigned Mr. Schirmer in Mr. Martin's place to the disputed cable pull, Mr. Lechner also removed Mr. Martin generally from his assignment to foreman Murphy and replaced him with Mr. Schirmer. Tr. 12,719.

303. The rest of the evening of April 28, Mr. Martin simply sat in the office and was not assigned any other cable-pulling work. The next day, April 29, Mr. Martin was assigned to perform hold-tag verifications, a task that lasted about a week. Tr. 12,721-22.

304. On April 29, Mr. Martin asked his shop steward, George Nemeth, to arrange a meeting with Mr. Lechner and Mr. Tuite to clear the air. Mr. Nemeth told Mr. Martin on the night of the 29th that he had set up a meeting with Mr. Lechner and Mr. Tuite for the night of the 30th. On the 30th, Mr. Martin went to work as usual and Mr. Nemeth said he would contact Mr. Martin when Mr. Tuite and Mr. Lechner arrived for the meeting. Mr. Lechner and Mr. Tuite never showed up for the meeting. Mr. Martin discussed the situation with Mr. Nemeth, and both agreed that Mr. Martin should take his concerns to the NRC. Subsequently, Mr. Martin went to see Mr. Kropp at the NRC. Tr. 12,728-32.

305. After he finished the hold-tag verifications, Mr. Martin was assigned no further cable-pull work. He occupied himself by assisting other inspectors on his own initiative; no one assigned him to help them. That situation lasted for approximately 2 weeks. In mid-May, Mr. Martin was taken off the second shift, reassigned to the first shift, and assigned to do clerical work for Mr. Seese. He was given no further inspection work. Tr. 12,722-24.

306. Shortly after his deposition in this case, Mr. Martin was reassigned to the third shift, on what he termed "clean up inspections." Martin, Tr. 12,726-27.

307. NRC Staff appears to dismiss the incident on the basis of Mr. Martin's testimony that he did not regard his reassignment to hold-tag inspection as either harassment or intimidation. Staff Prop. Fdg. 455. Staff, however, misconstrues Mr. Martin's testimony. While Mr. Martin did not wish to charge his management with harassment or intimidation, or otherwise impute to management the

motivation for his transfer as retaliation for quality concerns, he was not absolving management from those possibilities. While Mr. Martin did not want to be a "judge" of whether it was harassment (Tr. 12,774), "point the finger" (Tr. 12,775), or "cry harassment" (Tr. 12,778), he felt he was mistreated, that there was a mismanagement problem, and that it was unfair that he was taken off inspections (Tr. 12,774-75). He was not making a judgment that it was *not* harassment. *Id.*

308. Although management has considerable leeway in providing staffing for various activities, it would be improper to require Quality Control inspectors to approve an installation in which the inspector cannot verify the process that he documents. If he cannot verify compliance with pull requirements, such as compliance with bend radii limitations, either by observing all aspects of the pull himself or having other quality personnel assist him by directly observing those conditions, he should not be required to document an approval of the process. Furthermore, if he complains about his inability to verify the compliance with installation procedures, any retaliation against him for his complaint would violate 10 C.F.R. § 50.7, whether or not the inspector *alleges* harassment or intimidation. On the evidence submitted with regard to this incident, Applicant has failed to sustain its burden of proving that Mr. Martin was not removed from cable-pull inspections in retaliation for his raising a proper quality concern.

309. On the other hand, the denial of Mr. Martin's request for additional inspectors on the cable pull did not appear to institute a new company practice. Other inspectors appeared to receive assistance on the cable-pull inspections when they requested it, although they may not have received the full number of assistants requested. *See* Tr. 12,746-49. The denial of Mr. Martin's request for assistance and his subsequent transfer from cable-pull inspections may have also been due to personal animosities, not merely the quality issue raised by Mr. Martin. *See* Tr. 12,775.

9. *Miscellaneous Findings*

310. Quality Control Inspector Robert D. Hunter was properly terminated for inspecting through paint. *See* Tr. 8469-8084.

311. Quality Control Inspector Dean Peterson was improperly pressured by Comstock management to inspect welds that had not been fully cleaned of paint, in order to increase his production. Mr. Peterson resisted this pressure and accepted a transfer out of that department. *See* Tr. 5905-09, 5915, 6039-42, 6099-103.

312. Quality Control Supervisor Richard Saklak's threat to fire Quality Control Inspector Franco Rolan for not identifying a craft electrician on an NCR did not constitute harassment or intimidation. *See* Tr. 4665-69.

313. Quality Control Supervisor Richard Saklak threatened and abused Quality Control Inspector Mike Mustered in attempting to coerce Mr. Mustered into retracting three ICRs on the grounds that Sargent & Lundy engineers were going to delete the design specifications. Mr. Saklak's actions constituted harassment and intimidation of a Quality Control inspector to impede him in the proper performance of his tasks. Mr. Mustered successfully resisted Mr. Saklak's threat and wrote the ICRs. *See* Tr. 4970-72, 5900-03.

314. Herschel Stout was properly reprimanded for extremely low inspection production. The use of Comstock's daily status reports to verify his low production does not establish the status reports as a tool for establishing production quotas. Because of his extremely low production, Mr. Stout's case was unique.

D. Grid-Area Weld Inspections

315. In 1981, Quality Control Manager Irving DeWald had worked at Braidwood as a Level II QC Inspector for L.K. Comstock. He and a few other weld inspectors including Richard Martin performed so-called "grid-area basis" inspections, documenting large numbers of welds on single inspection reports. DeWald Pref. Test., ff. Tr. 1700, at A.19. There was a general and consistent belief among Quality Control inspectors that Mr. DeWald had signed a checklist that documented his inspection of a thousand or more welds in a single day. Eight of the Quality Control inspectors who testified had heard through general talk among the inspectors of a Mr. DeWald 1000-plus checklist, but had not seen it themselves. Hunter, Tr. 8495-98; Martin, Tr. 8294; Mustered, Tr. 5061-62, 5086; Rolan, Tr. 4762-63, 4769-71; Stout Dep., Tr. 144-45; Klachko Dep., Tr. 192, 265-66; Hill Pref. Test., ff. Tr. 16,608, at 3; Gorman, Tr. 5817-18, 5828. Six of the inspectors that testified claimed to have actually seen one or more DeWald 1000-plus weld checklist. Bossong, Tr. 9848-50; Bowman, Tr. 6890-91; Holley, Tr. 5154-56; Perryman, Tr. 9652-57; Peterson, Tr. 5933-35; Wicks, Tr. 7151-54.

316. Mr. DeWald testified that he is "pretty certain" that he had never documented a thousand or more welds on a single inspection checklist. Tr. 4092. He doubted that it was possible that he ever did so. At the direction of his Supervisor, Tony Simile, Quality Control Inspector Bowman undertook a search for this checklist during the course of the proceeding, but was unable to locate the document. Tr. 6894; Bowman Pref. Test., ff. Tr. 16,000, at A.13-A.15.

317. On deposition, Mr. DeWald had been asked the maximum number of welds he had documented on a single checklist and could not remember, until found in a casual search through his old weld inspection checklist, documenting as many as 551 welds on a single inspection checklist. Tr. 15,000; Int. Exh. 19.

318. Although the inspectors originally believed that those inspection checklists represented inspections done over the period of one day, they were subsequently informed that the checklist could have been the result of several days' work. *See, e.g.*, Tr. 6892. Mr. DeWald testified that, while the inspected welds may have been covered by [illegible]e checklist, "it may have been a day, two days, three days it took me t[illegible]mplete all the particular inspections." Tr. 1482. With regard to the particular checklist covering 551 welds (Int. Exh. 19), Mr. DeWald believed that it took 2, 3, or 4 days to complete his inspections. Tr. 1490. He had found all the welds acceptable. Tr. 1491.

319 Quality Control Inspector Richard Martin had observed a checklist covering sixty cable tray hangers and associated auxiliary steel that could have covered up to 2500 to 3000 welds. Mr. Martin, who had inspected on the grid basis alongside of Mr. DeWald, recalled actually inspecting on the order of 300 to 350 welds in one day. Tr. 8376. Earlier, on deposition, he even recalled inspecting 500 welds on one day. Tr. 8377-78. Mr. Martin had also seen a checklist filled out by Quality Control Inspector Thomas with over a thousand welds. Tr. 8294.

320. In December of 1984, Inspectors John Walters, Mike Blake, and Dan Asmussen reviewed a 1979 checklist by Quality Control Inspector Richard Yankeitis, documenting, on a single sheet, the inspection and acceptance of 1166 welds. In a letter of concern to management, Mr. Asmussen stated, "I can not accept a 0% reject rate for that many welds inspected." One of the seventy-seven hangers listed on the grid inspection cover sheet was later the subject of a 1984 reinspection which identified extensive welding defects not identified in the original grid inspection. Mr. Asmussen, speaking for himself and the other inspectors, indicated that they recognized their responsibility to bring their concerns to management's attention and felt that this situation deserved "immediate management investigation." Int. Exh. 18 at 5-6.

321. Mr. DeWald, as Quality Control management, agreed that the total number of welds (1166) being inspected in a single day did appear to be a considerable number for one individual to accomplish. However, he dismissed that problem on the basis that the inspections written on the checklist could possibly have represented a total of several days' work. He dismissed the other concern, regarding the acceptance of all the welds, as follows:

> The other questionable item brought out by Mr. Asmussen is zero (0) rejects. To him, this is questionable, although it is felt the individual was a competent inspector.

Mr. DeWald concluded that if Mr. Asmussen had any question concerning the validity of the inspection, he could reinspect the items himself "to ensure a good valid inspection." *Id.* at 1.

322. As Mr. DeWald described the grid-basis weld inspections, there was only a small number of inspectors, they would complete an area, document it on the PTL coversheet, and fill out the inspection report on various days. They did not complete their inspection reports on each and every day that they had done inspections. Tr. 1479. The reason that they didn't fill out inspection reports as they completed each component was because there were only three or four inspectors covering a hundred welders. Tr. 1483.

323. Mr. Martin, who had served as a weld inspector along with Mr. DeWald, described the weld inspection documentation practices in more detail. Tr. 8343-78, 9384-97. As a rule, no official documentation of rejectable conditions was ever made unless the craft couldn't fix the defect promptly. Only then would an Inspection Correction Report be issued writing up the defect. Tr. 8349. Mr. Martin would simply note rejectable conditions in his personal notebook without indicating the identity of the welder or the particular weld found defective. Tr. 8351. Only acceptable items were documented on the official weld inspection checklist. Tr. 8352. This system, employed by Mr. Martin and the others for performing and documenting weld inspections, was not provided for by any Comstock quality procedure. Tr. 8358.

324. It was not until October 1983, after a Commonwealth Edison Company audit, that the practice of documenting weld inspections on personal notebooks and completing checklists later in the office was uncovered and brought to an end. Tr. 9570-77.

325. In 1984, Mr. DeWald took newly hired Level III welding inspector Worley Puckett on a tour of the Braidwood facility. Mr. DeWald pointed out welds to Mr. Puckett that he (DeWald) had inspected when he previously worked as a Level II weld inspector. The welds were on a large hanger. Mr. Puckett testified that although he just glanced at the welds, he saw welds that he (Puckett) would not have accepted. The welds he had observed had undercut, excessive spatter, slag, overlap, and excessive craters. Mr. Puckett indicated that he would not have had inspectors working for him that would have accepted some of those welds. Tr. 6215-17.

326. Robert D. Hunter joined the L.K. Comstock Company at Braidwood in October of 1983. Within 30 days thereafter, he became a welding inspector. He had had plenty of experience as a welder and welding inspector. Tr. 8471-81. When he first began inspecting at Braidwood, Mr. Hunter was asked by Quality Control Manager Irving DeWald to review some of Richard Martin's welds. Mr. Martin had been one of the few inspectors inspecting welds under the grid system, and had been trained by Mr. DeWald. Mr. Hunter reported to Mr. DeWald that Mr. Martin's work was lacking in certain areas. Mr. Martin would miss things such as undercut, cold-lap, and other things of that nature. Subsequently, in early 1984, Mr. Hunter accompanied Mr. Martin to the field, reviewed Mr. Martin's work, and discussed Mr. Martin's prior training

with him. According to Mr. Hunter, Mr. Martin didn't know some simple things about welds. For example, he didn't know what rod-craters were, and what the face or toe of a weld should look like. Tr. 8484-92. Quality Control Inspector Therman Bowman also testified with regard to reinspecting Mr. Martin's early welding inspections. Although he testified reluctantly on this matter, Mr. Bowman indicated that he had found one-third of the welds inspected by Mr. Martin to have been rejectable. Tr. 6888.

327. In 1984 and 1985, the "Braidwood Construction Assessment Program" was instituted which reinspected samples of prior Quality-Control-accepted construction work. Of over 13,000 welds reinspected approximately 16% were found to be deficient in one or more respects that might possibly have an effect on their safety function. Other, lesser types of deficiencies were ignored. The sampling was done on a statistically random basis and, presumably, should have represented the population at large. If the approximate 16% figure for discrepant welds represents discrepancies *after* at least one original Quality Control inspection, it is inconceivable that any large numbers of uninspected welds would be free of discrepancies. If the percentages arrived under the BCAP hold true, in an inspection of 500 welds, one might expect 80 welds to be discrepant (500 × 16%), even after the welds were inspected at least once by Quality Control. Assuming at least a 50% Quality Control effectiveness on the welds examined under the BCAP Program, 160 welds out of 500 would have been discrepant *originally* (i.e., before inspection). In the case of Mr. Yankeitis's 1166 welds examined by Mr. Asmussen, one might similarly expect at least 340 welds to be discrepant. Not only is it inconceivable that the weld inspection reports indicating acceptances of multi-hundred welds could have reflected the original condition of the welds, but it is also inconceivable that such large numbers of discrepancies could have been reworked or repaired during the 1, 2, 3, or 4 days between the beginning of the inspection and the signing of the inspection report. Neither time nor space would be adequate for such operations even if craft were not otherwise occupied in its further construction activities.

328. Moreover, the failure to record discrepant conditions, which surely must have existed in the multi-hundred weld inspections under the grid system, if observed, would violate Criterion XVII of 10 C.F.R. Part 50, Appendix B, which requires, as a minimum, a record of any deficiencies noted.

329. On the basis of the evidence adduced, which indicates that the inspection standards of a significant portion of the weld inspectors was substandard, that the inspectors failed to observe significant numbers of discrepancies, and that the weld inspectors failed to document discrepant conditions as required by Appendix B, the weld inspections performed under the grid system, in effect until October of 1983, lack credibility.

E. Applicant's Sampling Reinspection Programs

330. In an attempt to prove the effectiveness of the Comstock Quality Assurance Program, Applicant presented the results of two large sample reinspection programs. The first program was the Construction Sample Reinspection (CSR) conducted as part of the Braidwood Construction Assessment Program (BCAP). This data spans the time period from the start of construction until June 30, 1984. The second set of data results from the routine overinspection of Comstock Quality-Control-accepted work by Pittsburgh Testing Laboratory (PTL) for Applicant's Quality Assurance Department for the period July 1, 1982, to June 30, 1986. These reinspection programs were conceived, designed, and carried out independently of each other. DelGeorge Rebuttal Prep. Test., ff. Tr. 16,740, at 6, 9; Kaushal Rebuttal Prep. Test., ff. Tr. 15,568, at 7-8.

331. The Braidwood Construction Assessment Program (BCAP) was a program of reinspections and reviews carried out by Edison in 1984 and 1985 covering safety-related construction activities at Braidwood. The BCAP was comprised of three principal program elements. These were (1) the Construction Sample Reinspection (CSR), (2) the Reverification of Procedures to Specification Requirements (RPSR), and (3) Significant Corrective Action Program (RSCAP). Kaushal Pref. Test., ff. Tr. 13,068 at 4. Only the CSR program element was presented at hearing.

332. The CSR consisted of a visual reinspection of a sample of onsite, safety-related construction work which, as of June 30, 1984, had been completed and Quality-Control inspected. The sample was selected based in part on engineering judgment and in part on the use of statistical concepts. The reinspections were carried out from October 1984 through July 1985. Kaushal Pref. Test., ff. Tr. 13,069 at 3, 13-16.

333. The CSR (and other elements of BCAP) were carried out by the BCAP Task Force. The BCAP Task Force Director was Edison employee Dr. Narindar Kaushal. Kaushal reported directly to the Braidwood project manager, Mike Wallace, who had principal production responsibilities at Braidwood. *Id.* at 9-10. The BCAP QA group, a part of Edison's QA Department, under the direction of an Edison employee, Neil Smith, oversaw the BCAP Task Force activities. *Id.* at 10.

334. Discrepancies found by BCAP CSR inspectors were evaluated for design significance by Sargent & Lundy (S&L), which was responsible for developing the design drawing specifications for Braidwood. The activities of Sargent & Lundy, the BCAP Task Force, and BCAP QA were reviewed by an Independent Expert Overview Group (IEOG) established through the Evaluation Research Corporation. *Id.*, ff. Tr. 13,068 at 10-11.

335. The NRC Staff assigned Inspector Ronald Gardner to monitor on site the implementation of the BCAP program. Gardner was on site from August

20, 1984, until June 1985, during which time he engaged in daily oversight of BCAP activities. Gardner Pref. Test., ff. Tr. 17,606 at 3, 7.

336. BCAP Director Kaushal was assigned to BCAP in March 1984, after BCAP was conceived but before it was implemented. Tr. 13,098. NRC Inspector Gardner was assigned to BCAP in August 1984. Gardner Pref. Test., ff. Tr. 17,606 at 3; Tr. 17,569.

337. BCAP was not designed to look at suspected problems or to respond to the possible effects of harassment and production pressure on Quality Control inspector work performance. Nor was BCAP designed to look for isolated design-significant defects. Rather, BCAP was designed as a quality "confirmation" program; the program design assumed that construction quality was good and relied on a sample size that would reveal only recurring, programmatic construction problems. Kaushal Pref. Test., ff. Tr. 13,068, at 3-6, 16-17; Tr. 13,326-28.

338. The record contains evidence that NRC officials had misgivings about the sufficiency of the BCAP design, but no evidence that the NRC actually approved that design. Edison forwarded the BCAP program document to NRC Inspector Keppler and his staff for comments in June 1984. Keppler's response to Edison, Intervenor's Exhibit 140, made twenty-seven specific recommendations for changes in the program design. With only one exception, Edison responded to each of Keppler's comments that "Edison believes that no change to the existing BCAP document is warranted." Kaushal, Tr. 13,114-17.

339. The Board ruled that Mr. Gardner was not competent to vouch on behalf of the NRC for the adequacy of the BCAP program design or the S&L design-significance evaluations because he had no role in either aspect and that if Edison or the Staff wished to establish that the NRC had approved the BCAP design or design-significance evaluations, they would have to present other witnesses. Tr. 17,566-606. No such witnesses were ever produced.

340. The CSR was a sample program. For purposes of taking samples, the entire population of onsite contractors' safety-related construction work was divided into thirty "construction categories," which were defined as groups of hardware constructed using similar processes or containing similar types of components. Six of those construction categories contained electrical work: cables, cable pans, cable pan hangers, conduit, conduit hangers, and electrical equipment installation. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 11-13. The total sample for each construction category consisted of three parts. The first or "random" portion was chosen in such a manner as to support formal statistical conclusions with at least 95% confidence and at least 95% reliability concerning each sampled construction category. *Id.* at 13-16; Frankel Rebuttal Prep. Test., ff. Tr. 17,082, at 9-11. For the second portion of the sample, engineering judgment was used to determine sample size and to select items. This portion emphasized types of items that are part of safe-shutdown or emergency core cooling systems. It was initially intended that the "engineering judgment"

portion of the CSR sample would also emphasize the types of items that had previously exhibited deficiencies at Byron and Braidwood. However, for each of the electrical construction categories it was determined that none of the previously identified deficiencies could be limited to a subset of the construction category. Therefore, additional items were chosen using random methods. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 14-15. Although both the "random" and "engineering judgment" portions of the CSR sample already included more highly stressed items, in the cable pan hanger category, ten additional more highly stressed items were added as the third part of the CSR sample. *Id.* at 15-16; Kostal, Tr. 15,074-75. Under the provisions of the CSR, if any design-significant discrepancies had been found in the initial CSR sample, the sample size would have been increased. These sample expansion provisions could have led to a 100% reinspection. However, since no design-significant discrepancies were identified, the sample was not expanded. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 6-7; Tr. 13,756-57, 14,148-49.

341. The CSR inspection checklists and instructions were developed by the BCAP Task Force engineers based on relevant design information provided by S&L. The attributes selected for reinspection were those that (1) are required by applicable codes and standards, (2) potentially have an effect on the item's ability to perform its safety-related design function, and (3) are currently observable. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 18-19. In the electrical construction categories, the CSR checklists and instructions were not based on the original Comstock inspection checklists, and did not include attributes with no potential for design significance. Kaushal, Tr. 13,180-86, 13,375, 13,385.

342. The CSR electrical sample was chosen from items that had been Quality-Control inspected and accepted as of June 30, 1984. Edison estimated that only 24% of the total research construction items in the plant were "valid" and had been Quality-Control inspected and accepted as of June 30, 1984; only those items were therefore eligible to be included in the CSR sample. Appl. Exh. 133, Int. Exh. 159. Thus only 17% of conduit hangers, 29% of electrical equipment installations, 39% of cable pans, 42% of conduits, and 59% of cable pan hangers were eligible to be included in the CSR samples. Appl. Exh. 133; Int. Exh. 159. The remaining 76% of the electrical construction items in the plant (some 72,216 items out of a total of 94,947 electrical items in the plant) were ineligible for the CSR samples and were thus not covered by the CSR program at all.

343. The fact that the CSR program covered only 24% of the total electrical construction population at Braidwood limits the overall conclusions that can be drawn from the BCAP program with respect to Quality Control inspector performance. The CSR cutoff date of June 30, 1984, bears no relation to Intervenors' contention concerning harassment and production pressure. Many

of the incidents exhibiting harassment or production pressure that have been developed in this record occurred after June 30, 1984:

- The Comstock campaign to eliminate the backlog was reaching its most intense period in June 1984. During that month, DeWald received a memorandum from Shamblin emphasizing the urgency of eliminating the backlog and announcing weekly meetings for progress reports.
- The termination of Inspector Puckett, arguably the most egregious incident of harassment in this extensive record, occurred in August 1984.
- On March 29, 1985, twenty-four Comstock Quality Control inspectors went to the NRC to complain about problems at Comstock, including production pressures that, in their view, placed an emphasis on quantity over quality in the Comstock Quality Assurance organization.
- Allegations of harassment and production pressure continued well into 1986 as exemplified by the retaliatory incidents involving Richard Martin and Gregory Archambeault.

Early in the CSR program the NRC Construction Assessment Team identified deficiencies on three of six pipe supports/restraints which the BCAP Task Force inspectors had previously reinspected. The BCAP Task Force reinspectors had not identified these deficiencies. In addition, IEOG overinspections identified deficiencies associated with a concrete placement which had not been identified during the BCAP CSR reinspections. Gardner Rebuttal Prep. Test., ff. Tr. 17,606, at 8-9. In response to these findings and following a meeting with Mr. Gardner on January 23, 1985, Mr. Kaushal temporarily suspended CSR reinspections. *Id.*, ff. Tr. 17,605, at 8-9; Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 21-22; Int. Exh. 148. Corrective actions were taken to address the identified CSR reinspection discrepancies and to ensure that future CSR reinspections were performed in an acceptable manner. These actions included the partial repeat reinspection of previously reinspected mechanical pipe supports; the review of electrical conduit support packages, and partial repeat reinspection of such supports, where necessary; the implementation of additional training for BCAP inspectors; the revision and clarification of BCAP checklists and instructions; and the initiation of the BCAP Quality Control overview of BCAP Task Force inspections. Gardner Rebuttal Prep. Test., ff. Tr. 17,606, at 9-10; Staff Exh. 25 at 5; Appl. Exh. 135; Wozniak Rebuttal Prep. Test., ff. Tr. 13,068, at 5-7; Smith Rebuttal Prep. Test., ff. Tr. 13,068, at 7-14.

344. Kaushal believed that the root cause of the CSR reinspection errors identified by the CAT and the IEOG prior to January 23, 1985, was a misunderstanding by the BCAP Task Force inspectors of certain attributes on their checklists. Tr. 13,941-42. Mr. Gardner, on the other hand, concluded that the root cause of these CSR reinspection deficiencies was the fast pace at which BCAP

Task Force inspectors were working. Gardner Rebuttal Prep. Test., ff. Tr. 13,068, at 10. Although Mr. Gardner did not discuss this concern with Kaushal in their meeting on January 23, 1985, or document it in his inspection reports, he continued to monitor BCAP inspectors' attitudes and instructions. Tr. 18,369. Subsequently the CSR reinspectors were instructed to disregard any pace concerns and take as much time as necessary to perform their inspections. Tr. 17,623-24.

345. Three types of data were produced as a result of the BCAP CSR program. The first, the raw data from the CSR reinspections, were tabulated in terms of the number of the discrepancies and the number of acceptable conditions identified by the CSR overinspectors. Second, those numbers were used to compute so-called "agreement rates." Third, the discrepancies were analyzed to determine whether they were design significant.

346. All CSR reinspection observations reported by the BCAP Task Force inspectors were reviewed by their lead discipline inspectors for clarity, completeness, and accuracy. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 22-23. If suitable for further processing, the observations were evaluated for validity by BCAP engineers. Under BCAP procedures (Int. Exh. 143), CSR observations that had previously been identified by Applicant or its contractors on an existing nonconformance report or other controlled system were considered to be invalid. Conditions that were in accordance with current design documents or design documents current at the time of the original Comstock inspection were also not valid. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 23; Int. Exhs. 143, 154; Tr. 13,588-603. Observations that related to items not within the CSR sample or attributes not on the CSR checklists were declared "out of scope." In addition, because the objective of the CSR was to look for previously unidentified and unaddressed construction problems, observations that pertained to known conditions addressed prior to the CSR through existing procedures or other documented plans for future construction completion activities (for example, all cable pan hanger configuration observations) were also declared "out of scope." Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 22-24, 26-27; Tr. 13,535-38, 13,799-802; Int. Exh. 143. The remaining (valid, in-scope) observations were termed "discrepancies" and were transmitted to Sargent & Lundy for evaluation of design significance. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 25-26.

347. Early in the CSR program, Sargent & Lundy engineers reviewed each discrepancy sent to them by BCAP for validity as well as for design significance. However, in March 1985, NRC Inspector Gardner assessed an item of noncompliance against BCAP for invalidating thirty-seven so-called "red-line" observations all relating to a Phillips-Getschow documentation practice, based on an inadequate rationale provided by S&L. Although the focus of the NRC Staff's concern was the invalidation itself, rather than S&L's role, after this time BCAP-06 was modified to emphasize that S&L could only recommend invalidation and only the BCAP Task Force could invalidate BCAP observations. There-

after, S&L played little or no role in the invalidation process. Gardner Rebuttal Prep. Test., ff. Tr. 17,606, at 11-12; Gardner, Tr. 17,764-67, 18,328-34; Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 25; Tr. 13,489-503, 13,828-34, 14,343-45, 14,476-77.

348. Sargent & Lundy categorized all discrepancies sent to it for evaluation of design significance as either: "insignificant," "notable," or "design significant," depending on its severity. Appl. Exh. 179 at 15; Thorsell Rebuttal Prep. Test., ff. Tr. 14,270, at 9-10. Discrepancies that reduced an item's capacity by less than 10% but did not impair its ability to perform its safety-related design function were termed "insignificant." Discrepancies that reduced an item's capacity by 10% or more but did not impair its ability to perform its safety-related design function were termed "notable." Any discrepancy that would impair the item's ability to perform its safety-related design function within code-allowable stresses was called "design significant." Thorsell Rebuttal Prep. Test., ff. Tr. 14,270, at 9-10; Kostal Rebuttal Prep. Test., ff. Tr. 13,068, at 16-17, 28; Appl. Exh. 179. Sargent & Lundy's evaluation of discrepancies for each of the six electrical construction categories concluded that there were no design-significant discrepancies.

349. The Board heard substantial testimony regarding S&L design-significance evaluations for CSR discrepancies. CSR sample items cable pan hanger ("CPH") 104, and cable ("CBL") 130 were vehicles for a comprehensive evidentiary review of S&L's approach and methodology; *see generally*, Kostal, Tr. 14,641-86, 14,755-805, 15,517, 16,675-76; Thorsell, Tr. 14,453-60, 14,477-90, 14,565-66; Int. Exhs. 155, 155A, 155B; Appl. Exhs. 159, 173, 180. Sargent & Lundy initially calculated the design margin for CPH 104, taking into account CSR-identified weld discrepancies, to be 1.03. Tr. 14,781-83; Int. Exh. 155B at 14-15. Any value equal to or greater than 1.0 is not design significant and therefore acceptable. Tr. 14,781; Int. Exh. 161. Subsequently, a revised calculation was performed using the actual cable tray weights that existed in the pan, rather than the conservatively estimated load used in the initial calculation. Tr. 14,756, 14,784-85, 15,181-82; Appl. Exh. 159. That calculation resulted in a design margin of 1.89, but an improper shortcut was taken in the second calculation. Correcting for the shortcut, the design margin was calculated at 1.28. Tr. 14,781-84. With respect to cable 130, Sargent & Lundy erred in closing out a minimum bend radius violation observation on the basis of technical acceptance criteria contained in a letter from the cable manufacturer, Okonite Company, without first specifically pointing that cable out to the manufacturer's representative, or providing a written description of the bend radius violation to the manufacturer. Thorsell, Tr. 14,482-83.

350. The criteria in the letter for approval of the bend radius did not apply to cable 130 without a further determination by the manufacturer of the condition of the cable, and a different cable was examined by the manufacturer's

representative than assumed by Sargent & Lundy. Tr. 14,456-62, 14,482-89, 14,565-67. The errors in both the CPH 104 and cable 130 design-significant evaluations were not discovered and corrected until the S&L experts were cross-examined by Intervenors' counsel at hearing.

351. The quality control inspection of an item such as a cable or a cable pan hanger requires the inspector to verify that the item conforms to design requirements for each attribute on his checklist. Verification of each such attribute may require one or more inspection judgments. Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 19-20; Tr. 13,761-62. Moreover, the items included in the CSR sample varied greatly in their complexity and thus in the number of inspector judgments required for the initial Quality Control inspection and for the CSR reinspection. Tr. 13,758-59, 14,166-73; Appl. Exhs. 143, 144. To permit meaningful judgment of inspector performance and meaningful comparison of inspector performance with respect to items of differing complexity, the BCAP Task Force together with BCAP Quality Assurance and Sargent & Lundy developed the concept of "inspection points" and "discrepancy points." Tr. 13,758-59, 13,770, 13,773, 14,173-79. Each inspector check to determine the acceptability or rejectability of an item or an attribute was identified and termed an "inspection point." Each inspection point that resulted in a CSR discrepancy was termed a "discrepancy point." Kaushal Rebuttal Prep. Test., ff. Tr. 13,068, at 19-20; Kostal Rebuttal Prep. Test., ff. Tr. 14,270, at 13-14; Tr. 13,760-64. On this basis, over 98% of the inspection points were found to be correct (nondiscrepant) and more than two-thirds of the discrepancy points were insignificant. Appl. Exh. 179 at 16; Thorsell Rebuttal Prep. Test., ff. Tr. 14,270, at 11; Kostal Rebuttal Prep. Test., ff. Tr. 14,270, at 22.

352. Applicant also presented the CSR results for the electrical construction categories on a per-weld basis. About 84% of the welds had no discrepancies. Appl. Exh. 181; Rebuttal Prep. Test., ff. Tr. 16,740, at 38. The comparable figure for the PTL overinspection data for the period July 1, 1982, to June 30, 1986, is 93%. For the period in which the two data bases overlap (July 1, 1982, to June 30, 1984), the agreement rates are 89% and 90%, respectively. DelGeorge Rebuttal Prep. Test., ff. Tr. 16,740, at 37-38; Tr. 16,801-02.

353. A third way of looking at the CSR results was supported by Intervenors in this proceeding. Any item with one or more discrepancies would be termed a "discrepant item." The NRC had originally required that any conclusions on expanding the CSR sample size be based on the percentage of acceptable items, irrespective of the number of attributable inspection points. Int. Exh. 140, BCAP Comments II-4; Tr. 17,710-11. Applicant committed itself to this requirement. Appl. Exh. 128, Attach. A at 3 of 7. Although Applicant's statistician did some early analyses based on an item, rather than inspection point, basis, Applicant inexplicably breached its commitment to the NRC and abandoned that basis. Tr. 17,141-42, 17,631, 17,710-18. On an item basis, 60.0% of the cables,

64.4% of the cable pans, 59.0% of the conduit, 56.4% of the conduit hangers, 86.2% of the cable pan hangers, and 72.5% of the electrical equipment installation would be deemed "discrepant items." Appl. Exh. 181. Applicant's witnesses did not view this as a reasonable or fair measure of Comstock Quality Control inspector performance — both because it masks the actual number of inspector errors on each item and because it equates very dissimilar reinspection outcomes. For example, a huge cable pan hanger with hundreds of welds, one of which might be discrepant due to an arc strike, would count the same as a conduit wall strap support that was totally missing. Kaushal, Tr. 13,758-59; Shevlin, Tr. 13,770; Kaushal, Shevlin, Wozniak, and Smith, Tr. 14,173, 14,179.

354. NRC Inspector Gardner agreed that in grading inspector performance he would not equate such dissimilar "discrepant items." Mr. Gardner did not believe that Applicant Exhibit 181, standing alone, presents a balanced portrayal of the CSR reinspection results. Nonetheless he recommended that the Licensing Board should consider all the data available to it, including the data presented on an item basis. Mr. Gardner stated that his own personal standards were high, and he would expect a good inspection program would have resulted in lower rates of discrepant items than is shown in Appl. Exh. 181. However, he conceded that he had never developed acceptance criteria for differentiating good from average or poor inspection programs using data presented in Intervenors' suggested "item basis" format. Tr. 17,633-45, 17,807-11, 18,347-49. In Mr. Gardner's view, the Comstock Quality Control inspectors were not effective in the "classical" 10 C.F.R. Part 50, Appendix B sense of identifying all defects, but they were effective and adequate in the sense that they did not miss any design-significant defects. Tr. 17,807-09, 17,813-15.

355. There is merit in both Applicant's and Intervenors' positions. Clearly, if we are dealing with a complex component containing a number of welds, each of which is evaluated on the basis of seventeen design-significant attributes, it would be unrealistic to judge the original Comstock inspection as a failure if one attribute on the component were discrepant, as Intervenors suggest. On the other hand, judging the quality of the original inspection on the percentage of *attributes* that were discrepant, as Applicant proposes, is similarly unrealistic. As an example, welds were divided into seventeen inspection points (or attributes). It seems unlikely that any weld that had more than two or three discrepant inspection points (i.e., attributes) would have become the subject of an original inspection by an L.K. Comstock Quality Control inspector. If a craftsman were to weld a weldment with more than two or three faulty attributes, such as being undersized or cracked, lacking fusion, etc., it is likely that he would redo that weld himself without waiting for Quality Control to reject it. On a practical level then, the original Quality Control inspector is inspecting welds that might have, at most, one, two, or three defective attributes (although any of those, such as a crack, might render the weldment totally nonfunctional). But, even

if we were to assume that the Quality Control inspector inspected and passed only discrepant welds (those with one, two, or three defective attributes), his percentage of acceptable calls (i.e., his "agreement rate" under BCAP) would range between 82% and 94%. On its face, an 82% to 94% rate does not seem egregious, even though it should because, in our example, the Quality Control inspector missed every single discrepant weld that the craftsmen would not have redone of their own volition.

356. There are infirmities in the BCAP CSK reinspection program that go beyond the question of whether components, subcomponents (such as welds), or inspection points should be tallied to determine the percentage of discrepancy. Even if we were to choose one of these, we would still lack the perspective to judge the quality of the original Quality Control inspection. The main element lacking in the evaluation would be the number of the discrepant items (components, subcomponents, or attributes) that the original Quality Control inspector *reported*, as opposed to those that he missed, only the latter being disclosed under the BCAP program.

357. As an example, let us use welds as the unit of measurement and 15% of the welds as being found discrepant under the BCAP reinspection program. (Applicant's Exhibit 181 indicates that approximately 16% of the welds examined by the BCAP inspectors were found to be discrepant.) If we assume that the craftsmen had welded 45% of their welds discrepantly, the Comstock Quality Control inspector would have had to miss one-third of those discrepant welds ($\frac{1}{3} \times 45\%$) to have been found 15% discrepant under BCAP. If, on the other hand, the craftsmen had welded 20% of the welds discrepantly, the Comstock Quality Control inspector would have had to miss three-quarters of the discrepant welds ($\frac{3}{4} \times 20\% = 15\%$). Consequently, unless we know either explicitly or deductively (or inductively, as the case may be) how many discrepancies were reported by the original QC inspectors, we do not know whether the Comstock QC inspectors were 67% effective, 25% effective, or any other percentage.[4]

---

[4] The calculation made in this example is somewhat simplified. Since I do not distinguish between weld discrepancies missed by an original Comstock QC inspector and any Comstock reinspector, but use only the final products of their cumulative inspections, it is unnecessary to adjust the calculation for welds that were reinspected, as in the examples presented at hearing where the examples began with a hypothetical 100 welds to be initially inspected.

I also do not take into account in this simplified calculation the possibility of the BCAP reinspectors' not being 100% accurate. I recognize that they could be expected to have missed discrepant welds, as offered by Intervenors and Applicant. I do not also accept the proposition offered by Applicant that these BCAP reinspectors would have erroneously reported nonexisting discrepancies under a rate comparable to, or greater than, that of missed discrepancies. I do not believe that one could expect inspectors to find things that weren't there, except in unusual circumstances. That does not go to say that there might not have been differences in judgment between the BCAP reinspector and the original Comstock QC inspector, but I would expect that any errors in judgment on the part of the BCAP inspector would have been weeded out in the BCAP review that he was subject to which, in all probability, also weeded out any marginal calls he made, even if correct.

358. There would seem to be no reason why the discrepancies uncovered by the BCAP reinspectors could not be compared to the discrepancies originally reported by the Comstock inspectors, as contained in the inspection packages for the sampled components. Under the requirements of Part 50, Appendix B, Criterion XVII, the original inspection records should be retrievable. Criterion XVII states, *inter alia:*

> XVII. Quality Assurance Records
>
> . . . Inspection and test records shall, as a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted. Records shall be identifiable and retrievable.

359. It would appear that even at this point a comparison can be made between the discrepancies found by the BCAP inspectors and those found by the original Quality Control inspectors. We need only examine the original sampling packages, with no need for any further sampling, if we wish to measure the effectiveness of the original Quality Control inspectors. Whether any such comparison was ever made has not been disclosed and is not a part of the record. In the absence of such comparison the BCAP program cannot be accepted as *any* measure of the effectiveness of the original Quality Control inspector. It might also be noted at this juncture that if a comparison had been made, the entire controversy over which units (i.e., components, subcomponents, inspection points) should be measured would have been obviated. Had Applicant compared only those attributes examined by the BCAP reinspector with the comparable attributes originally inspected to by the Comstock Quality Control inspector, Intervenors would have no basis for challenging the results. Of course, even if Applicant had measured apples against apples and oranges against oranges, it would only have arrived at a *percentage* of the effectiveness of the original Quality Control inspector. Unless those results were determinative on their face (i.e., either an extremely high rate of Quality Control inspector effectiveness or an extremely low rate), the results would still have to be evaluated by the experts and the Board.

360. Without any measure of *effectiveness* of the Quality Control inspector, and with only a measure of the absolute numbers of discrepancies missed, a meaningful comparison cannot be made between different periods of inspection activity. Moreover, any BCAP sampling comparison between the pre-DeWald (as Quality Control Manager) era and the period in which the contention alleges that management harassed and intimidated inspectors, is particularly inappropriate. Mr. DeWald became Quality Control Manager in August of 1983, shortly before the grid-area basis for weld inspectors was discontinued in October of 1983. The grid system was not a proper or effective method of inspection (*see* Min. Fdgs. 315-329, *supra*) and, consequently, neither the grid-

system period nor the DeWald-Saklak period represents a standard against which any other period can be judged.

361. In the absence of any measure of Quality Control effectiveness based upon a comparison between discrepancies missed and discrepancies reported, the BCAP evaluations of "design significance" were presented as a measure of Quality Control effectiveness. But the question of whether a discrepancy is "design significant," is totally irrelevant to the function of a Quality Assurance inspector. He is not charged with seeking out design-significant discrepancies or even with determining whether any putative discrepancies are significant from a safety standpoint. His obligation is to report all discrepancies. Any attempt by him to ignore those discrepancies that he might consider insignificant would interfere with this obligation. The question of whether a discrepancy is design-significant is uniquely in the presence of an engineer to evaluate based in part on the inspector's findings but also based on a variety of other data and expertise that is not immediately known to a quality control inspector. The measure of the qualification of a quality control inspector is whether he can inspect to established acceptance criteria. Tr. 16,775-76.

362. The only value, therefore, that BCAP could have for us, considering the way it was programmed, is with regard to the constructed hardware, rather than with regard to the effectiveness of the Quality Control Inspection Program. However, even there little weight can be given to the results. The main problem here is with the party selected to make the determination of design significance, Sargent & Lundy.

363. The BCAP program document recognized the need for independence of the Independent Expert Overview Group reviewing the program. The document provided that the IEOG members "will be free of any significant contacts with Commonwealth Edison Company" and "will not have participated in the design, construction, or quality assurance activities related to the Braidwood Station or with Braidwood site contractors within the last five years." Appl. Exh. 137 at V-2. The IEOG was not shown at hearing as being any more than a token oversight group. However, the BCAP Director, Mr. Kaushal, was an Edison employee. He and BCAP were answerable directly to Edison management in the person of Mike Wallace, the Braidwood project manager who was responsible for cost and scheduling considerations at Braidwood. Kaushal, Tr. 13,716. More importantly, Sargent & Lundy, which performed the design-significant evaluations, the only evaluations of any importance[5] in the BCAP program, did not meet the independence criteria. Sargent & Lundy failed the independence criteria on almost all grounds. As architect/engineer, it designed Braidwood and was

[5] It would not have mattered one iota whether there had been half as many or twice as many discrepancies or notable discrepancies found by the BCAP inspectors. The entire conclusion as to whether the facility passed the BCAP test was founded on S&L's determining whether any of the discrepancies was design significant.

intimately involved with its construction. As consulting engineer, it advised on construction and dispositioned NCRs and ICRs that documented discrepant construction activities. It was in day-to-day contact with Applicant, the Commonwealth Edison Company. Because of its intimate involvement in the construction activities, whether or not it was the case, Sargent & Lundy appeared to the Quality Control Manager of L.K. Comstock to be the prime electrical contractor and Comstock only the subcontractor. DeWald, Tr. 1805-06. Were the Braidwood facility to fail to meet its licensing requirement or were its construction to prove deficient in some degree, it is likely that Sargent & Lundy's liability exposure would surpass that of even Applicant, the Commonwealth Edison Company.

364. An example of S&L's direct liability for design-significant defects is cable 130, which violated the manufacturer's bend radii limitations and which S&L evaluated (incorrectly, at first) as having no design significance. The bend radii's violation was attributable to the cable being placed in a junction box that was too small to permit the cable to be bent properly. S&L had designed and ordered the equipment and installation, and had failed to require an adequate junction box. Tr. 14,923-25.

365. Not only would Sargent & Lundy have failed the independence test in the BCAP program document, but other reasons exist for questioning the objectivity of its evaluations on the BCAP. Just prior to the critical period in issue in this proceeding (beginning with the summer of 1984), Sargent & Lundy had complained that the Comstock Quality Control inspectors were being "over-critical and were marking discontinuities which S&L felt were acceptable." Appl. Exh. 1 at 1. Sargent & Lundy had complained in particular about the Quality Control inspectors' interpretation with regard to overlap, undercut, arc strikes, lack of fusion, tack welds, base metal reduction, and spatter. Sargent & Lundy was concerned that these interpretations constituted "overinspection." *Id.*

366. Consistent with the evidence of Sargent & Lundy's concern about inspections being too critical, was the Quality Control inspectors' recurrent testimony during the course of the hearing that they were becoming somewhat demoralized because of Sargent & Lundy's practice, as evaluating engineer, of dispositioning QC-determined discrepancies on a "use as is" basis. Tr. 8162-64, 10,485, 10,576, 12,320, 12,632, 17,363; Testimony of Mendez and Neisler, ff. Tr. 10,490, at 30. Many of the Quality Control inspectors believed these dispositions to be unjustified and had voiced complaints to the NRC. *Id.* Some had successfully challenged the S&L engineers' "use as is" dispositions. Tr. 8162-64.

367. Further disquieting about the role of Sargent & Lundy as an objective evaluator under BCAP were its participation in the improper termination of Mr. Puckett and its testimony in defense of that termination, its errors and evaluations of the two sample BCAP packages randomly selected by Intervenors

for examination at hearing, its improper invalidation of thirty-seven red-line drawings under BCAP, its complaints to Comstock's management concerning Quality Control inspectors who sought engineering advice from them for not having gone through channels (i.e., through their Quality Control supervisors with whom they disagreed), its unilateral departure from FSAR standards (e.g., with regard to response spectra (*see* Tr. 15,176-79, 15,197-201)) in evaluating BCAP design significance, and the seeming inability of Sargent & Lundy witnesses to answer Intervenors' questions directly with regard to the BCAP program.

368. As a general matter, by virtue of its direct involvement in the design and construction of the Braidwood plant and its potential liability to Commonwealth Edison for any construction or licensing problems, Sargent & Lundy is too committed to the licensing of the plant to be considered an objective evaluator. While it is certainly entitled to evaluate the plant's construction under BCAP or any other program for its *own* purposes to determine *for itself* whether the plant is properly constructed, its commitment to the licensing of the plant is too strong for acceptance of its opinions as impartial. Furthermore, its past actions and testimony at trial confirm its partisanship in that regard. Its attitude in general appeared to be that it had designed the plant with so much safety margin that no deficiencies in construction and inspection in the electrical area could impair the ability of the electrical equipment to function safely. While that might be the case, that opinion should be expressed by someone other than the designer of the plant to be afforded much weight.

369. Further questions exist with regard to whether the design-significant evaluations made by Sargent & Lundy are satisfactory samples for statistical application. In the statistical process, one can select sufficient items on a random basis to project to the population at large. The population being sampled, however, must have a degree of homogeneity in order for that statistical projection to be valid. But in this case, the calculations and evaluations made for design significance appear to be unique calculations suitable only for the particular items selected. While Sargent & Lundy began its evaluations with standard design calculations, it departed from these standards through a series of so-called "refinements" when the design margins became minimal. Sargent & Lundy's design-significance calculations were carried out by using successive levels of "refinement." When one set of calculations produced results that indicated a concern about design significance, Sargent & Lundy turned to "more refined calculations" which, by eliminating purported conservatisms in the first set of calculations, enhanced the acceptability of an item. Sargent & Lundy employed multiple layers of refinement in order to arrive at its conclusions that no discrepancies were design significant. Tr. 15,076, 14,083-85. These refinements took many forms, including examinations of the "as-built" configuration of the sample item and its neighbors to determine if additional

safety margins exist, departures from the FSAR specifications to those based upon its own engineering judgment to see if further safety margins exist, and departures from the equipment manufacturers' specifications and requirements on the basis of its own engineering judgment to determine if further safety margins exist. Many of these departures from the original design specifications adopted in the FSAR were based on *ad hoc* exercises in engineering judgment, and all were in the direction of finding *additional* safety margins in the as-built construction. Absent were any suggestions of refinements in the direction of *reduced* safety margins because of as-built conditions that might have included observations of less-than-satisfactory workmanship or materials in the sampled item, or in a neighboring item that might adversely affect the sampled item. Given the predisposition of Sargent & Lundy to validate the construction of Braidwood as satisfactory, which was the expressed purpose of the BCAP program, and considering Sargent & Lundy's resourcefulness and their predisposition for searching only for matters that would show an increased safety margin, it is difficult to see how they would ever find a discrepancy of design significance.

370. For the same principal reasons that the CSR agreement rates are not indicative of the efficacy of the original Comstock Quality Control inspector, because there is no comparison between the discrepancies he missed and those that he found, the PTL results are similarly unilluminating. Furthermore, in addition to the sampling's not being done on a statistically random basis, there is further doubt as to how representative the sampling was. The PTL inspectors were permitted to overinspect welds through paint. Although the PTL panel experts claimed that this amounted to only 7% of the inspected welds, this testimony was questionable.

371. They arrived at the 7% figure by reviewing PTL's overinspection records for July 1982 through June 1986 and determined how many of the welds were noted in the remarks section of the inspection reports as having been inspected through paint. This amounted to 7% of the total welds that were overinspected. The PTL witnesses testified that it was PTL's practice, although not a written procedural requirement, to indicate in the remarks section of PTL's inspection reports which welds were overinspected through paint. They believed that the PTL inspectors followed this practice whenever they inspected through paint. Tr. 15,749-54.

372. That testimony is not acceptable. On its face, the 7% figure seems very low considering the practice of Comstock of coating welds with Galvanox after the initial installation and Quality Control inspection. Tr. 8533, 8541. Galvanox was a heavy, thick, gray-colored paint used as a protective coating to prevent welds from rusting. Tr. 8531, 8540. It would be less surprising if the figure given for welds covered by Galvanox by the time of the PTL overinspection was 70%, rather than 7%. Furthermore, not only did PTL's written procedures

not require noting the welds overinspected through paint, but neither did the checklist given to the PTL overinspectors. Tr. 15,780-81. Nor was there any other written direction to note those inspections through paint. Tr. 15,782. But PTL, no less than the original Quality Control inspection group, is required by Part 50, Appendix B, to document in writing its procedures and instructions. Criterion V states, in pertinent part, as follows:

> V. Instructions, Procedures, and Drawings
>
> Activities affecting quality shall be prescribed by documented instructions . . . .

Criterion XVIII states, in pertinent part:

> XVIII. Audits
>
> . . . The audits shall be performed in accordance with the written procedures or check lists by appropriately trained personnel . . . ."

373. If PTL, which had been overinspecting visual inspections of welds since 1977, had not memorialized any directions to its overinspectors to note welds inspected through paint (as it had documented its other requirements) by the period for which it offers its conclusions, 1982-1986, we cannot accept the testimony that these instructions existed and were uniformly applied. And, if in fact a large number of welds were inspected through paint, PTL's high agreement rate with Comstock Quality Control inspectors means very little because many discrepant attributes would have been obscured by the paint. The Galvanox coating could obscure cracks, undercut, cold lap, porosity, and other attributes. Tr. 8531-32. Moreover, one could not be sure that the sampling by PTL, which was not statistically random in the first instance, would not be biased by Comstock's making sure that the more questionable welds were Galvanoxed immediately.

III. MINORITY ULTIMATE FINDINGS OF FACT AND CONCLUSIONS OF LAW

1. Having the Comstock Quality Control onsite management report to Edison's Project Construction Superintendent, Dan Shamblin, beginning in May of 1984, did not *per se* violate Criterion I of Appendix B to 10 C.F.R. Part 50 because Comstock was organizationally required to continue to report to the Comstock offsite Quality Assurance management. Edison could legitimately monitor the activities of the Quality Control organization of its contractor, L.K. Comstock, without violating Criterion I's requirement that the organizations performing quality assurance functions have authority and organizational freedom to identify quality problems, including independence from cost and schedule,

because of prior problems that Comstock had encountered in fulfilling its quality assurance functions. Comstock's inspection and documentation backlog and its deficient inspection practices were a proper concern of Edison.

2. However, by assuming, in fact, the function of day-to-day supervision of the Comstock onsite Quality Control management and by asserting continuous production pressure on Comstock that Comstock Quality Control management, in turn, imposed on its Quality Control inspectors, Edison's practices were violative of Criterion I.

3. There is no credible evidence, and only self-serving testimony with no corroborative support, that Edison's project construction superintendent promoted good quality practices, rather than merely asserted pressure for increased production.

4. The pressure asserted by Edison's project construction department was based upon the threat of terminating the Comstock construction contract.

5. The production pressure asserted by Edison upon Comstock management resulted in practices and actions by Comstock that were violative of the quality control standards established by Appendix B to Part 50. Certain of these improper practices and actions are enumerated in the following paragraphs.

6. The two major improper practices adopted by Comstock onsite Quality Control management were (1) to promote a climate of intense production pressure and (2) to attempt to discourage the documentation of any major deficiency that could result in a lengthy delay in production. Certain of these improper activities of Comstock Quality Control management predated Mr. Shamblin's overseeing of Comstock Quality Control and were attributable to the pressure on Comstock management of a backlog of inspections and documentation. Comstock had built up this backlog because of its improper practice of assigning too few Quality Control inspectors to document construction deficiencies.

7. Richard Saklak was improperly given supervisory authority over Quality Control inspectors although he lacked any background in quality control or the particular disciplines he supervised. He was appointed, and his authority was subsequently expanded, only because of his production and scheduling background and his dedication to speeding production. His lack of certification in the quality control disciplines that he supervised, attributable to his lack of background, was in direct violation of L.K. Comstock procedures and contributed to deficient practices in the Calibration Department, for which John Seeders was later transferred. Mr. Saklak's push for production, which was encouraged by Quality Control management, resulted in the Mustered and Snyder harassment incidents and exacerbated the Seeders' incident.

8. Irving DeWald was appointed as Comstock Quality Control Manager to improperly orient the Quality Control Department away from quality control and toward production.

9. The intense pressure for production directed by Comstock Quality Control management against its Quality Control inspectors resulted in the March 29, 1985, complaints of the twenty-four Quality Control inspectors to the NRC. Their marching *en masse* to the NRC office with their complaints was only precipitated by the Saklak-Snyder incident and reflected a more fundamental problem, the climate of intense production pressure fostered by Quality Control management. Although there were only a few incidents subsequently related by these Quality Control inspectors that amounted to an actionable incident of harassment and intimidation in a quality sense, the unanimity, or near-unanimity, of the complaints about improper production pressure reflected its presence.

10. Worley Puckett was improperly terminated because the matters he raised with regard to improper Quality Control practices and procedures would have resulted in some delay, perhaps considerable, in Comstock production. Mr. Puckett's recommendations came at the time of the most intense pressure by Edison on Comstock to reduce its inspection and documentation backlog, disposition all open NCRs and ICRs, and increase the pace of current inspections, and would have delayed those efforts. Considering the correctness of Mr. Puckett's recommendations and the high regard in which Mr. Puckett had been held by other Quality Control inspectors, his improper termination was a major violation of 10 C.F.R. § 50.7. Although this Board is not directly involved in the labor-management aspect of the termination, which was submitted to the Department of Labor, but only in its effect on LKC's quality control function, the effect on Mr. Puckett of being improperly labeled as incompetent, when he was not, and perhaps rendering him unemployable, should be taken into account in assessing the gravity of the offense. Edison was fully involved in the decision to improperly terminate Mr. Puckett.

11. The incidents of harassment and intimidation involving Messrs. Perryman, Archambeault, and Martin, although not as serious as the termination of Mr. Puckett, were violations of 10 C.F.R. § 50.7 that resulted from the improper attitude of L.K. Comstock toward matters raised by Quality Control inspectors that might delay production.

12. Other instances of harassment, intimidation, or retaliation, that were evidenced in this proceeding were isolated acts that might have occurred in any organization no matter how devoted its management might have been to quality practices. At most they were merely technical violations of 10 C.F.R. § 50.7.

13. Although Comstock management improperly overemphasized production and, in a few instances, improperly pressured Quality Control inspectors not to raise major items that might delay production, the weight of the evidence is that management made no attempt to discourage inspectors from documenting ordinary discrepancies.

14. With regard to the period after October 1983, the evidence is that the Comstock Quality Control inspectors performed their field inspections

competently and successfully resisted any attempts that may have been made by management to sacrifice quality for quantity. In making that determination, no weight has been given to the direct testimony of any Quality Control inspector that he did not deliberately disregard a discrepancy that he observed or that he had not seen any other inspector disregard such a discrepancy which the testifying inspector had not reported. It would be unrealistic to expect contrary testimony, because that could result in the immediate termination of employment of the testifying inspector. This evaluation of the good quality practices of the Quality Control inspectors also takes into account the fact that the Board heard testimony primarily from those inspectors who complained to NRC about Quality Control management and would most likely be the ones to uphold good quality control practices.

15. Had the other evidence not supported the adequacy of the Quality Control inspectors' inspection activities for the period after October 1983, Applicant's sampling reinspection programs would have been insufficient to satisfy Applicant's burden of proving the adequacy of the quality assurance program. Nor do the sampling reinspection programs, in any way, add to the weight of evidence in favor of acceptable construction. The reinspection programs were not designed and staffed to afford any assurance that the Quality Control inspection efforts were effective or that the construction was adequate.

16. Similarly, NRC Staff's approval of the Comstock Quality Control effort has little weight because NRC Staff did not fully investigate Quality Control inspectors' complaints of harassment and intimidation, and adopted too sympathetic an attitude toward Applicant.

17. On the evidence adduced, Comstock's Quality Control inspections of welding on the grid-area-system basis, in effect until October of 1983, are totally lacking in credibility. Under those circumstances, a 100% reinspection program, rather than a sampling program, is ordinarily required to determine whether there is reasonable assurance about the safety of the construction. Since the grid system inspections and the time period in which those inspections were conducted were not directly in issue in this proceeding, Applicant should have the further opportunity of proving the efficacy of those inspections.

18. Under the test in *Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983), it is determined that there has not been a breakdown in quality assurance procedures of sufficient dimension to raise legitimate doubt as to the overall integrity of the installation of electrical system for the period after October 1983. There is reasonable assurance that the electrical system installed after October 1983 can be operated without endangering the public health and safety.

19. Because of the gravity of the violation of 10 C.F.R. § 50.7 by Comstock and Edison in the termination of Worley Puckett, a substantial civil penalty

should be imposed on Applicant under § 50.7(c)(2). A lesser penalty should be imposed for the Archambeault, Martin, and Perryman incidents.

20. NRC Staff should investigate to determine whether L.K. Comstock improperly treated A-446 sheet material as prequalified material without adopting AWS Code D1.3 after it terminated Mr. Puckett.

Herbert Grossman, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland
May 19, 1987

Cite as 25 NRC 671 (1987) LBP-87-15

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

James L. Kelley, Chairman
Glenn O. Bright
Dr. James H. Carpenter

In the Matter of **Docket No. LRP**
(ASLBP No. 86-519-02-SP)

INQUIRY INTO THREE MILE ISLAND UNIT 2 LEAK RATE DATA FALSIFICATION

May 21, 1987

In this Recommended Decision, the Board reports the findings of its inquiry conducted pursuant to the Order of the Commission in CLI-85-18, 22 NRC 877 (1985).

STANDARD OF PROOF

Although the "preponderance of the evidence" standard could be applied to all issues in the proceeding, the Board chooses to apply the "clear and convincing evidence" standard to findings of manipulation and falsification because those findings are likely to have strong reputational impacts and because they tend to involve the most serious memory difficulties in this proceeding conducted 7 to 8 years after the incidents giving rise to the inquiry.

APPEARANCES

Harry H. Voigt, Michael F. McBride, James W. Moeller, Robert St. John Roper, Molly S. Boast, Marlene L. Stein, and **C. Christopher Sprague, Esqs.,** LeBoeuf, Lamb, Leiby & MacRae, Washington, D.C., for Numerous Employees.

Smith B. Gephart, Jane G. Penny, and **Terrence G. McGowan, Esqs.,** Killian & Gephart, Harrisburg, Pennsylvania, for Numerous Employees.

Ernest L. Blake, J. Patrick Hickey, and **John N. Nassikas III, Esqs.,** Shaw, Pittman, Potts & Trowbridge, Washington, D.C., for GPU Nuclear.

James B. Burns, Chicago, Illinois, and **Christopher W. Flynn** and **Frederick C. Williams, Esqs.,** Washington, D.C., Isham, Lincoln & Beale, for Jack Herbein.

Michael W. Maupin and **M. Christina Hensley, Esqs.,** Hunton & Williams, Richmond, Virginia, for Gary P. Miller.

Marjorie M. and **Norman O. Aamodt,** Lake Placid, New York, Pro Se.

Jack R. Goldberg and **Mary E. Wagner, Esqs.,** Bethesda, Maryland, for the Nuclear Regulatory Commission Staff.

TABLE OF CONTENTS

Synopsis

This inquiry was instituted by the Commission in December 1985, following investigations by the NRC Staff and GPU Nuclear Corporation ("GPUN") consultants that flowed from former employee Harold Hartman's allegations of leak rate surveillance improprieties at TMI-2 during 1978-1979. Hartman had alleged that the tests were at times purposely manipulated in several different ways and that records of unacceptable results were discarded to cover up problems with this surveillance. We accepted into evidence the reports of the prior investigations, which include a voluminous analysis of the technical aspects of the leak rate surveillance at TMI-2 and interviews of people that had been involved. However, we have assessed independently the implications of this and other evidence to reach our own conclusions concerning the issues before us.

On December 31, 1985, the Board sent letters to 120 present and former employees at TMI-2 who might have knowledge of or involvement with the subject of this inquiry. The ensuing petitions to intervene resulted in admission of six parties to this proceeding: (1) a group of twenty-five present and former employees of TMI-2 ("Numerous Employees"); (2) Mr. Kidwell, a former employee; (3) Mr. Herbein, a former officer of Metropolitan Edison Company ("Met-Ed"); (4) Mr. Miller, an employee of Met-Ed; (5) GPUN;

and (6) Marjorie M. and Norman O. Aamodt. The petition of Marvin I. Lewis was denied. Pursuant to the Commission's initial Order, the NRC Staff did not participate as a party; however, the Staff provided extensive documentary material, and Staff witnesses appeared at the hearing to respond to several hundred questions on the technical aspects of leak rate testing at TMI-2. In addition, technical experts who had prepared reports for Met-Ed and GPUN were called as "Board witnesses" to answer questions concerning technical aspects of their work.

The hearing began in September 1986 and required 33 hearing days with a resulting transcript of over 5000 pages. Forty-seven witnesses testified, most of whom prefiled testimony. Twenty-five exhibits were entered into the record. All parties filed proposed findings of fact and reply findings which we have considered in detail in reaching our assessment of this record.

The "Numerous Employees" submitted a memorandum of law in support of their proposed findings of fact, in which several issues including the question of the appropriate standard of proof were raised. Upon consideration of comments from various parties, we concluded that the usual "preponderance of the evidence" standard is appropriate, except with respect to findings of manipulation and falsification. Primarily because findings of manipulation and falsification are likely to have strong reputational impacts, we apply the "clear and convincing" standard to such evidence.

The scope of this inquiry was delineated in the Commission's Order in the form of four multipart issues. Our findings are arranged to address these specific issues. We also developed findings on the organizational structure at TMI-2 during 1978 and 1979, the TMI-2 Technical Specifications ("Tech Specs"), and the training program, to provide a perspective viewpoint in considering the performance of individuals.

1. Tech Spec Interpretation

The first Commission issue covered the interpretation and implementation of Tech Spec 3.4.6.2 and the events of October 1978 when an NRC inspector discovered that that Tech Spec was not being properly interpreted. Tech Spec 3.4.6.2 established five leakage limits, including one gallon per minute ("1 gpm") for "unidentified" leakage, the leakage measured by the leak rate test involved in this inquiry. The "Action Statement" in Tech Spec 3.4.6.2 stated that if leakage exceeded that limit, the operators must "reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours." Tech Spec 4.4.6.2 stated that Reactor Coolant System leakages shall be demonstrated to be within limits by four different surveillances, including "performance of a RCS water inventory balance at least once per 72 hours during steady state operation."

Virtually all Operations Department personnel worked under an erroneous interpretation of the above Tech Specs under which entry into the Action Statement was required only if they were unable to obtain a leak rate test result of 1 gpm or less *once* in a 72-hour period. If a test result of less than 1 gpm were obtained, any other tests run during the same period that showed excessive leakage were not considered to require entry into the Action Statement. This incorrect interpretation, coupled with the operators' cynicism about the test, resulted in a practice whereby test results greater than 1 gpm were routinely discarded, and test results of 1 gpm or less were filed.

Some Operations Department personnel would search for leakage or "eyeball" plant parameters for indications of excessive leakage after obtaining a test result greater than 1 gpm, but many did not. Particularly during the last 3 months of operation, the operators were, in effect, going through the motions of satisfying a procedural requirement, without regard to the validity of the test results.

During our questioning of the operators and foremen, it became apparent that there was a pervasive ignorance of the safety significance of the leak rate test. Classroom training on the leak rate Tech Specs and associated surveillances was virtually nonexistent during 1978-1979. We were quite surprised by the operators' total unfamiliarity with the "leak-before-break" concept, and the safety analysis of leaks in the TMI-2 FSAR. The conclusion is inescapable that the lack of meaningful training was a major cause of improper attitudes toward leak rate testing at TMI-2.

The improper interpretation of the Tech Specs was discovered by an NRC inspector in October 1978, and the chronology of events associated with this inspection is detailed in our hearing record. The resulting Licensee Event Report conveyed no clear explanation to the NRC or to the operating personnel that the interpretation of the Tech Specs had been wrong. Similarly, an Operations Memorandum to shift foremen and supervisors contained only a single, cryptic paragraph that was an inadequate attempt toward instruction on proper leak rate practice. The clear answer to the Commission's question whether the Licensee's corrective action was sufficient is no.

2. Difficulties with Leak Rate Surveillances

The second Commission issue pertained to the difficulties operators experienced in conducting leak rate surveillances. The test was performed by typing a code into the computer; the computer then carried out the data acquisition and computation of the leak rate at the end of a 1-hour test interval. The difficulty the operators experienced was that the test results were quite variable. Successive tests during a shift or from shift to shift showed computer-calculated leak rates that were inconsistent and, therefore, unbelievable, i.e., a large leak does not spontaneously become smaller. There is near unanimity in the record that there

was a lack of confidence in the computer-calculated test results and, yet, these tests were routinely approved by operators and shift foremen and the papers filed as a demonstration of compliance with the surveillance requirement. Such specious performance was remarkably unprofessional.

The specific reasons for the difficulty were not known to anyone in the Operations Department, but were generally thought to be in the computer program. Unreliability of the computer-based surveillance should have led the operators to use the manual procedure that also is part of the TMI-2 Surveillance Procedure 2301-3D1. Furthermore, the Operations Department personnel failed to follow Administrative Procedure 1010 to conclude that the tests were not satisfactory and to classify them as either an exception or deficiency. If deficient test results had been retained and properly classified, it seems probable that appropriate attention might have been given to the technical defects in the test.

The technical defects represented the summation of (a) procedure errors, (b) instrument inaccuracies, and (c) oscillations in plant conditions. The technical experts identified thirteen procedure errors, of which four were quantitatively important and, singly or in combination, may have produced errors of 1 gpm or more on some tests. Instrument inaccuracies or variability were estimated by the technical witnesses as possibly producing errors of up to approximately ± 1 gpm. Plant oscillations contributed another large (± 1 gpm) source of variability to the leak rate test results. It is clear on this record that the operators at TMI-2 were faced with a grossly inadequate surveillance system. However, we also find that much of the difficulty could have been attenuated if attention had been given to the problem. For example, the effects of the instrument errors and plant oscillations could have been drastically reduced by extending the test interval; i.e., a 1-gpm error with a 1-hour test interval would become a 0.25-gpm error with a 4-hour test interval.

Apart from these technical defects, there were certain "idiosyncrasies" associated with the TMI-2 leak rate test that made it even more difficult for the operators to demonstrate compliance with the 1-gpm limit. Thus, when Regulatory Guide 1.45 refers to 1 gpm as being measurable in sumps as an industry experience, it seems clear that room temperature is implied. In the TMI-2 Tech Specs, the 1-gpm limit is applied at reactor operating temperature, thereby effectively reducing the limit to 0.72 gpm.

The TMI-2 test limit did not include an "evaporative loss factor" for the RCS, in contrast to some other Babcock & Wilcox power reactors. For example, TMI-1, Rancho Seco, and Oconee have evaporative loss factors in their test limits that range from 0.51 to 0.73 gpm. The actual evaporative losses at TMI-2 were not established in our inquiry, but it seems probable that such losses may have been approximately 0.5-0.7 gpm, making it probable that test results would frequently exceed the 1-gpm limit.

The Superintendent of Technical Support (Seelinger in 1978 and Kunder in 1979) and the Unit 2 Superintendent (Logan in 1979) were aware that there were difficulties with the leak rate test, but they did not explore the situation and failed to initiate effective corrective actions. Only one substantive corrective action was finally taken on March 16, 1979, and it was technically flawed. Unidentified leakage was calculated as the difference between gross leakage and identified leakage. Beginning in February 1979, substantial leakage developed from valves on the pressurizer, and this identified leakage was estimated from the rate of water collection in the reactor coolant drain tank (RCDT). One of the errors in the test procedure was the failure to convert the volume of water collected in the RCDT at room temperature back to RCS temperature before it was subtracted from the gross leakage. The volume of a given mass of water is 1.4 times greater at RCS temperature than it is at room temperature. Thus, when the rate of drain tank collection reached 2.5 gpm around February 25, 1979, the net or unidentified leakage was in error by 1 gpm. The March 15 temporary change notice called for a manual calculation that properly corrected for this error, but did not call for correction of the similar error in not converting the volume of water added to the make-up tank to its volume at the RCS temperature. It should have been obvious that *both* volumes should be corrected to RCS temperature.

The Commission also raised the question whether the operators felt pressure to obtain surveillance results that did not exceed Tech Spec limits. The record shows that the operators felt a general sense of pressure to keep the plant on line and they were asked questions about the status of the leak rate test or told to get a "good" leak rate. However, this pressure did not translate into feelings that adverse actions would be taken against them if they failed to obtain a "good" leak rate test result.

3. Discarding Leak Rate Test Results

The Commission raised the question whether unacceptable test results were discarded. The evidence is that 50% or more of the tests were discarded. The practice of discarding results greater than 1 gpm began at TMI-1 and carried over to TMI-2. Every CRO, shift foreman, and shift supervisor who appeared before us (with one exception) testified he was either aware of the practice or personally discarded tests. Some testified that searches for leaks were carried out before a test was invalidated and discarded. Others claimed that they compared the test results to plant parameters, and apparent inconsistencies led to discarding test results greater than 1 gpm. For the most part, however, any test over 1 gpm was routinely discarded without any effort to "validate" it. Indeed, it was not possible to validate quantitatively against a 1-gpm standard by "eyeball" reference to other plant parameters.

The skepticism with which the operators viewed test results was not unreasonable, but their behavior in discarding the papers rather than documenting the apparent problems permitted those problems to go uncorrected month after month. The Supervisor of Operations, Mr. Floyd, and the Superintendent of Technical Support, Mr. Seelinger, were aware of the practice of discarding tests; we have not found any excuse for their countenancing these improper practices. There is no evidence that any members of management above Floyd and Seelinger knew that tests were being discarded.

4. Leak Rate Test Manipulations

The concluding section of our findings covers the individual responsibility of the thirty individuals who worked in the Operations Department and the Supervisor of Operations, Mr. Floyd, with respect to manipulation and falsification of tests. We do not attempt to summarize these results; the findings for each individual are self-explanatory.

RECOMMENDED DECISION

Introduction and Procedural Background

The Board adopts and sets forth, below, GPU Nuclear Corporation's Part I of its proposed findings, entitled "Introduction and Procedural Background," ¶¶ 1-28 at 1-16, except as ¶ 28 is modified by the Board.

"1. On March 24, 1980, Harold W. Hartman, Jr., a control room operator at Three Mile Island–Unit Number 2 ('TMI-2') prior to the accident, publicly alleged that reactor coolant system ('RCS') leak rate surveillance tests ('leak rate tests')[1] were at times purposely manipulated and records of unacceptable results were discarded to cover up the fact that over an extended period of time the results of the tests exceeded Technical Specification ('Tech Spec') limits for unidentified leakage. Hartman alleged that the computer program for calculating leak rates was unreliable, frequently yielding unrealistic results. This made it more difficult to get 'good' leak rates. Hartman further alleged that operators at TMI-2 sometimes manipulated leak rate test results by inputting wrong data into the computer, adding hydrogen gas to the make-up tank during leak rate tests,

[1] The leak rate tests were used to assess whether primary system leakage surpassed limits contained in the facility's technical specifications. The leak rate test is commonly known by several names or acronyms, such as: "Leak Rate," "LRT," "Reactor Coolant Inventory Balance," "RCIB," or "Mass Balance." Generally, the term "leak rate test" will be utilized in this decision except when dictated otherwise in quoting or paraphrasing testimony or documentary evidence.

adding water to the make-up tank during a leak rate test and not inputting the addition into a computer, and adding water to the make-up tank while performing water transfer operations involving other tanks. Hartman specifically alleged that shift supervision was aware of such improper conduct. *Inquiry into Three Mile Island Unit 2 Leak Rate Data Falsification*, CLI-85-18, 22 NRC 877 (1985)."

"2. Shortly after Hartman made these allegations public, the Nuclear Regulatory Commission ('NRC') Office of Inspection and Enforcement ('I&E') began an investigation. In the early stages of this NRC investigation, the United States Department of Justice ('DOJ') was advised of evidence uncovered by the NRC, and on April 28, 1980, DOJ assumed control of the investigation. I&E remained involved only to the extent of providing assistance to DOJ. Board Exh. 1-A, Stier Report, Vol. I at 2."[2]

"3. On April 16, 1980, Metropolitan Edison Company ('Met-Ed'), then the operator of TMI-2, retained the law firm of Faegre & Benson to conduct an investigation of Hartman's allegations. *Id.* Because of the criminal nature of the investigation being conducted by DOJ, Faegre & Benson could not gain access to key witnesses. *Id.*; Board Exh. 2, Faegre & Benson Report, Vol. 1 at 13. However, they did interview Hartman for two days in April 1980 and performed extensive technical analyses of leak rate testing at TMI-2. Board Exh. 2, Faegre & Benson Report, Vol. 2 at 2; Board Exh. 1-A, Stier Report, Vol. I at 2. Their report was issued on September 17, 1980. Board Exh. 2, Faegre & Benson Report."

"4. While the criminal investigation of leak rate testing was pending, the NRC received a status report from its Region I personnel who had conducted the original investigation. That report was presented on June 3, 1983, and summarized the findings of I&E up to the point where the investigation was turned over to DOJ. The NRC subsequently instructed its Office of Investigations ('OI') to investigate TMI-2 leak rate test practices. On June 27, 1983, OI began an investigation that was also limited because of the pending DOJ investigation. Like Faegre & Benson, OI was not able to interview critical witnesses. Board Exh. 1-A, Stier Report, Vol. I at 2-3."

"5. On November 11, 1983, the DOJ investigation resulted in an eleven-count indictment returned in the U.S. District Court, Middle District of Pennsylvania (Criminal No. 83-00188), charging Met-Ed with criminal offenses arising out of leak rate practices at TMI-2. On February 28 and 29, 1984, Met-Ed entered into a plea agreement with the Government ending the criminal prosecution. Met-Ed pleaded guilty to one count of the indictment and *nolo contendere* to six other counts of the indictment. *Id.* at 3; *see also id.*, Vol. V(A), Tab 3

[2] Appendix A provides a list of exhibits offered or received in this proceeding. *See* Tr. 5221; Board Order of Nov. 19, 1985 (unpublished).

(Statement of Metropolitan Edison Company with respect to the Plea Agreement)."

"6. When the Government and Met-Ed entered the plea agreement with the Court, both the United States Attorney and Met-Ed entered statements into the record. *Id.*, Vol. I at 3. In urging the Court to accept the plea agreement, U.S. Attorney David Queen, *inter alia*, stated that the evidence developed in the Grand Jury inquiry did not indicate that any of the directors and officers of GPU Nuclear Corporation ('GPUN') from its inception in 1982 as successor operator of TMI-2 to Met-Ed to the date of the indictment, or any of the directors of Met-Ed 'participated in, directed, condoned, or was aware of the acts or admissions that are the subject of the indictment.' CLI-85-18, 22 NRC at 879."

"7. After the Court accepted the plea agreement, Met-Ed and the NRC moved to obtain the release of the evidence presented to the Federal Grand Jury. On April 10, 1984, and June 25, 1984, the Court denied those motions, and the evidence on which the Grand Jury relied has remained sealed. Board Exh. 1-A, Stier Report, Vol. I at 3."

"8. In January of 1984, GPUN retained Edwin Stier, a former Director, New Jersey Division of Criminal Justice, to conduct an independent investigation into leak rate testing at TMI. *Id.* at 4. Stier's report examined the attitudes and behavior of TMI-2 personnel toward leak rate testing during the full year of TMI-2 operation, the 222 leak rate tests for which records presently exist, and statements made by individuals possibly involved in leak rate testing. *See id.* at 11-16. The Stier Report, entitled 'TMI-2 Reactor Coolant Inventory Balance Testing,' was issued on September 5, 1985. Board Exh. 1-A, Stier Report."

"9. The Commission asked OI to examine whether Michael Ross, Manager of Operations at TMI-1, had participated in, directed, or condoned leak rate falsifications at TMI-2. OI interviewed Ross and others under oath regarding Ross's involvement at Unit 2, reviewed pertinent records, and concluded that Ross's role at TMI-2 was minimal. In its report of April 16, 1984, OI found that during the period falsifications took place, Ross was present at TMI-2 only the minimum time necessary to maintain his TMI-2 license and was not involved in the falsifications. *See* CLI-85-18, 22 NRC at 879."

"10. In July 1984, the NRC Staff issued NUREG-0680, Supp. No. 5, dealing with the restart of TMI-1. Among the subjects discussed in that report was management involvement in leak rate testing at TMI-2. The NRC Staff relied on two sources of information: (1) the statement issued by the U.S. Attorney and (2) all of the evidence that had been gathered by the NRC up to that time, including evidence developed by OI in its then pending investigation. Board Exh. 1-A, Stier Report, Vol. I at 4."

"11. OI issued a report on August 15, 1984, summarizing its findings as of that date. In his cover memorandum, OI Director Ben Hayes described his report as follows: '[I]t does not set forth the facts and evidence obtained as a

result of a completed investigation but sets forth the information accumulated by the NRC since May 1979.' *Id.* (*citing* Memorandum, Ben B. Hayes to NRC Commissioners, *Three Mile Island Nuclear Generating Station Unit 2/Alleged Falsification of Leak Rate Surveillance Test Data* (1-83-010), August 15, 1984, at 1)."

"12. Both the August 1984 OI Report and the July 1984 NUREG-0680, Supp. No. 5, indicated that the NRC Office of Nuclear Reactor Regulation ('NRR') and OI would jointly continue an investigation of leak rate test practices by some individuals who had been licensed at TMI-2 or had held dual licenses for TMI-1 and TMI-2. NRR worked with OI on investigations of ten licensed operators[3] to determine their involvement, if any, in improper activities associated with leak rate testing at TMI-2 before the accident. NRR performed a technical evaluation of 161 leak rate tests performed at TMI-2 during the period September 30, 1978, to March 28, 1979.[4] In addition, joint NRR/OI interviews were conducted with thirteen former control room operators and two shift foremen. NRR prepared a report on each of the ten individuals under investigation, identifying the individual's role in leak rate testing irregularities and evaluating the individual's current performance.[5] Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1. On April 1, 1986, the joint NRR/OI Report — 'Results of NRR's Investigation and Evaluation of Ten Licensed Operators Involved in TMI-2 Preaccident Leak Rate Testing Irregularities' — was issued. Board Exh. 5-A, NRR Report."

"13. In an Order issued in the TMI-1 Restart Proceeding on February 25, 1985, the Commission stated that it would institute a separate hearing apart from the Restart Proceeding to develop the facts surrounding the RCS leak rate data falsifications at TMI-2 prior to the March 28, 1979 accident in sufficient detail to determine the ultimate status of those possibly involved. The Commission's Order specifically excluded those individuals whom the U.S. Attorney at the sentencing hearing of Met-Ed had stated were not involved and those individuals

---

[3] The ten operators were Raymond R. Booher, Joseph R. Congdon, Martin V. Cooper, Craig C. Faust, Edward R. Frederick, Carl L. Guthrie, Theodore F. Illjes, Hugh A. McGovern, Adam W. Miller, and Dennis I. Olson. NRC chose to investigate these individuals because they continued, at the time, to be licensed NRC operators. Although Booher and Olson were no longer licensed by the time NRC completed the investigation and issued the NRR/OI Report, the Report included findings, conclusions, and recommendations concerning all ten. *See* Board Exh. 5-A, NRR Report.

[4] Stier reviewed all 222 leak rate tests at TMI-2 for which records presently exist. Stier used different numbering of tests from NRR. Generally, the Board will refer to the number assigned to the test by NRR (e.g., NRR Test No. 1). Stier test numbers will be used for those tests that NRR did not review or when Stier's evaluation of the test is being discussed (e.g., Stier Test No. 1). NRR tests are found in Board Exh. 5-A, NRR Report, Vols. 2-4. Stier tests are found in Board Exh. 1-A, Stier Report, Vols. IV(C)-(K). Appendix C provides a list correlating the NRR and Stier test numbers.

[5] The Board excluded as evidence in this proceeding portions of the NRR/OI Report regarding current performance. The individuals' current performance and recommendations for actions that may be taken with respect to anyone involved in leak rate falsifications were beyond the scope of our fact-finding process. *See* CLI-85-18, 22 NRC at 883-84.

whom OI already had reviewed and found not to be implicated in its TMI-1 leak rate investigation (i.e., Michael Ross). *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), CLI-85-2, 21 NRC 282, 298-99 (1985)."

"14. In December 1985 the Commission issued an Order and Notice of Hearing for this proceeding. CLI-85-18, 22 NRC 877. It directed this Board to address the following issues:

> (a) How were the Technical Specification 3.4.6.2 requirements for reactor coolant system unidentified leakage interpreted and implemented by control room operators (CROs), shift foremen, shift supervisors and onsite and offsite management? Following the discovery by an NRC inspector in October 1978 that Technical Specification 3.4.6.2 requirements were not properly interpreted or implemented, what corrective action was taken by management personnel? Was the corrective action taken sufficient to ensure compliance with the Technical Specification 3.4.6.2 by the personnel performing and reviewing the leak rate surveillance tests?
>
> (b) What difficulties, if any, were operators experiencing when conducting leak rate surveillance tests required by Technical Specification 4.4.6.2.d? Who knew about these difficulties? What corrective actions were taken? Did operators feel pressure to obtain leak rate surveillance test results which did not exceed technical specification limits? If so, what type of pressure was perceived or exerted and who was responsible?
>
> (c) Were unacceptable leak rate surveillance test results required by Technical Specification 4.4.6.2.d discarded? If so, who knew of, condoned or directed this practice? Were unacceptable leak rate surveillance test results discarded in an attempt to hide them from the NRC?
>
> (d) Did operators manipulate data or take other actions during leak rate surveillance testing in an attempt to improperly influence test results? Who performed, condoned, directed or was knowledgeable of data manipulation or other improper actions during leak rate surveillance testing? This would include, but is not limited to the following:
>
> (i) inputting the wrong data into the plant computer;
>
> (ii) adding hydrogen gas to the make-up tank during the test in an attempt to influence make-up tank level indication;
>
> (iii) adding water to the make-up tank during the test and either not including the addition in the computer calculation or underrecording the addition in the computer;
>
> (iv) taking advantage of differences or inaccuracies in plant instrumentation (e.g., make-up tank level indicators) in an attempt to influence parameters critical to the leak rate surveillance test calculation;
>
> (v) taking or failing to take any action in violation of technical specification requirements?

CLI-85-18, 22 NRC at 880-81."

"15. The Commission's Order and Notice of Hearing of December 18, 1985, established the procedures for the hearing. Pursuant to the Order and Notice of Hearing, the hearing was not conducted under 10 C.F.R. Part 2, Subpart G, except as noted in the Commission's Order. The Presiding Board

('Board') did have the powers specified in 10 C.F.R. §§ 2.718(a), (e), (f), (h), (i), (j), and (k). The hearing was conducted using a legislative hearing format. *Id.* at 882."

"16. The Commission directed the Chief Administrative Judge, Atomic Safety and Licensing Board Panel, to appoint a three-person Presiding Board to rule on petitions to intervene, to conduct any prehearing procedures and the hearing, and to render a recommended decision setting forth the facts surrounding the falsifications and identifying those individuals who participated in, or knew of and condoned, or by their dereliction or culpable neglect allowed, the leak rate falsifications at TMI-2. *Id.* at 881."

"17. On December 20, 1985, Administrative Judges James L. Kelley, Glenn O. Bright, and Jerry R. Kline were appointed to serve as the Board. Judge Kelley was appointed the Chairman. On August 27, 1986, Administrative Judge James H. Carpenter replaced Judge Kline, who was unable to continue because of a schedule conflict. Appointment of Presiding Board to Conduct a Legislative Hearing, 50 Fed. Reg. 53,489 (1985)."

"18. Any person who had an interest that the hearing may have affected was allowed to petition to intervene. If the Board determined that the petitioner had an interest that could be affected and the petitioner was likely to contribute to the development of an adequate record, the petition was to be granted. CLI-85-18, 22 NRC at 881-82."

"19. On December 31, 1985, as a supplemental notice to potentially interested individuals, the Board sent a letter by certified mail to about 120 present and former employees of Met-Ed who were associated with TMI-2 between February 2, 1978, and March 28, 1979. The group represented those employees who might have been involved in or had knowledge of the RCS leak rate data that was the subject of this inquiry.[6] Memorandum and Order, February 14, 1986, at 1. We enclosed a copy of the Commission's Order and Notice of Hearing of December 18, 1985, and invited those interested to file a petition to intervene by January 30, 1986."

"20. Following the Commission's Order and Notice of Hearing and this Board's supplemental notice, the Board received petitions to intervene from the following: (1) twenty-five present and former employees of Met-Ed ('Numerous Employees'),[7] (2) John M. Kidwell, a former employee of Met-Ed, (3) John

---

[6] One of the objectives of this proceeding was to exculpate individuals whose names have arisen in connection with falsified leak rate testing at TMI-2. Memorandum and Order, July 16, 1986 (unpublished), at 15. After conducting a comprehensive evidentiary hearing, the Board has determined that the record warrants the exoneration of any addressee of our letter whom we do not discuss in this opinion. *See* Appendix D. Of course, as to those whom we do discuss, our decision governs.

[7] The following employees sought intervention: Charles D. Adams, Raymond R. Booher, John A. Brummer, Kenneth P. Bryan, Joseph J. Chwastyk, Mark S. Coleman, William T. Conaway, Joseph R. Congdon, Craig C. Faust, James R. Floyd, Edward R. Frederick, Leonard P. Germer, Carl L. Guthrie, Gregory R. Hitz, Sr., Kenneth R. Hoyt, *(Continued)*

G. Herbein, a former officer and employee of Met-Ed, (4) Gary P. Miller, an employee of Met-Ed, (5) GPUN, (6) Marvin I. Lewis, and (7) Marjorie M. and Norman O. Aamodt. Each of the first five petitions alleged facts demonstrating an interest of the petitioner that this proceeding could have affected, and a likely ability to contribute to the record — the standards for intervention established by the Commission. For those reasons, the Board granted the first five petitions listed above.[8] *Id.* at 4."

"21. The Numerous Employees filed oppositions to the petitions to intervene from the Aamodts and from Lewis. We initially had questioned whether the Aamodt and Lewis petitions met the standards for intervention in this proceeding and had called for further information in our Memorandum and Order of February 14, 1986. We subsequently received written responses to our request from the Aamodts and Lewis. In addition, Mrs. Aamodt attended the prehearing conference on March 7, 1986, and argued her entitlement to intervention. We subsequently allowed the Aamodt intervention but denied Lewis' request. Memorandum and Order, March 26, 1986, at 1."

"22. The NRC Staff did not participate in this proceeding as a party. *See* CLI-85-13, 22 NRC at 882. The Staff made available to the parties and to the Board relevant documentary material within its possession. In addition, the Staff provided testimony and assistance to the Board to help ensure that the hearing record was fully developed."

"23. Under the Commission's Order and Notice of Hearing, no discovery was conducted. The Commission intended the hearing to serve as the fact-finding mechanism. *Id.*"

"24. Only the Board was allowed to call witnesses or to question them. The Board also had the power to issue subpoenas if necessary to compel the attendance of witnesses. *Id.* Prior to the commencement of the hearing, we made available to the parties a list of the individuals that we intended to call as witnesses. Memorandum and Order, March 26, 1986, Attachment A. We invited the parties to submit recommendations regarding additional witnesses. *See, e.g.*, Memorandum and Order, March 26, 1986, at 10; Memorandum and Order, May 22, 1986, at 3; Tr. 3604-05 (Kelley, J.)."

"25. Because the Board had exclusive authority to call witnesses, we considered all witnesses to be 'Board witnesses.' We even extended the designation of 'Board witnesses' to experts (Rockwell and Stier) who had prepared reports as paid consultants to Met-Ed and GPUN and in the conventional licensing case

---

Theodore F. Illjes, George A. Kunder, Walter J. Marshall, Hugh A. McGovern, Brian A. Mehler, Charles F. Mell, Adam W. Miller, Frederick J. Scheimann, Bernard G. Smith, and William H. Zewe.

[8] On May 7, 1986, Bryan, one of the original Numerous Employees, and Kidwell withdrew as parties to this proceeding. Memorandum and Order, May 22, 1986 (unpublished), at 13. Both men, however, submitted prefiled testimony and testified in this proceeding. *See* Tr. 4539-4610 (Bryan); Tr. 3285-3399 (Kidwell).

would have been expected to appear as witnesses for GPUN. Memorandum and Order, April 3, 1986, at 3. Although these experts were paid by GPUN, they appeared as Board witnesses. Tr. 216-18 (Kelley, J.). In addition, the Board proposed and subsequently adopted a 'no access' rule to promote on-the-record discussion of the issues and equal party access to the facts and to minimize burdens on technical witnesses. *See* Memorandum and Order, April 13, 1986, at 3; Memorandum and Order, May 22, 1986, at 13. The rule prohibited counsel for any of the parties from communicating with these Board witnesses prior to their appearance at the hearing. *See* Memorandum and Order, May 22, 1986. We subsequently modified this rule to allow the parties to contact these Board witnesses to discuss their conclusions and opinions concerning individual culpability for leak rate falsification at Unit 2. Memorandum and Order, August 7, 1986, at 3."

"26. Before each witness testified, we invited the parties to submit questions in writing to the Board that they believed we should pose to the witness. The Board had the discretion to use the questions suggested by the parties. CLI-85-18, 22 NRC at 882. All witnesses testified under oath."

"27. The hearing commenced on September 8, 1986, in Bethesda, Maryland. It consumed 33 hearing days and resulted in over 5000 transcript pages. Forty-seven witnesses appeared and testified, most of whom filed prefiled testimony.[9] Twenty-five exhibits were entered into the record. *See* note 2, *supra*."

28. The following findings of fact address the specific issues the Commission directed this Board to consider. *See* ¶ 14, *supra*. The findings are divided into six major parts. The first part of the findings covers the organization of TMI-2. The second part gives an overview of the TMI-2 Tech Specs and procedures concerning leak rate testing. These first two parts provide a background and overview necessary to an understanding of these findings and conclusions. The third part discusses the conduct of leak rate testing at TMI-2 in 1978 and 1979, including training on the subject, and events and actions relating to an NRC inspection of TMI-2 in October 1978. The fourth part addresses the difficulties operators were experiencing when conducting leak rate tests, who knew of those difficulties, the actions taken to correct those difficulties, and whether operators felt pressure to obtain leak rate results that did not exceed Tech Spec limits. The fifth part covers the documentation and retention of leak rate tests at TMI-2. The third through fifth parts are largely concerned with patterns of conduct, as distinguished from individual responsibilities (although individual

---

[9] Appendix B provides a list of witnesses and transcript citations to their testimony, as well as a list of documentary material bound into the transcripts.

Because Wright did not adopt his prefiled testimony, we had his prefiled testimony bound into the record, not as substantive evidence, but as a brief accurate summary of a longer statement placed in the record (Board Exh. 6, OI Report, Exh. 18, Wright Interview) and regarded as substantive evidence. Tr. 2662-63 (Kelley, J.).

John J. Blessing was subpoenaed by the Board. However, he did not comply with the subpoena and did not testify. *See* Tr. 4332, 4542 (Kelley, J.).

responsibility issues concerning certain senior supervisory and management personnel are also discussed). For example, in discussing widespread misinterpretation of the technical specifications, we cite the testimony of several operators to show the prevalence of the problem, but not to provide a complete listing of the operators involved. The sixth part addresses individual responsibility issues concerning each CRO, Shift Foreman, Shift Supervisor, and the Supervisor of Operations in Unit 2, Mr. Floyd. This part is organized by shifts and begins with a summary description of improper conduct common to that shift — e.g., discarding tests. We then address whether the operator manipulated data to influence test results improperly or took other improper actions. We also consider whether the shift foreman or supervisor participated in, condoned, directed, knew of, or by culpable neglect allowed manipulation of leak rate tests or other improper actions.

29. All parties filed proposed findings of fact and reply findings. The Board has considered all the proposed findings. Except in a few instances, we have not separately discussed findings or lines of findings with which we disagree, or which we find to be irrelevant or unnecessarily detailed. We believe, however, that our findings and the reasons for them are fully stated, and that we have addressed all of the significant points.

30. The Board adopts the following proposed reply findings of GPUN: "Both the Aamodts and Numerous Employees requested at the time of the submission of their findings that the Board take into account as evidence certain documentary materials which never had been introduced (or attempted to have been introduced) in what is a very lengthy hearing record. We were asked at the findings stage in two instances by Numerous Employees and two instances by the Aamodts to take 'official notice' of documents, and in the case of two other documents by the Aamodts at this stage to consider them for the Board's convenience. No explanation was provided for the timing of these requests. We reject this notion, absent good cause, that parties may wait until months of hearings are completed and thousands of pages of documentary evidence are compiled, and at the time of filing findings ask the Board to take additional materials into account through official notice or some other device. These documents are not necessary to our decision and we decline to take them into evidence for the reasons outlined above and discussed in more detail hereafter."

31. "In their proposed findings of fact dated February 2, 1987, the Aamodts requested the Board to take official notice of the following documents provided to the Board as attachments: (1) 'Preliminary Notification of Event or Unusual Occurrence — PNO-79-67,' dated March 28, 1979 (Attachment 1), and (2) reproduced pages of TMI-2 Control Room Logs 'covering the six weeks preceding the accident (February 15 through 4 a.m. March 28, 1979)' (Attach-

ment 2). Aamodt Proposed Findings of Fact ('Aamodt Findings') at 9, 14.[10] The Aamodts also attached to their findings, 'for the Board's convenience,' 'Table 1, which tallies daily water additions and Figure 1 which plots this data from the control room logs provided' (Attachment 3). Aamodt Findings at 14."

32. "None of these documents attached by the Aamodts to their findings after the close of the record of this proceeding will be considered by the Board. If the Aamodts wished to have the documents entered into the record, where they would have been subject to objections by the parties, they should have raised the documents as exhibits before the close of the record. They did not do so."

33. "The request of the Aamodts for the Board to take official notice of Attachments 1 and 2 is baseless. The rules and regulations on official notice carve out a narrow area of applicability and clearly indicate that official notice of the Aamodt attachments would not be appropriate. *See* 10 C.F.R. § 2.743(i); Fed. R. Evid. 201; *see also Union Electric Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 349-50 (1983); *Armed Forces Radiobiology Research Institute* (Cobalt-60 Storage Facility), ALAB-682, 16 NRC 150, 154 n.3 (1982); *Public Service Co. of Oklahoma* (Black Fox Station, Units 1 and 2), CLI-80-31, 12 NRC 264, 277 (1980). Like Attachments 1 and 2, Attachment 3 should have been proposed as an exhibit before the close of the record and not provided along with findings under the guise of 'the Board's convenience.' "

34. "In a similar fashion, the Numerous Employees sought to introduce into evidence after the close of the record two documents attached as appendices to Volume One of their Proposed Findings of Fact and Conclusions of Law filed on January 23, 1987: (1) the Indictment filed on November 7, 1983, in *United States v. Metropolitan Edison Co.* (Criminal No. 83-00188) (Appendix C) and (2) eight pages excerpted from 'Transcript of Proceedings/Change of Plea and Sentencing,' dated February 28-29, 1984, again in *United States v. Metropolitan Edison Co.* (Appendix D). In a letter accompanying its findings submitted to the Board on January 23, 1987, Counsel for the Numerous Employees simply stated that the Board should take official notice of Appendices C and D 'because the Commission did so in its order establishing this proceeding.' "

35. "The Commission, however, did not take official notice of Appendices C and D in its order establishing this proceeding; the Commission only referred to the indictment and plea agreement in its section on 'Background.' *See Inquiry into Three Mile Island Unit 2 Leak Rate Data Falsification*, 'Order and Notice of Hearing,' CLI-85-18, 22 NRC 877, 878-79 (1985). The regulations, rules, and caselaw on official notice cited above in discussing the Aamodts' requests apply with similar force and effect to the request of the Numerous Employees. Mere

---

[10] By letter to the Board dated February 3, 1987, forwarding "Errata," the Aamodts apparently backed away from "all, or nearly all" of one attachment to their findings while adding still more attachments. We decline to consider any of the "attachments" as evidence.

reference by the Commission to documents in a background section of an order and notice of hearing does not provide sufficient basis for a request that the Board take official notice of those documents as evidence in this proceeding. Like the Aamodts, if the Numerous Employees were interested in introducing Appendices C and D into evidence, they should have followed the proper course of proposing that the Board enter the documents as exhibits before the close of the record."

36. Several of the parties and the NRC Staff proposed numerous corrections to the transcript. No objections were filed to these proposals, except that the Numerous Employees objected to a few such proposals from two parties and the Staff. All of the proposed corrections are adopted, except that the objections of the Employees are sustained and the alternative proposals they advance are adopted.

Standards of Proof and Other Issues Suggested by the Numerous Employees

1. The Numerous Employees submitted a memorandum of law in support of their proposed findings of fact. The Board then invited comments on certain of the issues they had raised; comments were received from the NRC Staff, GPUN, and the Aamodts. The Employees filed comments on the Board's invitation. These matters are discussed in this part and also arise, implicitly or explicitly, in certain of the findings.

STANDARDS OF PROOF

2. The Commission could have specified a standard or standards of proof for this unique, discretionary proceeding, but it did not do so. Therefore, those questions devolve upon the Board. As the Numerous Employees point out, the theoretical choice is between the three generally recognized standards — "preponderance of the evidence," "clear and convincing evidence," or "guilt beyond a reasonable doubt." *See Addington v. Texas*, 441 U.S. 410, 423-24 (1979). Since the criminal standard of guilt beyond reasonable doubt is clearly inappropriate in a civil inquiry where the Board lacks any sanctioning power, the real choice is between the "preponderance" and "clear and convincing" standards.[11]

---

[11] Mr. Christopher, chief investigator and author of the OI Report, Exhibit 6, testified that he had applied a "beyond a reasonable doubt" standard in reaching his conclusions about individuals. Tr. 2385-86. While we do not apply that standard, we note that Mr. Christopher's application of it will have no effect on our conclusions. Our interest in the OI and other investigative reports in the record is in the evidence they present on the issues before us and

(Continued)

3. There appear to be no controlling precedents and, as we view the relevant factors, the choice is fairly arguable. Two factors weigh in favor of the more stringent clear-and-convincing standard.

4. First, a finding in this proceeding that, for example, a particular individual has falsified leak rate tests at least implies dishonesty or fraud and could result in severe reputational injury. Arguably, more than a bare preponderance of evidence should underlie such a finding. *See Addington v. Texas, supra*, at 424. We note, however, that findings of fraudulent conduct can sometimes be based on the preponderance standard. *See Steadman v. SEC*, 450 U.S. 91 (1981).

5. Second, this Board's inquiry came very late in the day. The events in question occurred in 1978-1979 and the witnesses were finally asked to testify about those events before this Board in the fall of 1986, 7 to 8 years later. While certain of the issues could be adequately explored through documentary evidence, proof of many important and disputed points depended upon faded or lost recollections about persons present, what was said and done, and by whom. It was obvious to the Board that many witnesses honestly could not remember details about their participation in leak rate testing at TMI-2. Apparently at the request of the Justice Department, which was then seeking criminal sanctions for TMI-2 leak rate activities, the NRC did not interview many persons involved in the criminal investigation between 1980 and 1984. *See* Stier Report, Vol. I at 2-4; Tr. 172. As a result, this inquiry, which otherwise probably could have been conducted in 1982, did not occur until 1986. We did not probe the reasons for the prolonged delay in the NRC investigation because, from the employees' standpoint, those reasons were irrelevant. Whatever the reasons, the delay before serious charges against them could be fully aired was greatly protracted. In a case like this, where an issue depends on strained and faded memories, it would be unfair to find a person guilty of dishonest or fraudulent conduct on a mere preponderance of the evidence, which can mean only that the record underlying a finding makes it slightly more likely than not.

6. Several other factors, however, suggest that the less stringent preponderance standard may be appropriate, at least on some types of issues. Generally speaking, the stringency of the standard of proof depends upon the sanction that may be imposed in the proceeding. Thus, the highest standard applies in a criminal case, particularly felony cases (records receive their closest scrutiny in death penalty cases). But if it is only a matter of money — a damage award or a traffic ticket — a preponderance suffices. The Board in this proceeding does not have the power to impose *any* sanction, not even a traffic ticket. Indeed, the

---

the investigators' analyses of that evidence. We are attaching little or no weight to the ultimate conclusions the investigators may have drawn about particular individuals. *See* Order of May 22, 1986, at 6.

Commission has explicitly provided that any facts we find "will not be binding in [any] subsequent enforcement or licensing proceeding." Commission Order of December 18, 1985, CLI-85-18, 22 NRC at 884. This total lack of sanctioning power and *de novo* treatment of our factual determinations suggests the appropriateness of a preponderance standard.

7. Moreover, while a finding of falsification of leak rates would carry with it severe reputational injury, many of the issues we are addressing do not have comparable potential for reputational impact. For example, we see no realistic expectation of severe reputational injury attaching to a finding that a person ran a test when the reactor was not in "steady state."

8. Furthermore, one can argue that public health and safety considerations support application of the preponderance standard in this context. In order to protect the public safety — that argument would run — inquiries should be structured to maximize detection of violations of safety standards, even at the risk of possible unfairness to some individual operators.

9. Balancing the foregoing factors, we believe that we probably could apply the preponderance standard to *all* issues in this proceeding. As a matter of discretion, however, we are applying the clear-and-convincing-evidence standard to findings of manipulation and falsification because those findings are likely to have strong reputational impacts and because they tended to involve the most serious memory difficulties in this proceeding. We resolve all other issues on the basis of the preponderance-of-the-evidence test.

10. We conclude our consideration of standards-of-proof questions with these observations:

> Although we use the traditional verbal formula "clear and convincing" evidence, we note that we are not bound by that exact form of words (*see Consumers Power Co.* (Midland Plant, Units 1 and 2), CLI-74-5, 7 AEC 19, 32 n.27 (1974)) and that, in any event, that standard does not imply a complete lack of conflicting evidence. Otherwise, a mere denial from a person against whom there is strong evidence of falsification would defeat an adverse finding against him. By "clear and convincing evidence" we mean that we are reasonably, if not entirely, sure that an adverse finding against a person on a particular issue is warranted, based on the record as a whole.
>
> As to many of our findings, no question arises as to standard of proof because the finding is based directly on voluntary statements of the person in question and/or because the adverse finding is warranted under any standard of proof — e.g., that virtually all the CROs discarded leak rate tests.
>
> Finally, owing to the way in which this proceeding was structured, no party had the "burden of proof" in the traditional sense of that phrase. In

the final analysis, the burden was on the Board to ensure that each of its findings is supported by evidence that meets the applicable standard.

OTHER ISSUES

11. The Numerous Employees took the position in their Memorandum of Law (at 14-20) that Met-Ed Administrative Procedures are not legal requirements imposed on the employees. We invited the parties to comment on that legal position and on whether we should make findings on violations of administrative procedures, even if such procedures were not legally binding on the employees.

12. We agree with GPUN and the Staff that we need not reach the legal question of whether a violation of a Met-Ed administrative procedure can form the basis of NRC enforcement action. This is a factual inquiry. It is clear from the record that various Met-Ed administrative procedures were violated and that such violations contributed to the problems with leak rate testing at TMI-2. As such violations are relevant to the factual issues put to us, we are making appropriate findings. We leave to the Staff and the Commission whether such violations can form the basis of NRC enforcement action.[12]

13. We asked for comment on the Employees' distinction between procedures being "established, implemented, and maintained" versus their being "adhered to." We agree with the Staff and GPUN that this distinction is unsound.

14. We asked whether the TMI-2 Tech Specs required satisfactory leak rate test results measuring unidentified leakage as a condition of continued operation. That is the import of the literal language of the Tech Specs. *See* § II.A, ¶ 5, below. As explained by the Staff and GPUN (taking somewhat different approaches), the answer to that question is affirmative. In that connection, we asked whether any of the other three surveillance methods could have been employed to demonstrate continued compliance with the 1-gpm Limiting Condition for Operation ("LCO"). The Staff says no, emphasizing that the leak rate test was the only test that could measure unidentified leakage as defined in the Tech Specs, a definition that included intersystem leakage. We agree that that point is technically valid. We also believe, however, that inclusion of intersystem

---

[12] The Board notes that on February 27, 1987, Counsel for the Numerous Employees filed the following clarification of their position:

> The licensed operators who are parties to the Memorandum of Law intend to adhere to all facility operating procedures, including administrative procedures, and the legal position taken by Numerous Employees at pages 14-18 of the Memorandum of Law does not conflict with the individual written and oral statements concerning adherence to procedures made by those licensed operators to the NRC during its investigation of leak rate testing at TMI-2.
>
> This clarification is being filed with the Presiding Board so as to avoid the necessity (in the Staff's view) for enforcement action while the issue herein is pending before the Board.

The Aamodts' motions of March 11, 1987, based on the Employees' filing of February 27, 1987, to reopen and expand this proceeding are patently without merit and are denied.

leakage in the definition made little practical difference because, as implemented at TMI-2, the operators were told to subtract steam generator leakage from the unidentified leak rate computation. Such leakage is the principal component of intersystem leakage. In any event, we agree with GPUN that, in fact, no other method was used to demonstrate compliance with the 1-gpm LCO.

15. GPUN suggests that the sump method could have been used to measure unidentified leakage. We agree that that method could have provided a measurement of unidentified leakage into containment but would not have met the Tech Specs' broader definition of unidentified leakage. In any case, as GPUN points out, during the time period in question, no effort was made to demonstrate compliance with the 1-gpm LCO with sump data.

16. Related to the preceding point, we asked whether it was necessary to enter the Action Statement "when a leak rate test showed unidentified leakage in excess of 1 gpm and there was no clear basis for invalidating the test." The Numerous Employees say no, and we disagree. The Staff and GPUN endorse our view that that is precisely the situation in which the Action Statement must be entered. The leak rate test was the only method the Employees had and used to demonstrate compliance with the 1-gpm LCO.

17. Finally, we sought comment on a contention of the Employees that they had met all relevant NRC requirements regarding retention of leak rate tests. This issue is discussed at length in Part V. Suffice it to say here that we agree completely with the NRC Staff's comments on this issue, and that we find the Employees' arguments devoid of merit.

Findings of Fact

The Board adopts in substantial part and sets forth below, GPU Nuclear Corporation's Part II.A subtitled "What Was the Organizational Structure of TMI-2 During 1972 and 1978?", ¶¶ 39-73 at 16-35. Board changes or additions are indicated in brackets.

I. WHAT WAS THE ORGANIZATIONAL STRUCTURE OF TMI-2 DURING 1978 AND 1979?

1. "The Operations Department at TMI-2 was responsible for the administration of the leak rate test. The Supervisor of Operations headed the Department. The chain of command below this position consisted of the shift supervisors, shift foremen, control room operators ('CROs'), and auxiliary operators. The Supervisor of Operations, together with the Unit 2 Superintendent of Technical Support, reported to the Unit 2 Superintendent. The Unit 2 Superintendent reported to the Station Superintendent, who was the highest member of

management at the facility. The Station Superintendent reported to the Manager of Generation, who in turn reported to the Vice President of Generation. After the Station Superintendent became Station Manager in March 1979, the position reported directly to the vice presidential level. The offices of both the Vice President and the Manager of Generation were located in Reading, Pennsylvania, about 50 miles from the facility. Board Exh. 1-A, Stier Report, Vol. I at 47, 131-32; *id.*, Vol. VI(F), Herbein 2/8/85 Interview at 9; Herbein, ff. Tr. 5268 at 6-7."

2. "In addition to the chain of command, several bodies existed to [provide] independent review of plant activities and to provide management with a source of information concerning operation of the plant. These groups included the Plant Operations Review Committee ('PORC'), the Generation Review Committee ('GRC'), the Quality Assurance Department ('QA'), and the General Office Review Board ('GORB'). Board Exh. 1-A, Stier Report, Vol. I at 132."

A. Management[13]

3. "John G. Herbein was the Vice President of Generation for Met-Ed, stationed in Reading, Pennsylvania. He was responsible for the overall operation, maintenance, administration, quality assurance, and related technical engineering support activities at the nuclear, fossil, and hydro generating stations owned and operated by Met-Ed. Herbein, ff. Tr. 5268 at 3-4."[29]

4. "The Manager of Generation Operations (Lawyer) reported to Herbein. In March 1979, the TMI Station Manager (G. Miller) began reporting directly to Herbein rather than to the Manager of Generation Operations. *Id.* at 7."

5. "Herbein relied on the chain of command and the formal review committees to bring issues requiring his input to his attention. On a day-to-day basis, he received information primarily from the managers who reported to him. About every 4-6 weeks, he visited TMI to meet with station management. During those visits, he periodically would speak with employees to indicate that upper management was interested in and supportive of them and that the Reading corporate organization was concerned about activities at TMI. *Id.* at 5-7."

6. "Lawrence L. Lawyer was the Manager of Generation Operations, stationed in Reading, Pennsylvania. He was responsible for the maintenance and operation of Met-Ed's nuclear, fossil, and hydro generation stations. Lawyer reported to the Vice President of Generation (Herbein). The Station Superintendents of the generating stations, including the TMI Station Superintendent

---

[29] Board note: This section essentially provides an overview of management structure. The Board's conclusions about the responsibilities of particular individuals in management positions are found at pp. 735-42, below.

(G. Miller) until March 1979, reported to Lawyer. In March 1979, when the TMI Station Superintendent's title changed to Station Manager, the Station Manager began reporting directly to the Vice President of Generation rather than to Lawyer. Board Exh. 1-A, Stier Report, Vol. VI(G), Lawyer 11/10/83 Interview at 5-7, 9; G. Miller, ff. Tr. 5039 at 4-5."

7. "Generally, Lawyer received daily station status reports during morning conference calls to each station superintendent. The TMI Unit Superintendents participated in the call with the TMI Station Superintendent. While Lawyer did receive daily copies of the Daily Plant Status Reports, he primarily depended on the daily morning conference calls and other phone calls from the plant to identify problems that needed his attention.[14] In addition to monthly meetings with his station superintendents, which occasionally took place at TMI, Lawyer usually traveled to TMI once a week to meet with the TMI Station Superintendent. Board Exh. 1-A, Stier Report, Vol. VI(G), Lawyer 11/10/83 Interview at 7-10, 19-22, 62-63."

8. "Gary P. Miller held the title of Station Superintendent at TMI until March 1979 when the title of the position changed to Station Manager. This position, the highest level of management stationed at TMI, was responsible for the supervision of TMI-1 and TMI-2 and was responsible for compliance with the operating licenses, Tech Specs, and all applicable regulations. While Station Superintendent, Miller reported to the Manager of Generation Operations (Lawyer). When the position title changed to Station Manager, Miller began reporting directly to the Vice President of Generation (Herbein). Persons in three principal operating positions reported to the Station Superintendent/Station Manager. They were the Unit 1 Superintendent, the Unit 2 Superintendent, and the Site Maintenance Superintendent, who was responsible for maintenance at both units. G. Miller, ff. Tr. 5039 at 2-5; Herbein, ff. Tr. 5268 at 7; Board Exh. 2, Faegre & Benson Report, Vol. 3B, Exhibit 70 at 2."

9. "Insofar as operation of the units was concerned, Miller relied principally on the Unit 1 and 2 Superintendents. Typically, he spent most of the time from 9 a.m. to 5 p.m., Monday through Friday in meetings. He did not regularly attend meetings involving plant operations. Miller estimated that he spent from 20% to 40% of his time away from TMI. While his goal was to visit the Control Rooms about once a week, Miller in practice was not able to visit them that frequently. G. Miller, ff. Tr. 5039 at 6, 12, 14; Tr. 5041, 5066-67 (G. Miller)."

10. "Miller kept abreast of the daily status of the units primarily through two mechanisms, namely the Daily Plant Status Report and a daily morning conference call typically involving Miller, the Units 1 and 2 Superintendents,

---

[14] The Daily Plant Status Report listed plant parameters, including unidentified leak rate, and provided areas for comments and special problems. G. Miller, ff. Tr. 5039 at 13. *See, e.g.*, Board Exh. 1-A, Stier Report, Vol. V(B), Tab 10.

and his superior in Reading. On those days when he was at TMI, Miller tried to review the Daily Plant Status Report each morning. While he did not recall seeing shift supervisor turnover notes attached to the reports, Miller believed, based on documents shown to him during the Stier Unit 2 leak rate investigation, that he did receive them. Miller recalled that he relied on the morning call as his principal daily source of information on the status of the units. G. Miller, ff. Tr. 5039 at 12-14."

11. "On matters of plant operations Miller expected his subordinates to use normal channels. His office was outside the security fence at TMI precisely so that employees would deal with their unit managements rather than coming directly to him on routine operation matters. *Id.* at 15."

12. "Because of his numerous responsibilities, Miller necessarily depended on his subordinates to bring to his attention operating matters that involved safety or unit availability. He was not in a position independently to seek out such problems. *Id.* at 11; Tr. 5066 (G. Miller)."

13. "Until late 1978, Miller concurrently held the title of Unit 2 Superintendent at TMI along with the Station Superintendent title. Joseph B. Logan, who had been hired by the company in January 1978 for the position of Unit 2 Superintendent, formally assumed the position toward the end of 1978 after obtaining an NRC Senior Reactor Operator License and familiarizing himself with the unit and staff. G. Miller, ff. Tr. 5039 at 3; Board Exh. 1-A, Stier Report, Vol. VI(G), Logan 3/27/85 Interview at 3."

14. "Miller believed that while he himself held both the Station Superintendent and Unit 2 Superintendent positions in 1978, James L. Seelinger, the Unit 2 Superintendent of Technical Support, substantially discharged the responsibilities of Unit 2 Superintendent. Miller testified that because of his station responsibilities he depended on Seelinger to supervise day-to-day operations. G. Miller, ff. Tr. 5039 at 3-4; Tr. 5050-53 (G. Miller). Seelinger took issue with Miller's view of him as acting Unit 2 Superintendent. Seelinger did allow that his and Miller's perception of his role in Unit 2 could have differed. Seelinger clearly did not view his authority as broadly as Miller did. *See* Seelinger, ff. Tr. 4623 at 4-6; Tr. 4627-28 (Seelinger)."

15. "The Unit 2 Superintendent reported to the TMI Station Superintendent and was responsible for the administration, operation, and maintenance of TMI-2 and for ensuring compliance with the Tech Specs. Administrative Procedure ('AP') 1010, 'Technical Specification Surveillance Program,' gave him specific responsibility for ensuring compliance of the Surveillance Test Schedules with the Tech Specs. Board Exh. 1-A, Suer Report, Vol. V(A), Tab 6 (Unit Superintendent Position Description); *id.*, Vol. V(C), Tab 17 (AP 1010, § 2.1.)."

16. "The four principal operating positions reporting to the Unit 2 Superintendent were the Unit Superintendent of Technical Support, the Supervisor of Operations, the Supervisor of Maintenance, and the Supervisor of Radiation

Protection and Chemistry. G. Miller, ff. 5039 at 4; Board Exh. 1-A, Stier Report, Vol. VI(G), Logan 11/18/83 Statement at 1."

17. "As Unit 2 Superintendent, Logan generally kept abreast of plant status and activities by participating in the morning conference calls between TMI and management in Reading, attending plan of the day ('POD') meetings,[15] and reviewing the Daily Plant Status Reports, shift supervisor turnover notes, control room logs, and documents generated by PORC. He also made tours of the plant and visited the control room several times each day. Board Exh. 1-A, Stier Report, Vol. VI(G), Logan 3/27/85 Interview at 20-22, 27-31, 33."

18. "James L. Seelinger was the Unit 2 Superintendent of Technical Support at TMI until December 1978, when he became the Unit 1 Superintendent and George Kunder replaced him as Superintendent of Technical Support. Seelinger, ff. Tr. 4623 at 1; Kunder, ff. Tr. 4800 at 1."

19. "The Unit 2 Superintendent of Technical Support reported to the Unit 2 Superintendent and was responsible for supervision of the technical aspects of plant engineering and for ensuring TMI-2 operation complied with the Tech Specs. The lead engineers assigned to TMI-2 reported to him. In addition to other responsibilities, the Unit 2 Superintendent of Technical Support chaired the PORC. Kunder, ff. Tr. 4800 at 1; Board Exh. 1-A, Stier Report, Vol V(A), Tab 6 (Unit Superintendent of Technical Support Position Description)."

20. "Seelinger perceived his responsibilities as principally being charged with the writing and approval of the procedures for operating TMI-2. Board Exh. 1-A, Stier Report, Vol. VI(J), Seelinger 4/4/84 Interview at 7. He typically attended the POD meetings. Tr. 4678 (Seelinger)."

21. "Kunder saw his relationship to the Operations Department as advisory, with no direct role in the operation of the unit and no responsibility for operational decisions. He usually learned about operational problems through members of his staff who performed the engineering tasks assigned to the department. Kunder, ff. Tr. 4800 at 1-2. Typically, assignments to the department did go through him; however, plant personnel could deal directly with Kunder's engineers in accomplishing tasks. Tr. 4814-16 (Kunder). Kunder normally attended most of the POD meetings. Board Exh. 1-A, Stier Report, Vol. VI(G), Kunder 3/6/85 Statement at 26."

---

[15] The POD meetings Logan attended were held daily in each unit early on the 7 a.m.-3 p.m. shift. The primary purpose of those meetings was to discuss plant problems and plant evolutions scheduled to be performed that day. The typical attendees included the Unit Superintendent, the Supervisor of Operations, the Superintendent of Technical Support, one or more shift supervisors, and a representative from the Maintenance Department. Tr. 4678-79 (Seelinger); Bryan, ff. Tr. 4540 at 2; Mehler, ff. Tr. 3842 at 3; Board Exh. 1-A, Stier Report, Vol. VI(G), Logan 11/18/83 Statement at 1-2.

B. The Operations Department

22. "The Operations Department at TMI-2 was headed by the Supervisor of Operations, James R. Floyd, who reported to the Unit 2 Superintendent. He was responsible for the overall administration of his department and for ensuring compliance with the Tech Specs. The shift supervisors and two Operations engineers reported to him. The Supervisor of Operations was required to hold an NRC Senior Reactor Operator License. Board Exh. 1-A, Stier Report, Vol. V(A), Tab 6 (Supervisor of Operations Position Description); Floyd, ff. Tr. 4894 at 1-2; Marshall, ff. Tr. 4380 at 1; G. Miller, ff. Tr. 5039 at 2-3. An Administrative Procedure 1012, 'Shift Relief and Log Entries,' required the Supervisor of Operations to review and sign the Control Room Log and Shift Foreman's Log at least once per week. Board Exh. 1-A, Stier Report, Vol. V(C), Tab 18 (AP 1012, § 2.2)."

23. "Floyd delegated the actual running of TMI-2 to the shift supervisors and expected them to discuss any problems they had with him. He perceived his job as primarily that of a 'crisis fighter,' living out of the control room and the shift supervisor's office with close contact with CROs. Floyd, ff. Tr. 4894 at 2; Tr. 4969, 4974-75 (Floyd)."

24. "One means by which Floyd gave direction to the Operations Department was through the periodic issuance of Operations Memoranda, which were compiled in a binder in the Control Room. Tr. 4943, 4999-5001 (Floyd); Tr. 2637 (Coleman); Board Exh. 1-A, Stier Report, Vol. VI(I), A. Miller 3/22/85 Interview at 84."

25. "Floyd believed he attended the POD and shift supervisor meetings, but rarely PORC meetings. Tr. 5031 (Floyd). Although he was on the distribution list for the Daily Plant Status Reports, he did not scrutinize them. He viewed them as the means by which his superiors were advised of plant status on a daily basis. Floyd, ff. Tr. 4894 at 6-7."

26. "The TMI-2 Operations Department work force was divided initially into five groups, referred to as 'crews' or 'shifts,' that would rotate among three daily shifts of 7 a.m.–3 p.m., 3 p.m.–11 p.m., and 11 p.m.–7 a.m. Board Exh. 1-A, Stier Report, Vol. I at 47. Prior to the establishment of the six-shift rotation, certain individuals were specified for relief. After addition of the extra shift, however, it became easier to provide relief personnel since a relief shift became a part of the normal shift rotation. Tr. 2329 (Russell). A shift supervisor, who held an NRC Senior Reactor Operator License, headed each shift. The license authorized him to direct the licensed activities of licensed operators and to manipulate the controls of the plant. The license itself stated that '[i]n directing the licensed activities of licensed operators and in manipulating the controls . . . the licensee shall observe the operating procedures and other conditions specified in the facility license . . . .' Because the shift supervisor

was responsible for overseeing Operations Department activities at both Units 1 and 2, he divided his time between TMI-1 and TMI-2 during his shift. The shift foreman for each unit reported to the shift supervisor. Board Exh. 1-A, Stier Report, Vol. I at 47, 49; *id.*, Vol. V(A), Tab 6 (Shift Supervisor Position Description); Board Exh. 10-A, SRO License."

27. "The shift supervisor was responsible for ensuring that plant operations did not jeopardize the health and safety of the employees and public. The shift supervisor was also responsible for ensuring that the surveillance testing program was conducted in compliance with the Final Safety Analysis Report ('FSAR'). Board Exh. 1-A, Stier Report, Vol. V(A), Tab 6 (Shift Supervisor Position Description)."

28. "The turnover notes prepared by the shift supervisor on the 11 p.m.–7 a.m. shift were attached to Daily Plant Status Reports distributed at TMI. *Id.*, Vol. I at 137; *id.*, Vol. VI(H), Mehler 2/28/85 Interview at 76-77; *see, e.g., id.*, Vol. V(B), Tab 10."

29. "Monthly shift supervisor meetings were held at TMI. The minutes of the meetings indicated that personnel matters were the main topic of discussion. Smith, ff. Tr. 4331 at 2; Bryan, ff. Tr. 4540 at 2; Mehler, ff. Tr. 3842 at 3; Board Exh. 1-A, Stier Report, Vol. II(B), G. Miller Summary at 5."

30. "A shift foreman, who held an NRC Senior Reactor Operator License, directly supervised the TMI Operations Department staff on shift at each unit. The license authorized him to direct the licensed activities of licensed operators and to manipulate the controls of the plant. The license itself stated that '[i]n directing the licensed activities of licensed operators and in manipulating the controls . . . the licensee shall observe the operating procedures and other conditions specified in the facility license . . . .' The CROs reported to the shift foreman. Board Exh. 10-A, SRO License; Board Exh. 1-A, Stier Report, Vol. V(A), Tab 6 (Shift Foreman Position Description); *id.*, Vol. I at 48."

31. "Like the shift supervisor, the shift foreman was responsible for ensuring that plant operations did not jeopardize the health and safety of the employees and public and that the surveillance testing program was conducted in compliance with the FSAR. Board Exh. 1-A, Stier Report, Vol. V(A), Tab 6 (Shift Foreman Position Description)."

32. "The shift foreman would assign work among his subordinates and would personally become involved in the resolution of any problems encountered on his shift. The manner in which shift foremen performed their responsibilities varied. Some foremen spent more time in the Control Room than others who devoted more of their time to inspecting the plant. *Id.*, Vol. I at 48-49."

33. "The outgoing shift communicated information to the oncoming shift through shift turnovers. Floyd, ff. Tr. 4894 at 7; Tr. 2623 (Coleman)."

34. "Although Surveillance Procedure ('SP') 2301-3D1, 'RCS Inventory,' did not define specific responsibilities for the shift foreman, AP 1010, 'Technical

Specification Surveillance Program,' provided that '[d]ata sheets will be signed by the person performing the task, and reviewed and approved by his foreman where required by the forms and procedures.' As a general rule, the shift foreman would approve leak rate test results for filing by signing the leak rate test sheet. Board Exh. 1-A, Stier Report, Vol. I at 48; *id.*, Vol. V(A), Tab 6 (Shift Foreman Position Description); *id.*, Vol. V(C), Tab 17 (AP 1010, § 3.2.2)."

35. "AP 1012, 'Shift Relief and Log Entries,' required the shift foreman to maintain a Shift Foreman's Log. The shift foreman was responsible for review and sign off of the log at the completion of each shift. The procedure did not specify that the log contain any information relating to leak rate tests. *Id.*, Vol. I at 44; *id.*, Vol. V(C), Tab 18 (AP 1012)."

36. "The CROs, under the direction of a shift foreman, were responsible for operating the plant. Each CRO was required to hold an NRC Reactor Operator License. The license issued to the operator, which authorized him to manipulate all controls of the plant, stated that '[i]n manipulating the controls . . . the licensee shall observe the operating procedures and other conditions specified in the facility license . . . .' Board Exh. 10-B, RO License; Board Exh. 1-A, Stier Report, Vol. V(A), Tab 6 (Control Room Operator Position Description)."

37. "Two to four CROs comprised each shift, possibly including one or more CRO trainees whom the NRC had not yet licensed. The CROs were responsible for directing the work of several auxiliary operators. Board Exh. 1-A, Stier Report, Vol. I at 48; McGovern, ff. Tr. 3148 at 2; Conaway, ff. Tr. 3097 at 2. Although the division of responsibilities among the CROs on shift did vary, one CRO was assigned to the control panel, where his responsibilities included maintaining the Control Room Log. The responsibility for 'switching and tagging' equipment to control its proper use and for taking readings from plant instruments was assumed by the second CRO on shift (or divided between two or more CROs on crews that included a total of more than two CROs). The CRO responsible for taking readings usually would also be responsible for performing the leak rate test. In practice, the CRO duties overlapped somewhat. The switching and tagging CRO might make entries in the Control Room Log, and the CRO assigned to the Control Panel might, on occasion, perform a leak rate test.[16] Board Exh. 1-A, Stier Report, Vol. I at 48-49."

38. "Like the shift foremen, the CROs used turnovers to communicate information from shift to shift. Floyd, ff. Tr. 4894 at 7; Board Exh. 1-A, Stier Report, Vol. VI(G), Illjes 2/7/85 Interview at 45; *id.*, Vol. VI(D), Frederick 3/12/85 Interview at 127-28; Board Exh. 6, OI Report, Exh. 24, Faust Interview at 6."

---

[16] For each of the leak rate tests, Stier and NRR attempted to determine individual assignments for each of the individuals on shift. *See* Board Exh. 1-A, Stier Report, Vol. III(A), Tables 1-2; Board Exh. 5-A, NRR Report, Vol. 2, Table 11.

39. "The procedures implementing the Tech Spec requirements for leak rate testing imposed several requirements on the CRO. AP 1012, 'Shift Relief and Log Entries,' required CROs to maintain and sign a Control Room Log, including a record of the start and completion or suspension times of all tests required by Tech Specs. Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 2; Board Exh. 1-A, Stier Report, Vol. I at 44; *id.*, Vol. V(C), Tab 18 (AP 1012, §§ 2.4 and 3.3.17). AP 1010, 'Technical Specification Surveillance Program,' provided that the operator performing a surveillance task sign the data sheets where required by the forms and procedures. AP 1012 also required the test performer to document problems encountered during surveillance testing and test results not meeting test acceptance criteria on an 'Exception and Deficiency List.' Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 2; Board Exh. 1-A, Stier Report, Vol. I at 45; *id.*, Vol. V(A), Tab 17 (AP 1010, §§ 3.2.2 and 3.2.4). SP 2301-3D1, 'RCS Inventory,' required the responsible CRO to enter the Action Statement under Tech Spec 3.4.6.2 if a leak rate test indicated that a limiting condition for operation had been exceeded. Tr 653 (Kirkpatrick); Board Exh. 1-A, Stier Report, Vol. V(C), Tab 19 (SP 2301-3D1, §§ 6.4 and 7.2)."

40. "Several auxiliary operators were assigned to each shift. Generally, they reported to the CRO who operated the panel. They were stationed throughout the plant and assisted the CROs. Their duties included operating equipment that could not be operated from the Control Room. Board Exh. 1-A, Stier Report, Vol. I at 48-49. These individuals were not required to hold any NRC license."

41. "The following chart provides the shift compositions for both the five-shift rotation, from September 30, 1978, to December 1978, and the six-shift rotation, from January 1979 to March 28, 1979:"[17]

Shift	Position	September–December 1978	January–March 1979
A[18]	Shift Supervisor	Zewe, W.	Zewe, W.
	Shift Foreman	Scheimann, F.	Scheimann, F.
	CRO	Frederick, E.	Frederick, E.
	CRO	Faust, C.	Faust, C.
	CRO-in-training	McGovern, H.[19]	

[17] The individuals on a particular shift sometimes varied primarily because of vacations, illnesses, and training. The actual shift composition for a particular test was reconstructed by Stier and appears in Board Exh. 1-A, Stier Report, Vol. III(A), Tables 1 and 2.

[18] 1978 Shift A — *see* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 of Enclosure 10 at 6; 1979 Shift A — *see id.*, Enclosure 1 of Enclosure 6 at 1.

[19] McGovern was in training until receiving his RO license in November 1978. *See id.*, Enclosure 1 of Enclosure 10 at 6.

Shift	Position	September–December 1978	January–March 1979
B[20]	Shift Supervisor	Chwastyk, J.	Chwastyk, J.
	Shift Foreman	Conaway, W.	Conaway, W.
	CRO	Kidwell, J.	Kidwell, J.
	CRO	Illjes, T.	Illjes, T.
	CRO-in-training	Mell, C.	Mell, C.
	CRO-in-training	Hemmila, E.[21]	
C[22]	Shift Supervisor	Mehler, B.	No change after December 1978
	Shift Foreman	Adams, C.	
	CRO	Congdon, J.	
	CRO	Cooper, M.	
	CRO-in-training	Phillippe, M.	
D[23]	Shift Supervisor	Hitz, G.	No change after December 1978
	Shift Foreman	Miller, A.	
	CRO	Olson, D.	
	CRO	Wright, L.	
	CRO	Coleman, M.	
E[24]	Shift Supervisor	Smith, B.	Smith, B.
	Shift Foreman	Hoyt, K.	Hoyt, K.
	CRO	Booher, R.	Booher, R.
	CRO	Hartman, H.	Hartman, H.
	CRO-in-training	Blessing, J	Blessing, J.
	CRO-in-training	Germer, L.	
F[25]	Shift Supervisor	'F' Shift did not exist	Bryan, K.
	Shift Foreman		Guthrie, C.
	CRO		Hemmila, E.
	CRO		McGovern, H.
	CRO-in-training		Germer, L.

[20] Shift B — *see id.*, Enclosure 1 of Enclosure 9 at 1.
[21] Hemmila was in training until receiving his RO license in December 1978. *See id.*, Enclosure 16 at 2; Board Exh. 1-A, Stier Report, Vol. V(A), Tab 4 (8/15/78 Shift Assignment Sheet).
[22] Shift C — *see* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 of Enclosure 5 at 1.
[23] Shift D — *see id.*, Enclosure 1 of Enclosure 12 at 1.
[24] Shift E — *see id.*, Enclosure 15 at 2; *id.*, Enclosure 1 of Enclosure 3 at 1.
[25] Shift F — *see id.*, Enclosure 1 of Enclosure 10 at 6.

C. Bodies Outside of the Chain of Command

42. "The Plant Operations Review Committee was an advisory group that reported to the Unit Superintendent. It was an interdisciplinary committee consisting mostly of department heads and key individuals from the plant. PORC was responsible for review of procedure changes and plant modifications, as well as activities directly affecting the nuclear safety of the operating unit. Tech Spec 6.5.1.6 set forth the specific charges of PORC. One such charge was investigating violations of Tech Specs, including preparing reports covering evaluations and recommendations to prevent recurrence to the Station Superintendent and the GRC. PORC also was responsible for reviewing events requiring 24-hour notification to the NRC. The Tech Specs required PORC to provide written notification within 24 hours to the Station Superintendent and the GRC Chairman of disagreement between PORC and the Unit Superintendent. The Unit Superintendent, however, had responsibility for resolving the disagreements. Board Exh. 1-A, Stier Report, Vol. V(B), Tab 14 (Tech Specs 6.5.1.5 and 6.5.1.7); Kunder, ff. Tr. 4800 at 3-4; Tr. 4817-20 (Kunder); Herbein, ff. Tr. 5268 at 8."

43. "The General Office Review Board was an advisory group that reported directly to the President of Met-Ed. GORB reports provided the President, who was not involved in the day-to-day operational activities of the station, with the broad perspective of maintaining nuclear safety and appropriate radiation protection. Herbein, ff. Tr. 5268 at 8."

44. "The Generation Review Committee was a group organized to provide an independent review and audit of activities important to nuclear safety, which included procedural changes, plant modifications, and violations of regulations. *Id.*"

45. "The Quality Assurance organization audited and inspected safety-related activities, including operations, maintenance, engineering, and licensing, to ensure compliance with procedures developed by the functional groups. *Id.* at 9. QA had a specific responsibility to oversee surveillance testing. Board Exh. 1-A, Stier Report, Vol. I at 138."

II. TECHNICAL SPECIFICATIONS, TRAINING, AND CHRONOLOGY OF EVENTS DURING OCTOBER 1978 NRC INSPECTION

A. Technical Specifications and Procedures Relevant to Leak Rate Testing

In this section the Board generally adopts the GPUN Proposed Findings set forth in their § II.B. Such findings not modified by the Board are enclosed in quotation marks.

1. "The TMI-2 Operating License incorporated Tech Specs that established limiting conditions for operation. Two sections of the Tech Specs addressed the requirements for pressure boundary leakage detection, §§ 3.4.6.1 and 3.4.6.2. Each of these sections was divided into four parts: (1) limiting conditions for operation establishing minimum requirements for plant operation; (2) an 'Action' section, generally referred to as the 'Action Statement,' describing the steps to be taken if a limiting condition for operation was exceeded; (3) surveillance requirements, designed to assure compliance with limiting conditions for operation; and (4) 'bases' describing the background or purpose of the limiting conditions for operation. Board Exh. 1-A, Stier Report, Vol. 1 at 36; *id.*, Vol. V(B), Tab 14 (Tech Specs 3.4.6.1 and 3.4.6.2)."

2. Tech Spec 3.4.6.1 follows the provisions of Reg. Guide 1.45 by requiring the three leakage detection systems recommended in that Guide. The Tech Spec required radioactive particulate and sump monitoring systems in addition to either an air cooler condensate or a gaseous radioactivity monitoring system. The Action Statement of this Tech Spec described the steps to be taken in the event these systems were not continuously in operation. Its corresponding surveillance requirements specified how plant personnel were to demonstrate that these systems were operable. The "bases" of this Tech Spec explained that it was intended to be consistent with Reg. Guide 1.45. Tech Spec 3.4.6.1, however, did not specify the leakage limits that it was intended to monitor, and it did not require an inventory balance test. *Id.*, Vol. I at 36-37; *id.*, Vol. V(B), Tab 12 (Reg. Guide 1.45).

3. Tech Spec 3.4.6.2 established the following leakage limits as the limiting conditions for operation:

a. no pressure boundary leakage;

b. 1 gpm of unidentified leakage;

c. 1 gpm of primary-to-secondary leakage through the steam generators;

d. 10 gpm of identified leakage from the Reactor Coolant System;

e. 8 gpm controlled leakage at a Reactor Coolant System pressure of 2155 ± 50 psig.

Board Exh. 1-A, Stier Report, Vol. V(B), Tab 14 (Tech Spec 3.4.6.2).

4. The corresponding Action Statement to Tech Spec 3.4.6.2 required that if any pressure boundary leakage were found, the plant had to be in "hot standby" within 6 hours and in "cold shutdown" within the next 30 hours. For any other leakage, including unidentified leakage, in excess of a limiting condition for operation, leakage was to be reduced to within Tech Spec limits within 4 hours or the plant had to be in hot standby within the next 6 hours and in cold shutdown within the next 30 hours.

5. Tech Spec 4.4.6.2, which provided the corresponding surveillance requirements, stated:

> 4.4.6.2 Reactor Coolant System leakages shall be demonstrated to be within each of the above limits by:
>
> a. Monitoring the containment atmosphere particulate radioactivity monitor at least once per 12 hours.
>
> b. Monitoring the containment sump inventory and discharge at least once per 12 hours.
>
> c. Measurement of the CONTROLLED LEAKAGE from the reactor coolant pump seals when the Reactor Coolant System pressure is 2155 ± 50 psig at least once per 31 days.
>
> d. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation.

As the Board reads this language, all four of these surveillances were required. *Id.*, Vol. I at 37-38; *id.*, Vol. V(B), Tab 14 (Tech Spec 4.4.6.2).

6. "Tech Specs 1.14 through 1.17 defined the categories of leakage referred to in Tech Spec 3.4.6.2 as follows (Board Exh. 1-A, Stier Report, Vol. I at 38-39; *id.*, Vol. V (B), Tab 14 (Tech Specs 1.14-1.17); *see also* Wermiel, ff. Tr. 376 at 5):

> *IDENTIFIED LEAKAGE*
>
> 1.14 IDENTIFIED LEAKAGE shall be:
>
> a. Leakage (except CONTROLLED LEAKAGE) into closed systems, such as pump seal or valve packing leaks that are captured and conducted to a sump or collecting tank.
>
> b. Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be PRESSURE BOUNDARY LEAKAGE.
>
> c. Reactor coolant system leakage through a steam generator to the secondary system.
>
> *UNIDENTIFIED LEAKAGE*
>
> 1.15 UNIDENTIFIED LEAKAGE shall be all leakage which is not IDENTIFIED LEAKAGE or CONTROLLED LEAKAGE.
>
> *PRESSURE BOUNDARY LEAKAGE*
>
> 1.16 PRESSURE BOUNDARY LEAKAGE shall be leakage (except steam generator tube leakage) through a non-isolable fault in a Reactor Coolant System component body, pipe wall or vessel wall.

CONTROLLED LEAKAGE

1.17 CONTROLLED LEAKAGE shall be that seal water flow supplied from the reactor coolant pump seals. . . ."

7. "The Tech Specs also established requirements for reporting to the NRC when a limiting condition for operation was exceeded. Tech Spec 6.9.1.8 provided that in such instances a report had to be made to the NRC within 24 hours. This had to be followed by a more detailed Licensee Event Report within 14 days describing the event, the corrective action taken, and the steps that the licensee intended to take to prevent recurrence. Board Exh. 1-A, Stier Report, Vol. I at 39; *id.*, Vol. V(B), Tab 14 (Tech Spec 6.9.1.8); *see also* Wermiel, ff. Tr. 376 at 5, 11."

8. "Finally, Tech Spec 6.10 required 'records of surveillance activities . . . required by these Technical Specifications' to be retained for at least 5 years. Board Exh. 1-A, Stier Report, Vol. I at 40; *id.*, Vol. V(B), Tab 14 (Tech Spec 6.10); *see also* Wermiel, ff. Tr. 376 at 11."

9. "The TMI-2 FSAR described the leak rate test as the 'primary means of detecting reactor coolant system leakage.' Board Exh. 1-A, Stier Report, Vol. I at 41; *id.*, Vol. V(C), Tab 15 (FSAR); *see also* Wermiel, ff. Tr. 376 at 8-9; Board Exh. 22, FSAR §§ 5.2.7.3 and 5.2.7.4. It was in fact the only one of the tests prescribed in the Tech Specs that provided a quantifiable means of measuring unidentified leakage as defined in the Tech Specs. *See* Tr. 683 (Stier, Russell); Tr. 3865 (Mehler)."

10. "The following three interrelated procedures implemented Tech Spec requirements for leak rate testing: (1) SP2301-3D1, 'RCS Inventory,' controlling the performance of leak rate tests; (2) AP 1012, 'Shift Relief and Log Entries,' dealing with logging requirements; and (3) AP 1010, 'Technical Specification Surveillance Program,' covering reporting the results of surveillance tests.[26] Board Exh. 1-A, Stier Report Vol. I at 41; *id.*, Vol. V(C). Tabs 17 (AP 1010), 18 (AP 1012), 19 (SP 2301-3D1)."

---

[26] The NRC Staff identified one additional procedure, AP 1036, "Instrument Out-of-Service Control" (Board Exhs. 12-A and 12-B), as a relevant procedure to this proceeding. Tr. 1167-68 (Russell). Mr. Russell stated:

> The purpose of the procedure is to describe the method of control of readout devices which become inoperable or are strongly suspected of being inoperable, such that they are marked, documented and controlled until repair is effected. That's under section 1.1; purpose.

Under § 2.1, responsibilities:

> shift supervisors, shift foreman and control room operators. The shift supervisor and/or shift foreman and/or control room operators are responsible to assure out-of-service instruments are identified and logged out-of-service. They are also responsible to assure that work requests are submitted to effect repair and remove the out-of-service stickers from the instruments and close out the out-of-service instrument log entries.

This is the procedure that promulgates the log that we have been discussing, and I think the procedure is quite clear and it indicates that out-of-service instruments and suspected instruments are not to be used and they are to be tagged and indicated and those tags are to remain on them until such time as repairs are effected and they are again reliable for the purpose of operating the facility. Tr. 1803 (Russell).

11. "SP 2301-3D1 stated that its purpose was to assure compliance with the leakage limits set forth in Tech Spec 3.4.6.2. It required performance of a leak rate test at least once every 72 hours during 'steady state' in Modes 1, 2, 3, and 4, when, according to the Tech Spec definition of Modes, RCS temperature averaged greater than 200°F. Board Exh. 1-A, Stier Report, Vol. I at 42; *see also* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 2."

12. "The procedure prescribed the plant conditions required for the performance of a leak rate test. Certain 'operations should not be conducted,' for example, '(a) makeup or chemical addition to the makeup system, . . . (e) boration or deboration.' 'Operations such as adding water to the make-up tank or sampling the RCS [reactor coolant system] may be accounted for [in the test calculation] . . . , however, these should be avoided if at all possible.' The reactor coolant and make-up systems should be maintained in a 'steady state condition.' Valve lineups should be maintained the same throughout the test, and reactor power and RCS temperature and pressure should not be altered. The procedure also directed use of the same instruments to obtain data at the beginning and end of the test. Board Exh. 1-A, Stier Report, Vol. I at 42."

13. "The procedure also provided for the performance of the test normally by means of the plant computer. Operators were alerted to the inability of the computer to perform leak rate test calculations when RCS temperature was below 520°F. At such times, operators were to perform the calculation manually, and the procedure provided a data sheet for that purpose. *Id.* at 43; Board Exh. 2, Faegre & Benson Report, Vol. 4, Tab 2 (SP 2301-3D1, Rev. 3, §4.3); *see also* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 2."

14. "If an operator had to change the RCS inventory during the test, he had to account for the change in the calculation and complete a 'Data Sheet 4' to indicate the quantity added to the RCS and the operation that caused the change. Board Exh. 1-A, Stier Report, Vol. I at 43."

15. "The procedure contained directions for responding to test results that exceeded limiting conditions for operation. The first requirement was that an operator begin a new leak rate test. Next, the operator was to determine whether unaccounted-for operator action had affected the initial test. If such action had taken place, the operator was to invalidate the test. The procedure required that the operator record such action in the 'remarks' section of the data sheet. *Id.*; *see also* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 2."

16. "Operators were then required to check for leakage. If an operator found such leakage, he was to document the leakage on a 'Data Sheet 3' along with its flow rate and a description of the method used to determine the rate. The shift supervisor was then required to evaluate the safety significance of any such leakage that the operator had identified. Board Exh. 1-A, Stier Report, Vol. I at 43-44."

17. "If, after these steps were taken, test results remained in excess of acceptance criteria, the procedure required that the process of shutting down the plant should begin according to the Action Statement of Tech Spec 3.4.6.2. *Id.* at 44; *see also* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 1."

18. "AP 1012 set forth requirements for logging surveillance tests. A Control Room Log, maintained by a CRO, was to include a record of the start and completion or suspension times of all tests required by Tech Specs. The Supervisor of Operations was required to review and sign the Control Room Log at least once per week, indicating that he was satisfied with the recording techniques and was familiar with any operating abnormalities. The procedure also required maintenance of a Shift Foreman's Log, but did not specify that the Log contain any information relating to leak rate tests. Board Exh. 1-A, Stier Report, Vol. I at 44; *see also* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 2."

19. "AP 1010 established a system for documenting the results of surveillance tests that could not be performed successfully or failed to meet acceptance criteria. Any surveillance test that had an unsatisfactory result had to be documented on an 'Exception and Deficiency List' and filed. Filing an 'Exception' was necessary in the event of a failure to obtain 'required plant conditions' or an inability to use 'an existing procedure (i.e., equipment out-of-service or a procedure which cannot be followed).' Filing a 'Deficiency' was necessary when a test had been completed but acceptance criteria had not been met. Board Exh. 1-A, Stier Report, Vol. I at 45; *see also* Board Exh. 5-A, NRR Report, Vol. 1, Enclosure 1 at 2-3."

20. "A shift supervisor was required to review and initial all Exceptions and Deficiencies ('E&Ds') 'as soon as possible.' In the case of a Deficiency, he was to determine whether a reportable occurrence had taken place. If so, he had to bring the matter to the attention of the Unit Superintendent. The E&D List would then be attached to the test data package and filed with the GMS Coordinator. Board Exh. 1-A, Stier Report, Vol. I at 45."

21. "The GMS Coordinator, who was appointed by the Unit Superintendent to administer the GMS (Generation Maintenance System) program covering all plant maintenance and testing, would inform the PORC Chairman and the QC Supervisor when the maximum allowable time interval between surveillance tests had been exceeded. The GMS Coordinator would forward any E&D to the PORC Chairman and QC Supervisor as soon as practicable. He would also maintain a followup action log of all E&Ds. Finally, the QC Supervisor was designated to provide general oversight for all surveillance testing. *Id.*, at 45-46."

B. Training

The Board generally adopts the Proposed Findings of the Numerous Employees as set forth in their §§ V.A and V.B except as deletions are indicated by ". . . ".

22. "The testimony of Mr. Dennis J. Boltz, who was a training instructor assigned to the licensed operator training group at TMI-2 during 1978-1979, Tr. 2218-19, made apparent the fact that classroom training regarding the performance of leak rate tests was virtually nonexistent. Mr. Boltz acknowledged that, in 1978-1979, the TMI-2 training department focused exclusively on 'textbook type' training consisting of little more than providing a copy of the Technical Specifications to the operators and supervisors to read, and thus it 'had to rely heavily [on] the operations and on-the-job training aspects of [the CROs'] training programs with qualified personnel on shift.' Tr. 2225, 2226; *see* Tr. 2582, 2714, 2799, 2839."

23. "Mr. Boltz searched training records from 1978-1979 and found only one document that referred to leak rate testing; it merely states that a CRO must be '[c]apable of using [the] computer for calculations of leak rate, heat balance, Reactivity Balance, etc.' Exh. 16; *see* Tr. 2220, 2226."

24. "Mr. Boltz's testimony before this Board also highlighted the important information concerning leak rate testing that was omitted from the TMI-2 classroom training program. The training program did not include a discussion of the requirement of Administrative Procedure 1012 to log the start and completion (or suspension) of each leak rate test performed, Tr. 2224-25, nor did it include a discussion of the Administrative Procedure 1010 requirement that leak rate tests not performed successfully or that failed to meet the acceptance criteria should be documented through the use of an exception or a deficiency. Tr. 2224. The classroom training program at TMI-2 also failed to provide any instructions regarding the performance of leak rate tests by hand. Tr. 2229. Nor were such instructions provided during the 3-week course at the B&W simulator taken by all CRO trainees prior to becoming licensed. Tr. 2231."

25. "The only instruction as to how to perform leak rate tests was provided as part of an operator's on-the-job training (Tr. 2225; *see, e.g.*, Mell Prep. St. at 1-2, ff. Tr. 3239), but the TMI-2 training department took no action to assure that the on-the-job leak rate test training was consistent among the shifts. Tr. 2224. The Board thus finds that classroom training concerning leak rate testing at TMI-2 was essentially nonexistent during 1978-1979, and failed to teach the TMI-2 operators and supervisors the requirements pertaining to, and proper procedures for, leak rate testing."

26. "The evidence of record is that the on-the-job instruction received by the TMI-2 operators concerning leak rate testing was confined to a basic demonstration of the steps necessary to conduct the leak rate test. As Mr. McGovern

testified before this Board, '[a]ll I remember about performing leak rates and learning how to do them was what I was taught by the CROs. This is how you punch it out and make the leak rate test come out. That's what I remember about leak rate training.' Tr. 3207; *see* Mell Prep. St. at 1-2, ff. Tr. 3239."

27. "Mr. McGovern's recollection was echoed by the testimony of several other operators. Mr. Coleman testified that the on-the-job instruction he received concerning leak rate testing was not 'very extensive.' Tr. 2583. Mr. Cooper testified that apart from being shown how to perform a leak rate test, his only instruction concerned the prescribed limits for plant leakage. Tr. 2916. Thus, there is ample testimony illustrating the limited nature of the on-the-job training received by the TMI-2 operators in 1978-1979. In essence, there was no training on the meaning or purpose of the test. Tr. 523-24."

28. "The TMI-2 operators and shift foremen were unanimous in testifying that their on-the-job training on leak rate testing never included any discussion of the relationship between the test and the potential safety significance of a critical crack in RCS piping. Mr. Illjes, a CRO, could not recall having received 'any specific training on leak rates or the [safety] implications' of performing them. Tr. 3082. Nor could Mr. Mehler (a shift supervisor) (Tr. 3859-60) or Mr. Adam Miller (a shift foreman) (Tr. 3628) recall any such training. Other operators who testified to this void in their training include Mr. Cooper (Tr. 2916), Mr. Wright (Tr. 2672), Mr. Hitz (Tr. 3707), Mr. Guthrie (Tr. 4126), Mr. Olson (Tr. 4009-11) and Mr. Conaway (Tr. 3105)."

29. "The on-the-job training at TMI-2 was also deficient in that it failed to instruct operators to take the prescribed actions in response to unsatisfactory leak rate test results. Numerous operators testified that they were never taught to apply Administrative Procedure 1010, the Exception and Deficiency procedure, to unsatisfactory leak rate test results. Mr. Wright's testimony is typical in this regard. He stated that the requirement to apply the Exception and Deficiency Administrative Procedure to unsatisfactory leak rate test results was never 'impressed upon me, either in training or anything else.' Tr. 2672. The testimony of Messrs. Coleman (Tr. 2636), Conaway (Tr. 3108), Hitz (Tr. 3669), Miller (Tr. 3648), Smith (Tr. 4344), and Scheimann (Tr. 2795) supports Mr. Wright's recollection. . . ."

30. "It is also clear that the on-the-job training never conveyed the proper interpretation of the '72-hour' rule and the 'Action Statement' requirement. The TMI-2 operators believed that they were obligated to enter the Action Statement only upon failing to obtain one satisfactory leak rate test result within a 72-hour period. *E.g.*, Illjes Prep. St., ff. Tr. 3010, at 2-3; Scheimann Prep. St., ff. Tr. 2831, at 2; Cooper Prep. St., ff. Tr. 2835, at 5. Only a few TMI-2 operators and supervisors seemed to have correctly understood that the requirement to invoke the '4-hour clock' in the 'Action Statement' applied whenever a valid leak rate test

depicted unidentified leakage in excess of 1 gpm. Frederick Prep. St., ff. Tr. 2447, at 2; Zewe Prep. St., ff. Tr. 2946, at 2."

31. "The Board finds that on-the-job training at TMI-2 essentially consisted of a demonstration of the manner in which to perform the leak rate test, with virtually no guidance as to the significance of the test or the actions to be taken if test results were unsatisfactory. *See* Tr. 4967-71 (Board summary of testimony). The conclusion is inescapable that the lack of meaningful training was a major cause . . . of the problems with leak rate testing at TMI-2."

C. Chronology of Events During October 1978 NRC Inspection

The following section is based largely upon § II.C(iii) of the GPUN proposed findings. However, the Board's numerous departures from those proposals make it impracticable to identify the source of particular language.

32. In October 1978, NRC Inspector Donald Haverkamp discovered that certain inappropriate leak rate test practices were being followed. The record indicates that on October 15, 1978, at 7:27 p.m., a leak rate of –0.3504 gpm was obtained.[27] *See* NRR Test No. 12. On October 16, 1978, at 7:35 p.m., a leak rate of 2.5645 gpm was obtained, substantially above the 1-gpm limit set by the Tech Specs. *See* NRR Test No. 12A. On October 17, 1978, at 1:27 p.m., a leak rate of 2.0738 gpm was obtained, again substantially above the Tech Spec limit. *See* NRR Test No 12B. On October 18, 1978, at 5:13 a.m., a leak rate of 1.7754 gpm was obtained, again well above the Tech Spec limit. *See* NRR Test No. 12C.

33. The shift supervisor turnover note from the midnight to morning shift on October 18 stated, "[s]till could not get a leak rate — 1900 today is deadline doing hand calculations." Board Exh. 1-A, Stier Report, Vol. V(B), Tab 10 (10/18/78 Daily Plant Status Report at 104, Item 11). Brian Mehler, shift supervisor of the shift that was on duty that morning, said he was aware of the need for a good leak rate and the fact that the 72-hour clock was running out. Tr. 3893 (Mehler). At 7:35 a.m., a leak rate of 1.2939 gpm was obtained. *See* NRR Test No. 12D. Charles Adams, the shift foreman on Mehler's shift, testified that James Floyd, TMI-2 Supervisor of Operations, usually came into the Control Room around 6:00 a.m., and, though he did not recall exactly what time Floyd arrived on October 18, he recalled Floyd sitting at the computer console, where leak rate tests were run. Tr. 3797 (Adams). Floyd claimed not to recollect the morning events of October 18, but he did note that he frequently sat at

---

[27] For purposes of this discussion, the Board assumes that such a relatively small negative leak rate might reasonably be considered valid, taking into account the normal ranges of instrument error. *See* Tr. 4901 (Floyd). Our assumption is supported by the record, which indicates that small negative leak rates were considered acceptable. *See, e.g.*, Tr. 2797-98 (Scheimann); Tr. 4901 (Floyd); Tr. 2529-32 (Faust); Coleman, ff. Tr. 2579 at 5; Tr. 2652-53 (Coleman).

the computer console and sometimes started a test for an operator by typing "RCSL." Tr. 4898-99 (Floyd). Mehler did not recall Floyd's presence in the Control Room "immediately in the morning, early" but implied that Floyd was there before Haverkamp arrived. Tr. 3893-94 (Mehler). At 8:59 a.m., a leak rate of 1.3219 gpm was obtained. *See* NRR Test No. 12E.

34. At approximately 9:00 a.m. on October 18, Haverkamp, who was on site conducting a routine inspection of plant operations, arrived in or near the Control Room and overheard a discussion by a CRO, shift foreman, and shift supervisor about bad tests. Board Exh. 20, Haverkamp Testimony at 2-3. Haverkamp joined the discussion and saw several leak rate test results that exceeded the 1-gpm LCO. *Id.* Haverkamp interrupted his routine operations inspection schedule to question Mehler and/or Floyd about the tests. *Id.* at 4. He then learned of the interpretation being given to the Tech Specs and left the Control Room to discuss this with James Seelinger, the Unit 2 Superintendent of Technical Support, in his trailer. *Id.* Haverkamp went directly to Seelinger because Seelinger was Haverkamp's "primary point of contact for TMI-2." Tr. 2113 (Haverkamp). Discussing the type of day-in, day-out relationship he had with Met-Ed, Haverkamp testified that "when it came to plant operations, technical questions about engineer-related questions, I spoke frequently with Mr. Seelinger, probably . . . during each inspection." *Id.*

35. Haverkamp recalled that, shortly after he began his meeting with Seelinger, Floyd entered Seelinger's trailer office and joined the discussion. Board Exh. 20, Haverkamp Testimony at 4-5. Haverkamp clearly recalled Floyd telling him, in effect, that unidentified leakage test results must be calculated to be under 1 gpm only once every 72 hours to be in legal compliance with the Tech Spec surveillance requirements. *Id.* In Floyd's view, any number of test results could be greater than 1 gpm as long as acceptable results were obtained once every 72 hours. *Id.* Haverkamp informed Floyd that his interpretation was clearly incorrect and stated that the Tech Spec limiting conditions for operation limits must always be met, in accordance with the applicable Tech Spec facility operating modes, including the results of leak rate tests that were conducted more often than required by the 72-hour Tech Spec surveillance frequency. *Id.* Floyd claimed not to recall this conversation, but said that he had no reason to believe Haverkamp's recollection was incorrect. Tr. 4926-27 (Floyd).

36. In the discussion with Seelinger and Floyd, Haverkamp was informed that plant operators were attempting to identify any leakage sources to reduce unidentified leakage to less than 1 gpm. Board Exh. 20, Haverkamp Testimony at 6. Seelinger assured Haverkamp that the plant would be operated in accordance with the applicable Tech Spec Action Statements and informed him that the matter would be referred to PORC for its review as a potentially reportable occurrence. *Id.*; *see also* Tr. 2050-51 (Haverkamp); Tr. 4630-32 (Seelinger). Also during this discussion, the possibility of rounding off test results was discussed

after Haverkamp raised some questions about the specified limit being "1" gpm as opposed to "1.0" gpm.[28] Board Exh. 20, Haverkamp Testimony at 8-9; Tr. 2111-13 (Haverkamp); Seelinger, ff. Tr. 4623 at 7; Tr. 4770-72 (Seelinger).

37. Sometime on the morning of the 18th, Seelinger met with Gary Miller, TMI Station Superintendent and Unit 2 Superintendent, and informed him of the Haverkamp-related events. Tr. 4722-27 (Seelinger). Seelinger recalled that during this meeting, a telephone conversation took place with a Met-Ed manager in Reading about how to handle the situation. *Id.* Although Seelinger is the only member of either onsite or offsite management who remembered such a telephone conversation, no one disputes that it took place. The message Seelinger recalls receiving during that conversation was to review the item for reportability and act appropriately. *Id.*

38. At 10:16 a.m., a leak rate of 1.0246 gpm was obtained. *See* NRR Test No. 13. At approximately noon, Mark Bezilla, the procedure coordinator and PORC secretary for TMI-2 (Board Exh. 1-A, Stier Report, Vol. VI(A), Bezilla 2/22/85 Interview at 1), at Seelinger's request brought Floyd three tests, NRR Test Nos. 12C-E, to analyze. Tr. 4913-20 (Floyd). On Test No. 12C, which indicated a leak rate of 1.7754 gpm at 5:13 a.m., Floyd wrote that "rounds off high but is corrected by leak rate 10/18/78. 7:35:27 start time i.e. into action statement at 5:13:02 out of it at 7:35:27." Tr. 4913-14 (Floyd). On Test No. 12D, which indicated a leakage of 1.2939 gpm at 7:35 a.m., Floyd wrote, "OK by roundoff, JRF, 1200, 10/18/78." Tr. 4914 (Floyd). On Test No. 12E, which indicated a leakage of 1.3219 gpm at 8:59 a.m., Floyd again wrote, "OK by roundoff." These tests indicate that by noon on October 18, a practice of rounding off test results was in effect. Mehler specifically recalled that at some point in time Floyd came to him and advised him that he was going to be able to round off leak rates as a result of a discussion Floyd had had with Haverkamp, whose opinion allowed rounding off to the nearest whole number. Board Exh. 1-A, Stier Report, Vol. VI(I), Mehler 3/15/85 Interview at 18. Mehler then rounded off Test No. 13, which had been run that morning, and wrote on the test "Net Unidentified Leak Rate rounded off To Nears whole Number 1 GPM." *See id.* at 19, 37-39; *see also id.*, Vol. VI(A), Adams 3/13/85 Interview at 44-48.

39. At 12:21 p.m., a leak rate of 0.1081 gpm was obtained, later corrected by William Fels[29] to indicate a leak rate of –0.283 gpm. *See* NRR Test No. 14; Tr. 4520-31 (Fels). Probably in the early afternoon, Haverkamp was shown this test, with an acceptable leak rate of 0.1081 gpm, and was informed that some

---

[28] Although the short-term practice of rounding off test results to one significant figure is of some interest in understanding this sequence of events, evidence bearing on the question of who initiated a discussion of rounding off is in conflict and the conflict need not be resolved.

[29] Between March 1978 and March 1979, Fels was the engineer assigned to start up and check the TMI-2 computer systems. Board Exh. 1-A, Stier Report, Vol. II(A), Fels Summary at 1. He was the individual who installed the computerized leak rate test program at TMI-2. *Id.*, Vol. VI(C), Fels 2/25/85 Interview at 2.

amount of leakage had been identified and a computer input error found and corrected, both reducing unidentified leakage. Board Exh. 20, Haverkamp Testimony at 6-7; Tr. 2054-57, 2131 (Haverkamp). Statements about an identification of leakage and a correction of a computer input error were repeated in the subsequent Licensee Event Report (LER) and are addressed below.

III. COMMISSION QUESTIONS CONCERNING TECHNICAL SPECIFICATIONS AND RESPONSES TO OCTOBER 1978 INSPECTION

A. Incorrect Interpretations of Technical Specifications and Inadequate Corrective Actions

The first group of issues the Commission requested the Board to address is separated into three parts for clarity. We quote and address them, below.

> How were the Technical Specification 3.4.6.2 requirements for reactor coolant system unidentified leakage interpreted and implemented by control room operators (CROs), shift foremen, shift supervisors and onsite and offsite management?

1. From the period of time when leak rate testing began in March 1978 to October 1978, virtually all Operations Department personnel, including CROs, shift foremen, shift supervisors, and the Superintendent of Operations, Mr. Floyd, generally worked under an interpretation that Tech Spec 3.4.6.2 and its corresponding surveillance requirement, Tech Spec 4.4.6.2, required entry into the Action Statement only if they were unable to obtain a leak rate test result of 1 gpm or less once in a 72-hour period. If such a result were obtained, any other tests run during the same period and showing excessive leakage were not considered to require entry into the Action Statement. *See, e.g.*, Congdon, ff. Tr. 2709 at 2; Board Exh. 1-A, Stier Report, Vol. VI(G), Illjes 2/7/85 Interview at 14; Cooper, ff. Tr. 2835 at 5; Hitz, ff. Tr. 3644 at 3; Bryan, ff. Tr. 4540 at 2; McGovern, ff. Tr. 3148 at 3; Tr. 3151-52 (McGovern). Floyd, ff. Tr. 4894 at 3; Tr. 4753-57 (Seelinger). This erroneous interpretation contributed to a practice whereby tests greater than 1 gpm were discarded and tests of 1 gpm or less were filed. *See, e.g.*, Tr. 2715-16 (Congdon); Hitz, ff. Tr. 3664 at 3; Adams, ff. Tr. 3776 at 2; Tr. 3614-15 (A. Miller); *see also* Board Exh. 1-A, Stier Report, Vol. I at 58-59.

2. Some operators at times would search for leakage or "eyeball" plant parameters for indications of excessive leakage after obtaining a test greater than 1 gpm, but most of them would not make any efforts to determine the validity of a test before discarding it. The lack of such efforts was particularly true during the last 3 months of operation. *See, e.g.*, Tr. 2714-16 (Congdon);

Tr. 2522-24 (Faust); Tr. 3109-11 (Conaway); Tr. 4117-18 (Guthrie); Tr. 4241-47, 4252-53 (Hoyt); Smith, ff. Tr. 4331 at 4; Tr. 4359-62 (Smith); Tr. 4545-46 (Bryan). Virtually all of the operators, in effect, were simply going through the motions of conducting leak rate tests to satisfy a procedural requirement, without regard to the validity of the test.

3. The responsibilities of management above the level of TMI-2 Superintendent of Operations for interpretation of Tech Specs and other issues in this proceeding are discussed in pp. 736-42, below.

B. "Following the Discovery by an NRC Inspector in October 1978 That Technical Specification 3.4.6.2 Requirements Were Not Properly Interpreted or Implemented, What Corrective Action Was Taken by Management Personnel?"

4. Late on October 18, PORC met and determined that a reportable occurrence had occurred when the limiting condition for operation for Tech Spec 3.4.6.2 was not invoked at 7:35 p.m. on October 16 when a leak rate of 2.6 gpm was obtained. Tr. 4780-81 (Seelinger); *see also* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 31 (Seelinger 10/19/78 Letter to Grier ("Grier Letter")).

5. In the afternoon of October 19, Seelinger informed Haverkamp, who was still on site, that PORC had met to review operation of the facility during October 16-18 with unidentified leakage greater than 1 gpm and that PORC had determined the matter to be a reportable occurrence. Board Exh. 20, Haverkamp Testimony at 6-7.

6. Later in the day on October 19, Seelinger sent a letter to Boyce Grier, Director of Regulatory Operations at NRC's Region I, informing him of the reportable occurrence. Board Exh. 1-A, Stier Report, Vol. V(C), Tab 31 (Grier Letter). Bezilla, TMI-2 Procedure Coordinator and PORC secretary, wrote the body of the Grier letter; Seelinger probably made corrections to it. *Id.*, Vol. VI(A), Bezilla 2/22/85 Interview at 15-22.

7. The Grier letter also contains the statement that "[u]nidentified leakage was reduced to [Tech Spec] limits at 0735 on 10-18-78" but does not state that rounding off was the method of reduction. We find that the statement is misleading.

8. On October 20, Floyd issued an Operations Memorandum to the TMI-2 shift foremen and supervisors explaining in the first two paragraphs, respectively, that (1) the leak rate computer program had been modified to round off and (2) "[i]f the unidentified leakage is equal to or greater than 2 gpm, then the 4-hour time clock commences with the output time of the printout i.e., the time the final data was taken." Board Exh. 1-A, Stier Report, Vol. V(C), Tab 34 (Floyd 10/28/78 Operations Memorandum); *see also* Tr. 4934-44 (Floyd). The Board finds that the second paragraph was a poorly phrased and under the

circumstances, completely inadequate attempt by Floyd to instruct the operators about the need to enter the Action Statement immediately on obtaining a valid test equal to or greater than 2 gpm.[30] The Board also finds that Floyd, as the member of onsite management responsible for the memorandum and the overall supervision of the operators, had the duty to take whatever followup actions were necessary to implement the memorandum, including specific discussions of the subject with shift supervisors. Such actions were never taken.

9. During the week following the October 18 inspection, Haverkamp telephoned NRR to determine the acceptability of rounding off. Board Exh. 20, Haverkamp Testimony at 8-9. Haverkamp was informed that the rounding off of test data was not an allowable practice and conveyed this conclusion by phone to Seelinger, who stated that the rounding off practice would not be employed. *Id.* Seelinger admitted that in this conversation between Haverkamp and him, which Seelinger estimated occurred 10 days after the inspection, or approximately on October 28, he "wasn't terribly straightforward" with Haverkamp about the extent to which the rounding off practice had been relied on to achieve acceptable results. Tr. 4772-74 (Seelinger). The record indicates that the rounding off practice was actually terminated beginning on October 27. *See* Board Exh. 1-A, Stier Report, Vol. I at 143.

10. Sometime after the decision by PORC that a reportable occurrence had occurred, Seelinger asked Bezilla and James Stair, the licensing engineer responsible for writing up LERs (Board Exh. 1-A, Stier Report, Vol. VI(K), Stair 3/1/85 Interview at 2), to assist him in drafting the 14-day followup LER. *Id.*, Vol. VI(A), Bezilla 2/22/85 Interview at 19. Stair spent a total of about 1 1/2 hours on work related to the LER, including talking with the cognizant engineer, on whom he relied for factual information, drafting the original words of the LER, and attending the PORC meeting where the LER was reviewed and edited. *Id.*, Vol. VI(K), Stair 3/1/85 Interview at 11-20; *see also* Tr. 4641 (Seelinger); Board Exh. 1-A, Stier Report, Vol. VI(A), Bezilla 2/22/85 Interview at 24. PORC met and provided input to the LER on October 31, when a final draft LER was prepared and submitted to typing by Stair. Board Exh. 1-A, Stier Report, Vol. V(C), Tab 32 (Accountability Checksheet).

11. Sometime after the October 31 PORC meeting, Seelinger in his capacity as PORC Chairman sent the LER with a one-paragraph Narrative to George Troffer, Manager of Quality Assurance, in Reading. *See id.*, Tab 28 (Seelinger Memorandum to Troffer); Tr. 4647-51 (Seelinger). On November 1, 1978, Herbein formally submitted the completed LER with a revised three-paragraph Narrative to Grier at the NRC. *See* Board Exh. 1-A, Stier Report, Vol. V(C),

---

[30] Floyd's reference to 2 gpm is appropriate because reprogramming the computer to round off meant that leak rates of 1.01-1.49 gpm would round off to 1, an acceptable number, whereas leak rates of 1.50-2.49 gpm would round off to 2, an unacceptable number.

Tab 29 (Herbein 11/1/78 Letter to Grier). These two versions of the LER Narrative (i.e., the one-paragraph version drafted at the site and forwarded to management at Reading after PORC approval and the three-paragraph version that ultimately accompanied the LER forwarded to NRC by Herbein) contained several erroneous or questionable statements in common: (1) the reference to 10:00 a.m. on October 19 when a determination was made that the Tech Specs had been violated; (2) the statement that reduction of unidentified leakage to within allowable limits was accomplished at 7:35 a.m. on October 18; (3) two statements concerning discovery and correction of errors in inputting data to the computer; and (4) the statement that appropriate personnel would be instructed on the relevant requirements of the Tech Specs and surveillance procedures. These statements are discussed, *seriatim*.

12. The first phrase of both Narratives repeats the inaccurate time and date that appeared in the Grier letter — 10:00 a.m. on October 19 — when Seelinger stated the determination was made that the Tech Specs had been violated. Although either Stair or Bezilla may have written this phrase, the source of the phrase was Seelinger. Mr. Seelinger's best recollection of why the time and date were misreported was that although the PORC had met on the 18th (late in the day) Mr. Floyd did not attend the meeting, and he was not "brought on board" until 10 o'clock on the 19th. Tr. 4780-82 (Seelinger). Inasmuch as NRC Inspector Haverkamp, to Seelinger's knowledge, was already aware of the situation since his discovery of it on the 18th, the Board finds that this error was probably innocent and was, in any event, inconsequential.

13. Both "narrative" versions state that action was being taken to reduce the unidentified leakage to within allowable limits and that that was accomplished at 7:35 a.m. on October 18. Seelinger was aware, however, that the only action then being taken to reduce unidentified leakage was simply to round off, not to identify or correct leakage. *See* Tr. 4685-701 (Seelinger). Furthermore, even the rounding off was done retroactively, since Floyd approved of the 7:35 a.m. test at noon. *See* § II, ¶ 38. Thus the "accomplishment" at 7:35 a.m. of reducing leakage to within allowable limits was merely a retroactive paper change, not a real change in the leak rate. The Board does find, however, that unidentified leakage was reduced to below 1 gpm around noon on October 18, not by rounding off, but by identifying leakage. *See* NRR Tests 12E, 13, 14.

14. After the transmittal of the one-paragraph Narrative to Troffer in Reading, the format of the Narrative was changed to three paragraphs, minor changes were made, and, of significance, the phrase "by determining a portion of this to be identified leakage from the Reactor Coolant System and to be well within the limits of Tech. Spec. 3.4.6.2c" was added to describe, purportedly, how reduction of unidentified leakage was accomplished at 7:35 a.m. on October 18. *See* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 29 (Herbein 11/1/78 Letter to Grier); Tr. 4685-88 (Seelinger). As discussed above, the only "reduction" at

that time appears to have been by retroactive rounding off, a fact that was not disclosed to the NRC, nor apparently to Met-Ed management including Miller and Herbein. Although the Board has been unable to determine the source and reason for this erroneous language, Seelinger testified that it is unlikely that someone in Reading changed the Narrative without first checking with someone at TMI. Tr. 4651-61 (Seelinger).

15. The Narratives also contain two incorrect statements concerning the input of data to the computer: (1) "In addition, it was discovered that errors in inputting data to computer caused indicated leakage to be greater than actually was occurring" and (2) "[i]nput data for the computer program which calculates unidentified leakage has also been clarified." *See* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 28 (one-paragraph Narrative). Fels testified that input data had not been clarified as of November 1. Tr. 4529 (Fels); *see generally* Tr. 4512-31 (Fels). In fact, the only involvement Fels had with any generic computer problem associated with the leak rate test occurred sometime between November 9 and November 22, well after the LER had been drafted, approved, and sent to the NRC. Tr. 4514-17, 4528-29 (Fels). In that period of time, Fels discussed the possibility of program errors and decided to add a note to the program heading stating that a decimal point must be entered with leakage values. Tr. 4515 (Fels); *compare* NRR Test No. 40 (11/9/78) with NRR Test No. 41 (11/22/78). The only involvement prior to November 9 that Fels could recall having was limited to a specific test, NRR Test No. 14 conducted on October 18, where Fels may have told the operators involved to redo the calculation using the correct sign because the leakage sign convention looked wrong. Tr. 4520-31 (Fels); *see* NRR Test No. 14.

16. Seelinger testified that he partially drafted the first computer-related sentence and that he entirely drafted the second one. Tr. 4640-44, 4407 (Seelinger). In any event, he obviously approved both sentences at the time of the drafting of the one-paragraph Narrative. Seelinger stated that his practice was to rely on Fels for computer matters. Tr. 4704 (Seelinger). Seelinger also stated that, having heard the testimony by Fels, he believed that "Fels and I may have been on a different wavelength" when they discussed a possible program problem, with Fels stating something specific and Seelinger hearing something generic. Tr. 4705-07 (Seelinger). Finally, Seelinger stated that he vaguely recalled that within the few weeks following October 18, he went to Bezilla, the PORC Secretary, and asked him to request a writeup from Fels on the supposed clarification of computer input data, but Bezilla was "unsuccessful" in obtaining such a writeup. Tr. 4706-07 (Seelinger). Seelinger felt "some sense of resistance" but did not understand why and did not pursue the matter. *Id.* The request for a writeup was apparently withdrawn at Seelinger's request. *See* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 30 (TMI-2 PORC Action Items, § III).

17. The Board finds the LER to be flawed in several respects. Given the numerous errors concerning times, dates, and circumstances, it falls short as a straightforward description of the event. Indeed, the Board strongly suspects that at least some of the errors were not inadvertent, but reflected a conscious attempt to put the best light possible on the incident. Given the collective authorship of the document, however, it is not possible to assign responsibility for such an attempt to any specific person. More importantly, however, the LER conveyed no clear explanation to the operating personnel that their interpretation of the Tech Specs had been wrong, and that they were required to enter the Action Statement whenever a leak rate test reflected leakage in excess of 1 gpm and there was no valid basis for declaring the particular test invalid. The only information in that regard was the statement in the Narrative that "[t]he appropriate personnel will be instructed on the requirements of the applicable sections of the Tech Specs and the requirements to immediately invoke applicable action statements when the provisions of limiting conditions for operation are not met." This was, at most, a present promise of a future instruction which, as we next discuss, was never effectively carried out.

18. Walter J. Marshall, one of two Operations engineers assigned to Floyd, was given the responsibility for implementing and following up on the LER; in particular, the PORC Action Item specified that Marshall was to ensure that the Narrative sentence on instruction of appropriate personnel was "documented by Ops review" of the LER. *See* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 30 (TMI-2 PORC Action Items, § III; *see also* Tr. 4389-96 (Marshall)). The PORC Action Item initially was given a due date of November 20 and was signed by Seelinger; however, the "Document Review" form (i.e., "signature sheet") required review of the LER by November 10. *See* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 30 (PORC Action Item Sheet and Document Review Form). Someone other than Marshall filled in the signature sheet requiring the 10-day turnaround. Tr. 4396-97 (Marshall).

19. Marshall stated that the phrase "documented by Ops review" meant "that the document went to the Control Room with the cover sheet and that the operators had the opportunity to initial and read it." Tr. 4398 (Marshall). Marshall explained that he fulfilled his followup responsibility simply by making sure the LER and a signature sheet were placed in the three-ring notebook in the Control Room with other LERs and by reviewing the binder periodically to see if any CROs, shift foremen, and shift supervisors had still not signed the sheet indicating their review. Tr. 4397-400, 4408-09, 4414-16 (Marshall); *see also* Tr. 4713-14, 4664-68 (Seelinger); Tr. 4943-44 (Floyd). If someone had not signed the signature sheet, Marshall "would tell the group to take a look at it and sign it." Tr. 4409 (Marshall). No one has claimed that Marshall had any further responsibilities concerning this Action Item.

C. "Was the Corrective Action Taken Sufficient to Ensure Compliance with the Technical Specification 3.4.6.2 by the Personnel Performing and Reviewing the Leak Rate Surveillance Tests?"

20. The signature sheet attached to the LER indicates that all the CROs, shift foremen, and shift supervisors (with the exception of Bryan) signed the signature sheet indicating their review. *See* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 30 (Document Review Form); Tr. 4574-80, 4608-09 (Bryan). However, mere placement of the LER in the Control Room binder evidently did not constitute sufficient instruction of appropriate personnel. Operator after operator testified that he never received any clear instruction on the correct interpretation of the Tech Spec following the LER. *See, e.g.*, Tr. 3699-700 (Hitz); Tr. 3619-20 (A. Miller); Tr. 4455 (Phillippe); Tr. 4573-80 (Bryan); Tr. 2718-19 (Congdon); Tr. 2967-69 (Zewe); Tr. 3858-59 (Mehler); Tr. 3818-19 (Adams); Tr. 3244-46 (Mell); Tr. 3083-84 (Illjes); Tr. 3115-16 (Conaway); Cooper, ff. Tr. 2835 at 6-7; Bryan, ff. Tr. 4540 at 5.

21. Only one operator, Dennis Olson, testified that he changed his practice in some respects following the LER. *See* Tr. 4007-09 (Olson); Olson, ff. Tr. 3911 at 3-4. Olson stated that he was "pretty sure" that out of the LER came the word not to discard bad tests and not to accept negative tests. Tr. 4007-09 (Olson). Even Olson, however, nowhere suggests that he received instructions on the requirements to enter the Action Statement whenever a test showed unidentified leakage over 1 gpm.

22. In sum, operators had at least three possible ways of receiving instruction on the requirements of the Tech Specs and surveillance procedures pertaining to leak rate testing. First, superiors like Floyd, and to a lesser extent Seelinger, who were aware of the need for such instruction following Haverkamp's inspection, could have directly communicated with the Operations Department personnel. The record is clear, however, that effective direct communications never took place. Second, Floyd's October 20 Operations Memorandum to shift foremen and supervisors was an attempt to ensure that operators were instructed on proper leak rate practice. The cryptic language of the critical second paragraph of the Memorandum, however, led to the failure of this attempt also. The record indicates no further efforts by Floyd to elucidate the meaning of the Memorandum. (Seelinger even speculated that operators may have interpreted Floyd's putting an "X" through his October 20 memo after learning that the rounding off practice should be terminated to mean cancellation of the entire memo, not only the first paragraph, which dealt with rounding off, and a return to the practice prior to the LER. *See* Tr. 4680-81 (Seelinger); Board Exh. 1-A, Stier Report, Vol. V(C), Tab 34 (Floyd 10/20/78 Operations Memorandum)). Third, placement of the LER itself in a required reading book gave the operators potential notice of the problem but resulted in virtually no

instruction to them or change in practices. The record does not indicate any further meeting or memorandum to fulfill the promise of instructing appropriate personnel. The record is clear that operators did not receive adequate instruction by any means on the requirements of the Tech Specs and leak rate test surveillance procedures growing out of the October 18 inspection.

23. The Board concludes that, despite the apparent review of the LER and the October 20 Floyd Operations Memorandum by the operators, the operators following the Haverkamp inspection did not change their general practice of repeatedly running tests and discarding bad tests based on misunderstanding the Tech Specs only to require one "good" test every 72 hours.

24. Initially scheduled for completion by November 20, 1978, the PORC Action Item had its due date extended to "no later than December 15, 1978" because "plant problems and test program" had "overshadowed" the item. *See* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 30 (TMI-2 PORC Action Item Extension). Despite the force of the language "no later than December 15, 1978," action relating to this item inexplicably was not completed until March 5, 1979. *See id.* (PORC Action Items). *See also* Tr. 4397-98, 4404-05 (Marshall).

25. Seelinger testified that he made the following personal efforts to implement the corrective actions described in the Narrative:

> In any event, I attempted to implement the corrective actions described in the Narrative by assuring myself that Mr. Floyd followed Mr. Haverkamp's interpretation (which he appears to have done by issuing his Operations Memorandum dated October 20, 1978), by instructing Mr. Walter Marshall (by memorandum) to inform the operators of the correct interpretation, by discussing the matter in a plan-of-the-day (POD) meeting and again at a later date on second shift with Shift Supervisor, by satisfying myself that appropriate computer changes had been made, by advising Mr. O'Hanlon (the then-Unit 1 Superintendent), in October 1978, of the NRC's interpretation of the Action Statement requirement, and by assuring myself (after I became Unit 1 Superintendent) that Unit 1 operators would also take comparable action if unidentified leakage was greater than 1 gpm.

Seelinger, ff. Tr. 4623 at 8; *see* Tr. 4669-79 (Seelinger); *see also* Board Exh. 1-A, Stier Report, Vol. V(C), Tab 36 (Seelinger 8/9/84 Letter to Palladino). The Board finds that, based on the record cited in these findings, these personal efforts, while well meant, were not adequate to correct the situation.

26. As we have already indicated (*see* § III, ¶ 22), what was needed in this situation was a sustained effort to *make certain* that the operators and their immediate supervisors understood that they had been misinterpreting a Tech Spec, and that they must *change* their interpretation and their practices with respect to leak rate tests indicating excessive leakage. In our judgment, two basic steps should have been taken: first, the problem area — including a description of the previously prevailing misinterpretation of the Tech Specs, the correct interpretation, and the Action Statement requirement — should have been

put in memorandum form in simple English, with a copy to each CRO, foreman, and supervisor. Floyd's single, cryptic sentence in his Operations Memorandum was no substitute for a full and clear informational message. Second, all of the CROs, foremen, and supervisors should have been told, in face-to-face meetings, about the informational memorandum and given an opportunity to ask questions about the matter.

27. In sum, the Board finds that the efforts to implement the corrective actions articulated in the LER Narrative were totally inadequate. The members of management responsible for these efforts were primarily Floyd and to a lesser extent Seelinger. There is no indication in the record that any members of management above Seelinger and Floyd had any direct responsibility for the implementation of any corrective actions arising out of the LER.

IV. DIFFICULTIES IN PERFORMING LEAK RATE TESTS; SENIOR SUPERVISOR AND MANAGEMENT KNOWLEDGE AND RESPONSIBILITIES; PRESSURE TO OBTAIN "GOOD" TESTS

The Commission's questions in this area are quoted and discussed below.

> What difficulties, if any, were operators experiencing when conducting leak rate surveillance tests required by Technical Specification 4.4.6.2.d? Who knew about these difficulties? What corrective actions were taken? Did operators feel pressure to obtain leak rate surveillance test results which did not exceed technical specification limits? If so, what type of pressure was perceived or exerted and who was responsible?

CLI-85-18, 22 NRC at 880, Issue (b).

A. Difficulties the Operators Were Experiencing

1. The surveillance requirements of Tech Spec 4.4.6.2.d required that RCS leakages be demonstrated to be within prescribed limits by "[p]erformance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation," as well as by the other three required surveillances in this Tech Spec. Stier Report, Vol. V(B), Tab 14 (Tech Spec 4.4.6.2).

2. The TMI-2 operators typically performed a leak rate test on each 8-hour shift, in contrast to the Tech-Spec-required frequency. Stier Report, Vol. I at 51; Exh. 5-A, Enclosure 1 at 9. A test was performed by every shift if the computer was available and if the performance of other shift evolutions and responsibilities did not interfere. The practice of performing a leak rate test on every 8-hour shift was established at TMI-1 and was subsequently implemented at TMI-2. Stier Report, Vol. I at 52.

3. TMI-2 Surveillance Procedure 2301-3D1 governed the performance of the leak rate test and is set out in the Stier Report, Vol. V(C), Tab 19. The actual performance of a leak rate test was rather routine and uncomplicated. It was usually performed (although not always) by the "switching and tagging" CRO, that is, the CRO who was not manipulating the controls of the plant (i.e., "assigned to the panel"). If there were three CROs or more on shift, one would be assigned to the panels, one to "switching and tagging," and one to surveillance tests. *E.g.*, Olson Prep. St., ff. Tr. 3911 at 2-3. The CRO performing the test would instruct the computer, which was located in the TMI-2 control room, to calculate the RCS leakage by entering the appropriate code ("RCSL"). *E.g.*, Cooper Prep. St., ff. Tr. 2835 at 3-4. At the same time, the CRO would specify the time interval in which the test was to be performed (which, in practice, was always 1 hour). The computer would then conduct the leak rate test and at the end of the hour would request certain information of the CRO to complete the test. The CRO was asked to enter any identified leakage and any operator-caused change to the volumes of the RCDT or RCS. With that information, the computer would print the initial and final values of the parameters used in the leak rate test and the calculated values for the gross leakage, identified leakage, and unidentified leakage. Stier Report, Vol. 1 at 52-53; Exh. 5-A, Enclosure 1 at 2.

4. Generally, although not always, the CRO who performed the test signed the sheet printed out by the computer; on occasion, however, a licensed operator other than the CRO who performed the test signed it. Stier Report, Vol. I at 54; *e.g.*, NRR Test Nos. 96, 98, 108, 154, Tr. 3986-87. The test was then approved by an SRO, usually the shift foreman on duty during the performance of the leak rate test. Exh. 5-A, Enclosure 1 at 2.

5. Generally, the CRO performing the leak rate test would inform the CRO assigned to the panel that the computer was being instructed to conduct a leak rate test. On occasion, however, the CRO performing the test failed to so alert the CRO at the panel. This lack of communication led to occasional mistakes in the performance of the test, since the panel operator might manipulate the reactor controls to violate the "steady-state" conditions required by procedure or add water to the make-up tank without informing the operator who was performing the test. The Board infers that, since tests with such mistakes were approved, the foremen that approved the surveillance test results did not examine either the log or the make-up tank strip chart to confirm the absence of such mistakes.

6. The difficulty that the operators were experiencing was that the test results were quite variable. Successive tests during a shift or from shift to shift showed computer-calculated leak rates that were inconsistent and, therefore, unbelievable, i.e., a large leak does not spontaneously become smaller. There is near unanimity in the record that there was a lack of confidence in the computer-calculated result of this Tech-Spec-required surveillance test. Tr. 2097, 2904,

2988, 3017, 3196, 3249, 3487, 3526, 3528, 3826, 3924, 4134, 4341, 4352, 4462. The reasons for the difficulty (below) were not known to anyone in the Operations Department but were generally thought to be in the computer program.

7. The Board finds that the general knowledge that the computer-based surveillance was unreliable and erroneous should have led the operators, with concurrence from the shift foremen and shift supervisors, to use the manual procedure that also is part of the TMI-2 Surveillance Procedure 2301-3D1.

8. The operators were not obliged to file or foremen to approve these many dubious test results. They failed to follow Administrative Procedure 1010 to conclude that the tests were not satisfactory and classify them as either an exception or deficiency (*see* § II, ¶ 19). During the hearing, the Board inquired of a sufficient number of the Operations Department personnel to find the Exception and Deficiency mechanism was well known to them and used in other surveillance tests. Tr. 2177, 2194, 2222, 2268, 2545, 2672, 2795, 3524, 3648, 4077, 4345, 4587, and 4992.

9. The causes of the difficulties the operators were experiencing when conducting the leak rate tests generally fall into one of three categories: (a) procedure errors, (b) instrument inaccuracies, and (c) oscillations in plant conditions. The effects in each of these categories had some potential to cause the test to reflect a result other than actual unidentified leakage. In addition to the difficulties the operators were experiencing in conducting the leak rate test, there were certain idiosyncrasies associated with the implementation of the leak rate test that contributed to the operating personnel's negative or confused reaction to the test performance.

10. The record indicates that the degree of error caused by each of the difficulties was not necessarily cumulative. In some instances the errors cancelled each other out (Tr. 888 (Kirkpatrick)) or a particular error was not present because of plant conditions at the time of the test (Tr. 891 (Russell)).

Procedure Errors

11. The technical experts identified thirteen procedure errors that could have produced leak rate test results at variance from the true values. The degree of variance would have been dependent on the conditions existing at the time each test was performed. Board Exh. 1-A, Stier Report, Vol. IV(A) at III.3-III.4; Kirkpatrick, ff. Tr. 376 at 18-20 and Attachment 4. Four of these errors were quantitatively important.

1. Lack of RCDT Density Compensation

12. The leak rate test procedure failed to correct for a difference in density that existed between RCS leakage collected in the Reactor Coolant Drain Tank ("RCDT") and the water in the RCS itself. The difference in density was caused by the different temperatures of the water in the RCDT and in the reactor. This defect in the leak rate test procedure produced a significant error in the test calculation and seriously compromised the accuracy of the test. Faegre & Benson Report, Vol. 1 at 21-22; Stier Report, Vol. IV(A), § III, Table III-2; *id.*, Appendix A at A.16-A.18; Kirkpatrick & Wermiel Prep. St., ff. Tr. 376, Attachment 4.

13. Average RCS temperature was approximately 581°F. Stier Report, Vol. IV(A), § VI at VI.4. The RCS leakage collected in the RCDT was cooled to approximately 85°F. The failure of the leak rate test procedure to account for this difference produced an error that was typically about 40% of the total RCS leakage added to the RCDT during a leak rate test. Tr. 853-54; Faegre & Benson Report, Vol. 1 at 21. "The temperature compensation error was significant and affected virtually every leak rate test." Faegre & Benson Report, Vol. 1 at 22. The impact of the error on calculated unidentified leakage ranged between 0.07 and 2.10 gpm. Stier Report, Vol. IV(A), § III, Table III-2; Tr. 843. This was "a very significant error." Tr. 843. For example, if the actual unidentified leakage was zero but the identified leakage collected in the RCDT was 2 gpm, the value for unidentified leakage increased by 1 gpm due solely to this error. Tr. 844. From mid-February 1979 to March 16, 1979, identified leakage exceeded 2 gpm. Tr. 844-45, 848; Stier Report, Vol. IV(A), § IV, Figure IV-14 (RCDT collection rate and other identified leakage).

14. This defect in the TMI-2 leak rate test procedure was corrected by a Temporary Change Notice ("TCN") that became effective on March 16, 1979, 12 days before the TMI-2 accident. Stier Report, Vol. V(C), Tab 21. The TCN required that each leak rate test be corrected by a hand calculation to compensate for the failure of the test procedure to correct the temperature of the RCS leakage to the average temperature of the RCS. Tr. 857; Faegre & Benson Report, Vol. 1 at 22. There is no evidence in the record that explains how this defect was discovered or why it took so long to discover it. Tr. 858.

2. Lack of Density Correction for Additions to the MUT

15. The leak rate test procedure failed to account for the difference in density between water in the MUT and in the reactor because of the difference between the temperature of the water added to the MUT and the average temperature of the RCS. Stier Report, Vol. IV(B), Appendix A at A.16-A.18; *id.*, Vol. IV(A), § III, Table III-2; Faegre & Benson Report, Vol. 1 at 21-22. This

defect produced an error in a leak rate test result if water was added to the MUT during a test.

16. According to the Stier Report, there were thirty-one leak rate tests during which water was added. Stier Report, Vol. IV(A), § VI, Table VI-1 (listing 31 of 222 tests evaluated). Therefore, the failure to correct for the difference in density between water added to the MUT and water in the reactor did not affect every leak rate test. In any event, this error would have offset (in whole or in part, depending upon the amount of water added) the corresponding error in the leakage to the RCDT, if both occurred during a leak rate test, until the TCN was adopted on March 16, 1979. Tr. 1958 (Stier).

17. The failure to account for the difference in density between additions to the MUT and in the reactor was not discovered and corrected until August 21, 1979, after the TMI-2 accident. Tr. 878-79. No technical witness could explain why this defect was not discovered when the RCDT temperature compensation error was corrected by the March 16, 1979 TCN. Tr. 881. It is clear that the TCN should have corrected the leak rate test procedure for both the MUT and RCDT density differences (and, to be precise, the difference in density between identified leakage other than that collected in the RCDT and the density of RCS inventory at average RCS temperature).

3. RCS Temperature Was Not Correctly Entered if Temperature Exceeded 582°F

18. The TMI-2 leak rate test procedure failed to account for changes in the RCS temperature when it exceeded 582°F. Stier Report, Vol. IV(B), Appendix A at A.18-A.19. An RCS temperature of 582°F was used in the leak rate test procedure when the RCS temperature exceeded 582°F. This defect produced an error of 2.49 gpm in the test calculation for every degree of change in the temperature above 582°F. Tr. 885; Stier Report, Vol. IV(B), Appendix A at A.18. There is no explanation in the record for the failure of the test procedure to account for changes in the RCS temperature when it exceeded 582°F. Tr. 803, 882. Mr. Kirkpatrick suggested that the test was based on the TMI-1 leak rate test procedure and that 582°F was "an acceptable limit [at TMI-1] because the plant hardly ever got above 582 degrees Fahrenheit." Tr. 882. But at TMI-2, the evidence indicates that the RCS temperature exceeded 582°F in approximately fifty filed leak rate tests (Tr. 803, 883-86 (49 out of 161 tests); Tr. 885-86 (54 out of 170 tests); Stier Report, Vol. IV(B), Appendix A at A.18 (54 tests).

19. The failure of the leak rate test procedure to account for changes in RCS temperature when it exceeded 582°F frequently produced errors in the leak rate test results of up to 1 gpm. Tr. 803, 883-86; Stier Report, Vol. IV(B), Appendix A at A.18; *id.*, Vol. IV(A), § III, Table III-2; Kirkpatrick & Wermiel Prep. St., ff. Tr. 376, Attachment 4, Table 1. An error of approximately 1 gpm occurred

if temperature changed 0.5°F. Tr. 805, 883. However, in one test, on September 22, 1978, RCS temperature changed 1.5°F, which caused an error in the test result of several gpm. Tr. 885; Stier Report, Vol. IV(B), Appendix A at A.19.

4. RCS Pressure Differences Were Not Accurately Taken into Account

20. The TMI-2 leak rate test procedure failed to consider accurately the changes in the RCS pressure. Stier Report, Vol. IV(B), Appendix A at A.7, A.11; Faegre & Benson Report, Vol. 1 at 22-23. If the RCS was maintained in steady state (with respect to pressure), there would be no impact on the leak rate test as a result of this error. However, RCS pressure was not a variable that was within the control of the TMI-2 operators. Tr. 760-61.

21. Changes in RCS pressure often had a "significant impact on the leak rate test." Tr. 761. A change in the RCS pressure of ± 50 pounds per square inch (psi) "was typical of the test" (Tr. 762), and produced an error of 1.08 gpm in the test result. Stier Report, Vol. IV(B), Appendix A at A-11.

22. Staff witnesses Kirkpatrick and Wermiel agreed that the failure of the TMI-2 leak rate test procedure to account for the changes in the RCS pressure "had a very significant effect on the error in the leak rate calculation." Tr. 771, 786-87. The Faegre & Benson analysis (based on an RCS pressure change of 15 psi) and the Stier analysis (based on an RCS pressure change of 50 psi) are in substantial agreement. Tr. 785. There is no systematic analysis of the changes in the RCS pressure at TMI-2 in 1978 and 1979. However, the technical experts indicated that the typical change ranged from 20 to 50 psi during a leak rate test. Tr. 802-03. On at least one occasion, during January 4-5, 1979, a change in the RCS pressure of 60 to 65 psi produced an error in a leak rate test result of 2 gpm. Tr. 778-80, 785.

Instrument Errors

23. The normal instrument errors associated with the TMI-2 leak rate test procedure naturally affect the accuracy of the measurements used in the test. These measurements included the temperature in the two RCS hot legs, the temperature in two of the four cold legs, the pressurizer level, the MUT level, and the RCDT level. Stier Report, Vol. IV(B), Appendix A at A.6-A.7. The impact of these normal instrument errors was estimated by the technical witnesses. *Id.*, Vol. IV(A), § III at III.8-III.10; *id.*, Vol. IV(B), Appendix A at A.19-A.27. Kirkpatrick & Wermiel Prep. St., ff. Tr. 376, Attachment 4, Table 2; Faegre & Benson Report, Vol. 1 at 24-26. The cumulative impact of these normal instrument errors might have produced an error in a leak rate test of between 0.7 and 1.24 gpm, with a probability of 1 in 20, i.e., these values correspond

to approximately 2 standard deviations. Tr. 894 (1 gpm) (Kirkpatrick); Tr. 895 (1.24 gpm) (Rockwell); Tr. 896 (0.7 gpm) (Stier).

24. These normal instrument errors were, according to Mr. Kirkpatrick, "the kind of instrument error that you would expect in any kind of installation like this." Tr. 897. The effect of these errors could have been reduced by the performance of a leak rate test for more than the 1-hour test interval that was always used at TMI-2. Tr. 897. Mr. Moore testified that "we've learned a lot in these last few years and that, today, people are running longer tests. . . ." Tr. 936. Mr. Kirkpatrick testified that Regulatory Guide 1.45 fails to discuss normal instrument errors. Tr. 934.

25. In June 1983, the NRC published NUREG-0986, entitled "RCSLK8: Reactor Coolant System Leak Rate Determination for PWRs." In that report, the NRC Staff recommended a test interval of 4 hours. Tr. 950. Prior to the publication of NUREG-0986, there was no recommendation on the part of the NRC concerning the leak rate test interval. Tr. 951. Mr. Kirkpatrick testified that the random error would be approximately 0.1 gpm if the test were performed over an 8-hour interval, 0.2 gpm over a 4-hour interval, and 0.34 gpm in a 2-hour interval. Tr. 953-54. Given that it was not until June 1983 that the NRC recognized in print the advantage of performing the leak rate test over these longer intervals, we do not fault the TMI-2 operators for failing to do so.

26. In addition to the above "normal" instrument errors, the technical witnesses agreed on the existence of a defect in the MUT level sensor that produced errors. This defect may have been the result of a loop in the *dry* reference leg of that instrument, which on occasion, it is hypothesized, became filled with water from the MUT. This could produce a "loop seal" effect in that the pressure in the MUT tank gas phase would not be accurately transmitted to the sensor. Stier Report, Vol. IV(A), § III at III.10-III.12; *id.*, Vol. IV(B), Appendix A at A.27-A.32; *id.*, Figure A-4; Kirkpatrick & Wermiel Prep. St., ff. Tr. 376 at 25-29 and Attachment 5; Faegre & Benson Report, Vol. 2 at 68-69; *id.*, Vol. 3A, Exhs. 22-31; *id.*, Vol. 1 at 23-24.

27. The defect in the MUT level sensor was not conclusively established in the record to be the result of a "loop seal" effect. Tr. 960, 963-65, 972, 995-96. A defect in the MUT level sensor existed, and the existence of the "loop seal" effect is "a reasonable hypothesis." Tr. 965 (Stier). However, we agree with Mr. Stier that it is not critical to understand whether the defect was caused by the "loop seal" effect or by something else. *Id.* The important point is that some operators were aware of the defect and used it to affect tests, as discussed below.

28. The existence of a "loop seal" in the dry reference leg of the TMI-2 MUT level sensor could have had "a very significant effect under certain circumstances." Tr. 968 (Kirkpatrick). A positive bias might occur if water or hydrogen was added to the MUT, or a negative bias might exist as the MUT

level decreased during a leak rate test. Tr. 968-69. The existence of a "loop seal" in the MUT dry reference leg could have resulted in an overstatement in the change in the MUT level during a leak rate test. Stier Report, Vol. IV(B), Appendix A at 27; Tr. 975. According to Stier, the effect of the overstatement in MUT level could have been as high as 30%. Tr. 991 (Stier); *see also* Tr. 992-94 (Kirkpatrick).

29. The operators were not aware of the "loop seal" but rather some operators became aware that a water addition might be overindicated by the MUT level sensor and cause an erroneous "bonus" that would affect the computed leak rate. The technical experts also postulated that the "loop seal" was the cause of the spurious increase in the MUT level signal that sometimes occurred when hydrogen was added to the MUT. Kirkpatrick & Wermiel, ff. Tr. 376, at 26. These defects provided an opportunity for operators to manipulate the leak rate tests by adding either water or hydrogen to the MUT during the tests. We review the record to ascertain the evidence for individual responsibility in § F, below.

30. The "loop seal" effect was not discovered by the NRC until 1980, during the initial investigation of the allegations raised by Mr. Hartman. Tr. 983. There is evidence in the record to suggest that Met-Ed should have discovered the problem prior to 1980:

> B&W anticipated the possibility of certain problems with a dry-reference-leg system and suggested measures to minimize those problems. In particular, B&W suggested a reference leg with a condensate loop and draining capabilities. The suggestion was not incorporated in the actual modification as identified in the vendor's instruction manual. Incorporating the vendor's suggestion probably would have avoided the physical condition which may have allowed hydrogen additions to the make-up tank to affect level instrumentations.

Faegre & Benson Report, Vol. 2 at 63 n.* (footnotes omitted).

31. Met-Ed should have discovered and corrected this leak rate test defect well in advance of its discovery by the NRC in 1980. Tr. 1066 (Kirkpatrick) ("there were several indications of the loop seal problem which Met-Ed should have investigated but did not"); Tr. 1068 (Rockwell) ("any engineer looking at the configuration would recognize the potential for a problem"). As Mr. Kirkpatrick observed, "any competent instrument design engineer should have realized that accumulation of water in this — in a low spot would have caused instrument problems." Tr. 1079. We note that Mr. Chwastyk, Shift B Supervisor, testified that the reference was frequently "blown out," Tr. 3477, and that he had asked I&C to check the reference leg. Tr. 3473-75. Even so, the problem was not corrected.

Oscillations in Plant Conditions

32. Another defect in the TMI-2 leak rate tests was the impact of RCS oscillations on the calculation of the RCS leakage by the computer during the performance of a test. Stier Report, Vol. IV(A) at III.13-III.15; *id.*, Vol. IV(B), Appendix A at A.34-A.36; Faegre & Benson Report, Vol. 1 at 25; *id.*, Vol. 2 at 93-108; *id.*, Vol. 3B, Exhs. 37-42; Kirkpatrick and Wermiel Prep. St., ff. Tr. 376 at 17-18. The oscillations occurred in the RCS temperature and pressure, the pressurizer level, and the MUT level. The impact of these oscillations produced "a significant effect on the leak rate test results." Faegre & Benson Report, Vol. 1 at 25.

33. Mr. Moore testified that the oscillations were the result of a problem with the integrated control system. Tr. 1095-96. These oscillations caused similar oscillations in the RCS, thereby affecting the leak rate test and compromising its ability to quantify RCS leakage. Tr. 1097 (Russell) ("the oscillations caused high variability in the computed unidentified leak rate"), Tr. 1098 (Rockwell) ("there was a direct correlation between the oscillation in these plant parameters and the oscillation in the leak rate test results.")

34. If the oscillations in these parameters took place simultaneously or in phase, the leak rate procedure would have compensated for small changes in the values, which is the purpose of recording the magnitude of all these parameters three times at the beginning and end of the test. However, the analysis by Faegre & Benson found that these parameters did not vary in phase. Exh. 2, Faegre & Benson Report, Vol. 2 at 99. They used some reactimeter data for January 4-5, 1979, that recorded the plant parameters every 3 seconds to calculate a large series of leak rates, starting the calculations 3 seconds later on each successive calculation. Figure 1 shows a sample of the results. Faegre & Benson Report, Vol. 3B, Exh. 38-1. As may be seen for this particular data set, an operator could have obtained a gross leak rate test result ranging from 0.7 gpm to 3.3 gpm for gross or total leakage. The identified leakage was approximately 0.6 gpm, so that unidentified leakage would have ranged from 2.7 gpm to 0.1 gpm. This example may represent a time of near maximum oscillations but clearly shows that variable test results would have been obtained by the operator and that *any* single test was not a reliable measurement of leakage due to this problem.

35. The GPU Nuclear Proposed Finding 152 quotes the MPR report as stating:

> At worst, the effect of the oscillation would cause an additional error of the same magnitude as the instrument errors. On a "typical" basis the additional error would be less. Since it is independent of the instrument errors, it would combine with them on a random basis, producing only a minor increase on the overall expected error.

Exh. 1-A, Stier Report, Vol. IV(B) at A.36.

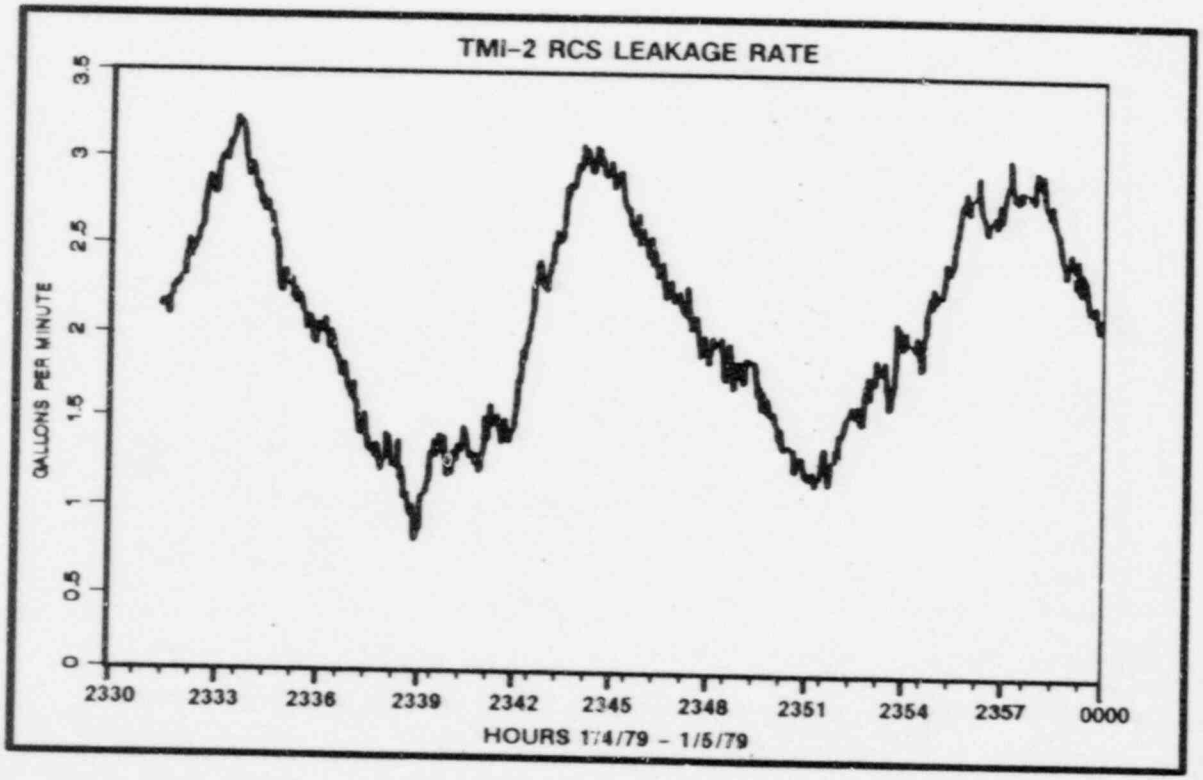

Figure 1. Gross Leakage Calculations, from Exh. 38 in Board Exh. 2. *See* § IV, ¶ 34.

36. The Board does not agree with this quote. If there are two independent sources of error, they would combine to produce a total variability (expressed as a standard deviation) equal to the square root of the sum of squares of the individual standard deviations.[31] For equal-sized errors, the resulting error would be 1.4 times the individual error. We find this to be a minor technical point. However, there is a more important aspect that can be seen in the data plotted in Figure 1. The data do not show a time variation or frequency of values that corresponds to a normal or Gaussian distribution, i.e., frequent small deviations from the mean value and less frequent larger deviations. In fact, the visual impression of Figure 1 is that extremely high or low values are as probable as the mean or, in fact, somewhat more probable. Conventional error analysis techniques that assume the "normal" frequency distribution are not applicable to these errors due to oscillations. We note further that the plant was in "steady state" as required by the procedure and was steadily oscillating.

37. The rapid variations (less than a minute) in Figure 1 appear to us to be a reflection of instrument errors. They are roughly 0.3-0.4 gpm rather than the 0.7-gpm to 1.24-gpm estimates provided by the expert witnesses. The Board notes that instrument errors in general at other plants may not be as great as this record would otherwise indicate. *See* § IV, ¶ 23.

38. The Board finds that the oscillations caused by the Integrated Control System at TMI-2 were a major contributor to the difficulty that the operators experienced in attempting to carry out the inventory balance surveillance test. It is clear to us that one of the reasons for specifying four surveillances in Tech Spec 4.4.6.2 is to provide redundancy or "defense-in-depth," and the problems with the inventory balance test should have led the Operations Department to utilize the containment sump inventory (required each 12 hours) to monitor leakage into containment until the ICS was adjusted properly. However, the Unit 2 Superintendent, Mr. Logan, testified "I don't think anybody ever tried to quantify by use of the sump pump or whatever a leakage." Tr. 5115.

39. The technical witnesses also testified that the sump surveillance was not properly carried out. Tr. 475-91. The failure to perform this sump inventory surveillance (4.4.6.2.a) was another violation of the Tech Spec requirements.

40. In addition to the difficulties induced by methodology and instrument errors, certain other aspects made it more difficult for the operators to obtain unidentified leak rate results smaller than the Tech Spec limit of 1 gpm. The difficulties in this class reflect the following idiosyncrasies in the TMI-2 leak rate test:

a. Both GPU in PF 153 and Numerous Employees in PFs 138-145 point out that there were inconsistencies between Reg. Guide 1.45 and the TMI-2

[31] We take official notice of the textbook, *The Mathematics of Physics and Chemistry*, Margenau and Murphy, D. VanNostrand Co., Inc., at 498 (1943), to support this generally recognized fact.

Tech Specs. The water inventory balance test is mentioned only once in Reg. Guide 1.45 as a means "of obtaining indications of uncontrolled or undesirable intersystem flow," (*id.* at 1.45-2); whereas, Tech Spec 4.4.6.2 calls for the water inventory balance test without restricting it to intersystem leakage. We agree that this definitional inconsistency would have made it more difficult for the operators to obtain test results lower than the 1-gpm LCO, since both pressure boundary leakage and intersystem leakage contributed to the measured values. The fact remains that the reactor water inventory balance surveillance was the *only* procedure that the Operations Department used to quantify unidentified leakage.

b. TMI-2 Tech Specs and surveillance procedures did not incorporate Reg. Guide 1.45 latitude to compare values of unidentified leakage obtained by different detection methods, e.g., sump pump. Reg. Guide 1.45 states that monitoring sump data is a reliable and sensitive way to measure unidentified leakage (Board Exh. 2, Faegre & Benson Report, Vol. 1 at 29-30), yet the TMI-2 Tech Specs provided no guidance on how to reconcile differences between detection methods (Board Exh. 1-A, Stier Report, Vol. I at 40). Tech Spec bases would seem to indicate a need for comparison to determine "effectiveness" of different methods of detecting leakage. Faegre & Benson Report, Vol. 2 at 18-21.

c. Unidentified leakage was based upon a volume rate of 1 gpm determined at RCS average temperature of 581°F rather than reactor building temperature (room temperature). When Reg. Guide 1.45 refers to 1 gpm as being measurable in sumps as an industry experience, it seems clear that room temperature is implied. Use of the 1-gpm number at the reactor temperature meant that effectively the LCO was 0.72 gpm rather than the 1 gpm described in Reg. Guide 1.45. The Tech Spec 4.4.6.2.b required that the containment sump inventory and discharge be monitored at least once per 12 hours. An LCO of 1 gpm for the sump surveillances should have corresponded to an LCO of 1.4 gpm for the inventory balance surveillance because of the temperature difference, but the Tech Specs make no mention of this aspect of the leak rate detection systems.

d. While the foregoing differences between the TMI-2 Tech Specs and Reg. Guide 1.45 made it more difficult, as a technical matter, to obtain the required 1-gpm result, we reject the premise put forward by the Numerous Employees (PF 145) that the differences and ambiguities arising when the two documents are read together actually caused confusion among the operators. Reg. Guide 1.45, standing alone, was, of course, not binding on the operators, any more than any other regulatory guide. Furthermore, we disagree with the assertions of GPUN (PF 75) and the Employees (PF 145) that the Tech Specs "incorporated"

Reg. Guide 1.45. That suggests that the Reg. Guide in its entirety was binding on the operators, and overstates the case. Although the "Bases" section of Tech Spec 3.4.6.1 does make an explicit reference to the Reg. Guide, that reference, in its context, does not reflect an intention to "incorporate" the entire Reg. Guide into the Tech Specs. Legal analysis to one side, there is no evidence in this record that any of the operators had ever read Reg. Guide 1.45, let alone been confused by the differences and ambiguities we have discussed.

e. The TMI-2 leak rate test procedure failed to include an "evaporative loss factor" for losses from the RCS. Tr. 1134. Other Babcock & Wilcox power reactors were allowed to include an evaporative loss factor in their leak rate test procedures. For example, TMI-1, Rancho Seco, and Oconee all include evaporative loss factors in their leak rate test procedures. Tr. 1135. The evaporative loss factor for TMI-1 was 0.51 gpm; for Oconee-1, 0.68 gpm; for Oconee-2, 0.73 gpm; and for Oconee-3, 0.52 gpm. Faegre & Benson Report, Vol. 1 at 19 n.*. Assuming that evaporative losses at TMI-2 were comparable to those at TMI-1, the failure of the TMI-2 leak rate test procedure to include such a factor resulted in the increased estimates of unidentified leakage in the calculation of the TMI-2 unidentified leakage of as much as 0.5 gpm. *Id.* Mr. Stier concluded that this was a primary problem in the performance of the leak rate test at TMI-2:

> There were several major causes of the difficulty experienced at TMI-2. First, the TMI-1 leak rate calculation permitted the subtraction of 0.5 gpm from gross leakage to account for "evaporative losses." At TMI-1, this helped offset the variability of test results caused by such factors as instrument error and oscillation within the reactor coolant system. The TMI-2 procedure contained no similar provision, thereby increasing the frequency with which calculated unidentified leakage exceeded 1.0 gpm due to inherent test variability.

Stier Report, Vol. I at 21.

41. The Staff witnesses contended that the use of an evaporative loss factor at TMI-2 was inappropriate. Tr. 1138. Staff's position, as we understand it, is that such a factor is not appropriate because, as plant operations continue, "frequently the amount of evaporative loss would be reduced so that you didn't know what it was." Tr. 1139. That may be true, but the basis of Staff's position might not apply to TMI-2 because it had not yet become a mature plant. Tr. 1121.

42. Staff witness Russell testified with respect to the evaporative loss factor that "it would have been an error to include it, since the maximum reactor coolant pressure boundary flaw size assumed in the safety analysis is that associated with a 1 gpm leak, not a 1 gpm plus an evaporative loss factor." Tr. 1138. In contrast to Mr. Russell's statement, the FSAR stated:

Based upon the above analysis the critical parameter would be a crack in the cold leg piping of approximately 9 gpm. In establishing a maximum unidentified leakage, the following criteria are considered:

1. The magnitude of the leakage should be well below the leakage associated with a crack of critical size.
2. The magnitude should be well within the capability of the normal makeup system.
3. The magnitude should be sufficiently large to allow for ease of detection within a reasonable period of time.
4. Offsite releases should be within 10 CFR 20 limits.

Accordingly, a 1 gpm leak was selected as the maximum allowable unidentified leakage rate. This value is well below the leakage associated with a crack of critical size. It can be detected within a reasonable period of time as discussed previously. . . .

Exh. 22 at 5.2-25; *see also* Stier Report, Vol. V(B), Tab 12, Reg. Guide 1.45 at 1.45-1 to 1.45-2 (basis for selection of 1 gpm (instead of some higher number less than 9 gpm) as the LCO for unidentified leakage is "industry practice"). We take the view that the 1-gpm LCO is essentially an ALARA number, having no bright-line safety significance — i.e., it is not the case that 0.9 is "safe" and 1.1 is "unsafe." Be that as it may, the Board finds that the TMI-2 operators were faced with a new plant that probably had an evaporative RCS loss of 0.5-0.7 gpm.

43. The Board concludes that the aggregate effect of the errors and idiosyncrasies discussed above would have produced erratic and usually inaccurate results in leak rate tests at TMI-2. The experts expressed a similar conclusion. Tr. 450, 1230-37. Indeed, those effects would have been such that should the test have produced an occasional result that happened to correspond with actual unidentified leakage, such a result would have been attributable more to a random confluence of errors than to any residual technical merit in the test — in the vernacular, a "happy accident." Having viewed erratic test results over time, the operators' skepticism of the test as a source of useful information was fully justified.

B. Managers Who Knew of the Leak Rate Test Difficulties

44. The difficulties with the leak rate test that the operators were experiencing manifested themselves over a long period of time in an inability to run two tests back to back, with no power changes or operator-caused changes, and obtain the same results. The test results were described as "unpredictable," and "quite erratic." Adams, ff. Tr. 3776 at 3; Cooper, ff. Tr. 2835 at 6; Guthrie, ff. Tr. 4113 at 2; Board Exh. 1-A, Stier Report, Vol. VI(F), Hitz 4/24/84 Interview at 31; Hitz, ff. Tr. 3664 at 4. *But see* Frederick, ff. Tr. 2447 at 4. All

of the CROs, their foremen and shift supervisors knew of these difficulties in some degree, as shown below in our discussion of individuals. In response to the Commission's next question, we discuss in this section the knowledge of management personnel about leak rate test difficulties.

45. James Floyd, Supervisor of Operations, characterized himself as a "crisis fighter." He allowed his shift supervisors to run the plant on a day-to-day basis and, as long as something had not come to the crisis level, it rarely came to his attention. Tr. 4969 (Floyd). With regard to leak rate testing in particular, Floyd stated that "[a]s soon as this plant would have been shut down for a leak rate test I'm sure I would have been acutely aware of the problem." Tr. 4969 (Floyd). It was his testimony, however, that he has "no recollection of knowing about any of these problems" and that he was "basically . . . ignorant of what was going on here [TMI-2]." Tr. 4976 [Floyd].

46. Despite Floyd's recollection, the weight of the evidence is that Floyd was aware of operator problems with leak rate tests. Floyd had a discussion in early October 1978 with Seelinger concerning the interpretation of the leak rate test procedure and was aware of and involved in many of the events of October 18, 1978. He expected difficulties with erratic leak rates during initial operation of the unit. Floyd, ff. Tr. 4894 at 5-6. Fels believed he discussed leak rate problems with Floyd; Chwastyk recalled a Floyd briefing on leak rates after the events on October 18; Haverkamp had a very strong recollection of Floyd being present when he spoke to Seelinger on October 18th; Cooper was aware Floyd was getting feedback from shift supervisors concerning leak rate problems; and Guthrie was "sure" Floyd knew the operators had problems with the leak rate. Tr. 4509-10 (Fels); Tr. 3502 (Chwastyk); Tr. 2050 (Haverkamp); Tr. 2903 (Cooper); Board Exh. 6, OI Report, Exh. 30, Guthrie Interview at 17. Also the NRC inspector, Mr. Haverkamp, testified that "Mr. Floyd expressed a lack of confidence in the computer calculated results of the RCS unidentified leakage" in October 1978. Tr. 2097.

47. Floyd generally portrayed himself as a "hands on" manager who spent a lot of time in the control room working directly with the CROs. For example, on the morning of October 18, a foreman testified that Floyd was in the control room sitting at the leak rate computer console. Tr. 3797. Given Floyd's style of operation, we think it highly probable that Floyd was quite familiar with the difficulties CROs were experiencing with leak rate tests. We reject Floyd's claim that he was basically ignorant of those problems.

48. James Seelinger, Superintendent of Technical Support at TMI-2, while knowledgeable of the fact that getting an acceptable leak rate test was difficult, had little in-depth knowledge of the various factors that were at play in those difficulties. As he revealed in his testimony:

[Judge Carpenter] With respect to Unit 2 and its interpretation, did you sit down with Mr. Floyd and ask yourself the question: What are the parameters that control this test, that are significant in the test? And how much variation do we have in those parameters? And what is the numerical effect of that variation? Did you do an analysis, is what I'm asking you?

A. No, sir, not at that time. And not at any time that I recall that I participated in.

Tr. 4749 (Seelinger).

49. Mr. Seelinger first learned of the practice of discarding leak rate tests that were greater than 1 gpm about 2 1/2 weeks before the Haverkamp incident. He found at the same time that the Action Statement was not being entered if a high leak rate was measured, as long as a "good" leak rate was obtained within 72 hours of obtaining a previous "good" leak rate. At the time, he did not think that either action was permissible. Tr. 4745 (Seelinger).

50. Two incidents that occurred shortly thereafter persuaded Seelinger to change his attitude, at least temporarily. The shift supervisor who had told him about discarding tests informed him that his interpretation of the Tech Specs would result in shutting down TMI-1. Seelinger resolved to meet with the TMI-1 PORC and straighten out the situation, but had to go to an offsite meeting for several days. When he returned, the plant was shut down and continued to be shut down for the next 7 to 10 days. Other matters occupied his attention, and he did not confer with the TMI-1 PORC before the Haverkamp incident. Tr. 4746-47 (Seelinger).

51. As to the second incident, he and Mr. Floyd conferred about the proper interpretation of the Tech Specs. The result of the discussion was, in Seelinger's words:

We came out of that conversation with an interpretation that I agreed to for a period of time — that the leak rate test was to be set aside if it exceeded the criteria on the basis of the fact that the plant was not in steady state operation and would allow the running of another, or another, and we didn't specify the number, of leak rate tests.

Tr. 4746 (Seelinger). This meant, as a practical matter, that any test over 1 gpm would be disregarded (set aside) and tests would continue to be run until a "good" test emerged from the computer.

52. After the Haverkamp incident, the resulting LER indicated that the Action Statement would be entered after *any* leak rate test result over 1 gpm was obtained. However, this interpretation was never implemented by the Operations personnel, as we have seen. *See* pp. 720-22, *supra*.

53. Against this factual backdrop, the Board finds that Mr. Seelinger was guilty of culpable neglect as described in GPUN's Proposed Findings 212-213, which we adopt:

212 . . . In early October 1978, the record is clear that James Seelinger learned of the practice of discarding tests. The fact that a shift supervisor subsequently told him that TMI-1 would shut down if Seelinger's interpretation of the Tech Specs were adopted and that Seelinger then intended to raise this issue with the TMI-1 PORC does not excuse Seelinger from the affirmative duty to act and follow through after gaining actual knowledge of a potentially improper practice. Furthermore, the meeting with Floyd at which Seelinger claims they reached a common ground of interpretation does not justify following an interpretation when Seelinger had actual knowledge that adherence to such an interpretation in practice meant the repeated running of tests and the discarding of all tests greater than 1 gpm.

213 . . . The Board believes that Seelinger's awareness in early October 1978 of the practice of repeated running and discarding of tests in and of itself is sufficient evidence for the Board to find that Seelinger by dereliction or culpable neglect allowed improper operator actions. Seelinger, however, allowed a bad situation to get worse. He had admitted that he was the source of an instruction to shift supervisors not to leave tests lying around to prevent the NRC from seeing them and becoming aware of an interpretation of the Tech Specs with which he was uncomfortable. Tr. 4756 (Seelinger). Seelinger's concern about the NRC's possibly finding bad tests lying around was realized on October 18 with Haverkamp's arrival in the Control Room; at the same time, the interpretation with which Seelinger was uncomfortable and which led him to advise the shift supervisors to keep bad tests out of sight was replaced by the immediate Action Statement entry interpretation insisted on by Haverkamp. *See* Tr. 4757-60 (Seelinger). Despite the relatively short duration of Seelinger's concern, the Board does not view his decision to keep information from the NRC as either reasonable or tolerable.

As we have previously indicated the Board believes that Mr. Seelinger could have exercised more vigor in following up the corrective action after the Haverkamp incident.[32] We do find that he did what he thought was within his authority. He directed Mr. Marshall to see that the LER was read by all shift personnel and assured himself that Mr. Floyd wrote an Operations Memorandum

---

[32] One aspect of Mr. Seelinger's testimony was very puzzling to the Board. Gary Miller, at the time in question both Station Superintendent and TMI-2 Superintendent, testified that he depended on Mr. Seelinger for the day-to-day supervision of TMI-2 operation. Tr. 5050-53 (G. Miller). Mr. Seelinger, however, did not believe that he had any authority outside his own chain of command (which did not include Mr. Floyd and the Operations Department). Tr. 4627-28. It becomes even more puzzling if we examine a relevant portion of the job description of the Unit 2 Superintendent of Technical Support.

> The overall scope of the responsibility of the Unit Superintendent Technical Support is to assist the Unit Superintendent in the integrated operation, maintenance and administration of a generating unit at the Three Mile Island facility to ensure that the unit is operated and maintained in a safe, efficient manner and that all applicable regulatory requirements are adhered to. This means that not only does the incumbent act as the Unit Superintendent during the Superintendent's absence, but actually assumes many of the normal duties of the Unit Superintendent with the same kind of authority as the Superintendent when such authority is so delegated and is not in conflict with established management policy as outlined in the Technical Specification.

Stier Report, Vol. V(A), Tab 6. It would be highly speculative of the Board to assert that if Mr. Seelinger had been aware of the responsibility that Mr. Miller thought he had and that his job description reinforces, the situation during the time in question here would have been improved. Nor do we intend to imply that this apparent misunderstanding was totally Mr. Seelinger's fault; it was clearly Mr. Miller's responsibility to adequately inform his subordinates as to what was expected of them. Mr. Miller never made clear to Mr. Seelinger just what his standing was. Tr. 5047-50 (G. Miller). In any event, we do believe that this is an illustration of an overall management situation gone awry.

to be read by all shift personnel which supposedly would explain the new procedures to be used in carrying out leak rate tests, among other things. *See* p. 720, *supra*. That the actions taken did not produce the desired results cannot be directly laid at Mr. Seelinger's doorstep. In the Board's view, he had every reason to believe that Mr. Floyd, who did not report to Mr. Seelinger,[33] would follow up with the Operations Department personnel. We also note that on or about December 1, 1978, Mr. Seelinger was promoted to Unit Superintendent at TMI-1 and was not present at TMI-2 during the time of greatest difficulties in performing the leak rate tests. The Board, in considering the entire record on the adequacy of these corrective actions, finds that Mr. Seelinger's actions, while imperfect, do not constitute culpable neglect.

54. The Board found Mr. Seelinger to be an unusually forthright and candid witness. His admission that he had instructed shift supervisors not to leave tests lying around for the NRC to see was volunteered by Mr. Seelinger and may not have come to light at all but for his admission.

55. George Kunder succeeded Seelinger as the Unit 2 Superintendent of Technical Support in early December 1978. Although Seelinger was uncertain whether he had informed his successor of the difficulties with the leak rate test (Tr. 7783-84 (Seelinger)), Kunder had some limited knowledge of the difficulties with the tests. He also was aware that some effort was being undertaken to correct the difficulties.

56. Sometime in 1979, Kunder became aware that there was some question whether leak rate test results accurately reflected plant conditions. Kunder believed the question was whether the calculation used to determine leakage was in error so that erroneously high readings were being obtained. Kunder was also aware that his department was requested to look at the leak rate test procedure or calculation to determine if a problem actually existed, and if so, to resolve it. Kunder, ff. Tr. 4800 at 2-3. Kunder had only limited recall of how he became aware of the difficulties and no recollection of what was accomplished to correct them. Tr. 4811-12, 4834-35, 4840-41 (Kunder). During this time, Kunder worked considerable overtime and had a very heavy work load,

> attempting to not only take over the reins of . . . managing the engineering organization but also take care of the collateral duties of PORC chairmanship, beginning some preparations for the refueling outages which [he] was responsible to coordinate the planning for, and . . . in particular, deal with a myriad of issues and problems that existed at the time to attempt to get [himself] up to speed on the details of the Unit 2 systems; that is, to prepare for senior reactor operator's license . . . .

---

[33] He was explicitly informed of this during his job interview with Messrs. Herbein, Miller, and Colitz. Prep. Test., ff. Tr. 4623 at 3.

Tr. 4803 (Kunder). We believe Kunder's inability to recall details with respect to his awareness of difficulties reflects his actual limited knowledge of these difficulties dur ng the period of operation of TMI-2. We find no excuse for his failure to pursue this ongoing problem, and that such failure constitutes culpable neglect.

57. Joseph Logan, Unit 2 Superintendent, also had some knowledge of the difficulties operators were experiencing. Logan thought the problem was with the computer because the leak rate test results were inconsistent. Although he does not know when he became aware of the difficulties, Logan does recall having had discussions with shift supervisors, Kunder, and Floyd. Tr. 5117, 5123-24 (Logan). Logan considered negative leak rate test results as an indication that there were computer program errors associated with this test. Tr. 5143, 5145 (Logan). However, Logan felt that the problem was recognized and the work being done led him to believe that a solution to correct the problems would be found. Tr. 5119, 5133 (Logan). Logan does recall that a change was made, but has no recollection if it was effective. Tr. 5134 (Logan).

58. The Board reviewed several leak rate surveillances with Mr. Logan, and Mr. Logan was able to recognize the several different kinds of operator errors that caused these tests to be invalid. Tr. 5153-76. The fact that Mr. Logan had been aware that there were problems with the leak rate tests but had never bothered to look at the test results reflects discredit on his discharge of his duties. While his subordinates, Mr. Floyd and Mr. Kunder, should have handled the leak rate test problems, their failure to do so should have led Mr. Logan to investigate the performance of the tests and to instruct them that the problems should be resolved without delay. Mr. Logan's inattention to the leak rate test records, coupled with the other circumstances we have noted, leads us to a finding of culpable neglect by Mr. Logan.

59. Gary Miller, TMI Station Manager and, until December 1978, Unit Superintendent of TMI-2, was aware to a limited extent of the difficulties the operators were experiencing. Miller was routinely exposed to several sources of information containing data that, if analyzed (such as comparing leak rate test results day after day) might have raised a question in his mind to inquire further. *See generally* Board Exh. 1-A, Stier Report, Vol. II(B), G. Miller Summary at 4-11. Miller, however, did not carry out such a comparison: "In short, I simply did not realize that such repetitive results were being recorded." G. Miller, ff. Tr. 5039 at 19. The primary source Miller depended on to raise operational problems was the morning conference call. Miller did not believe that the subject of continuing leak rate surveillance difficulties was ever discussed during these calls nor does he believe that anyone ever advised him about such difficulties on any other occasion. *Id.* The record supports this statement.

60. The extent of Miller's knowledge concerning the violation of the Tech Specs probably comes from Seelinger's conversation with Miller on October 18, 1978. While Miller has no current recollection of their conversation, he believes it well could have taken place.

61. By Seelinger's account of the conversation, Miller probably became aware that the operators had experienced some difficulty with the leak rate test at that time. Tr. 4723-27 (Seelinger). Miller also was aware that an LER was issued (Tr. 5056 (G. Miller)), but for the reasons previously discussed concerning the accuracy and completeness of the LER (*see* § III, ¶¶ 10-17, *supra*), it is doubtful that the LER expanded Miller's awareness. More likely the LER would have suggested to Miller that there was a one-time problem (not a consistent pattern of procedural abuse) and given Miller confidence that the matter was being resolved. Tr. 5085-86 (G. Miller).

62. Mr. Miller was not aware of any of the questionable practices concerning the leak rate tests performed at TMI-2. As he testified:

> I did not know that unacceptable leak rate surveillance test results were being discarded. I have testified before that this is something I would have expected to have been brought to my attention. I do not recall, however, that that was ever done. In my view, the discarding of leak rate tests on the scale on which it was apparently done was improper, and I would not have condoned it.

63. Mr. Miller's testimony is uncontroverted in the record. Although we have to some extent questioned his and others' management style (*see* § IV, ¶ 53, note 32), we find no evidence of any wrongdoing therein. He clearly had no direct responsibility for or knowledge of improper leak rate practices at TMI-2. The Board finds that Mr. Miller exhibited neither dereliction nor culpable neglect in the performance of his duties.

64. John Herbein, Vice President of Generation, had no knowledge of the difficulties. The strongest potential source of information that might have alerted Herbein to the difficulties was the Licensee Event Report 78-62/1T. On November 1, 1978, Herbein signed the transmittal letter sending the LER to the NRC. Herbein, however, has no independent recollections of the LER or surrounding events. Herbein, ff. Tr. 5268 at 10-11. The circumstances surrounding the preparation of the LER and Herbein's signing of the transmittal letter are covered at § III, ¶¶ 10-14, *supra*.

65. The LER failed to identify that the sources of the problem were repetitive test results exceeding acceptance criteria, and the Operations Department's lack of confidence in leak rate test results. The LER also failed to point out that the solution to the problem had been the decision to round off test results. Board Exh. 1-A, Stier Report, Vol. I at 143. Given these inaccuracies and inadequacies in the LER, the Board cannot impute knowledge of the difficulties that operators were experiencing to Herbein. In fact, to the extent Herbein would have had any

question of the existence and subsequent resolution of operators' difficulties, his questions might have disappeared the following January when the NRC notified him that the LER had been selected for onsite followup. The notification stated that "the inspector verified that the reporting requirements . . . had been met, that appropriate corrective action has been taken, that the event was reviewed by the licensee as required by Tech Specs, and that continued operation of the facility was conducted in conformance with Tech Spec limits." Board Exh. 20, Haverkamp Testimony, Exh. E, Enclosure at 10-11.

66. While we conclude that Herbein and Miller are not chargeable with "culpable neglect" on the specific issues before us, neither do we wish to imply any determination that their conduct with respect to the leak rate fiasco was all that it should have been. The record indicates that there was insufficient depth of senior management capability at TMI during much of Unit 2's operation. For many months, the post of Superintendent of Unit 2 was vacant, this at a time when the unit was in its initial "shakedown" phase of operation. No one was ever formally designated as "Acting" Unit Superintendent and the record reflects differences in the minds of Miller and Seelinger as to the scope of the latter's responsibilities. Seelinger Prep. St., ff. Tr. 4623 at 6; G. Miller Prep. St., ff. Tr. 5039 at 6. In any event, apparently Seelinger was overworked and it is clear that Miller was grossly overworked. Miller testified that he worked an average of 80 hours per week, far more than should have been required of a person in a senior management position potentially affecting public health and safety. Herbein knew (or clearly should have known) that his senior managers were stretched too thin at TMI, and that this might compromise their ability to do their jobs properly. Yet no effective efforts were made to remedy this situation.

C. Corrective Actions for Technical Errors

67. Despite the fact that there were many difficulties associated with the leak rate test, only limited corrective actions for the technical errors were taken to cure the fundamental deficiencies that caused the difficulties. Two such corrections are discussed below. That more corrections were not made or attention paid to the host of deficiencies with the leak rate test was explored by the Board with a number of witnesses. One explanation is that operators felt it was being cured. Chwastyk, ff. Tr. 3407 at 3; Faust, ff. Tr. 2511 at 3; Frederick, ff. Tr. 2447 at 4. Another was that the plant was still new. Adams, ff. Tr. 3776 at 2-3. Virtually no one seemed overly concerned with the problems.

68. An attempt to correct leak rate test problems was prompted when in February 1979, the collection rate of the RCDT began to increase. This high rate of collection had not been experienced before at TMI-2 for any extended period of time. Stier Report, Vol. I at 91. The leak rate test calculation failed

to convert RCDT collection from room temperature to RCS temperature before it was subtracted from gross leakage. A volume of a given mass of water is 1.4 times greater at reactor coolant temperature than it is at room temperature. *Id.*

69. Because of this error, the calculated unidentified leak rate was overstated by an amount equal to 40% of the RCDT collection rate. Thus, when RCDT collection reached a rate of 2.5 gpm at room temperature, the unidentified leak rate calculated at RCS temperature would be greater than the actual unidentified leakage by 1.0 gpm, even if the actual unidentified leak rate had not changed. This rate of drain tank collection (2.5 gpm) was reached around February 25. *Id.* at 92.

70. Having recognized that RCDT collection was driving up the unidentified leak rate measurements, on March 16 a procedural change was made to correct the calculation error that was causing RCDT collection to be understated. Thereafter, each test calculation was supposed to be corrected for this error by hand. This change, however, did not produce the desired result. Operators continued to experience difficulty in obtaining satisfactory leak rate test results. The apparent reason is that an inaccuracy in the make-up tank level transmitter continued to cause a 20 to 50% exaggeration in the drop in make-up tank level. Therefore, if RCDT collection were 4.0 gpm, the error in make-up tank level measurement would overstate the calculated unidentified leak rate by 1.1 to 2.8 gpm. *Id.* at 100.

71. The second, but largely insignificant, attempted cure to leak rate test difficulties occurred in the Fall of 1978. On October 31, 1978, the Instrument and Control Department reported a problem. The instruments for both the wet reference leg and the dry variable leg of the make-up tank were connected to a common set of sensing lines. This arrangement made it impossible to perform maintenance on one instrument without affecting the other. By November 9, 1978, installation was completed of separate sensing lines with a common penetration on the make-up tank. Faegre & Benson Report, Vol. 2 at 65; Stier Report, Vol. V(D), Tab 53 (Field Questionnaire). There was no apparent overall benefit from this change with respect to the subsequent accuracy of the make-up tank level measurement.

D. Pressure to Obtain Leak Rate Test Results That Did Not Exceed Technical Specification Limits

72. This Board examined the issue of whether operators felt pressure to obtain leak rate test results that did not exceed the Tech Spec limit.

73. CROs felt pressured by shift supervisors and shift foremen to obtain test results under 1.0 gpm. Shift foremen felt similar pressure from their shift supervisors. The evidence does not indicate that shift supervisors experienced

similar pressure from their superiors. Board Exh. 1-A, Stier Report, Vol. I at 124-25.

74. The pressure felt by the CROs was depicted as a general sense to keep the plant on line (*id.*, Vol. VI(G), Illjes 2/7/85 Interview at 57-58); being asked questions about the status of the leak rate test (Board Exh. 6, OI Report, Exh. 10, Cooper Interview at 24; Chwastyk, ff. Tr. 3407 at 6); and being told to get a good leak rate (Coleman, ff. Tr. 2579 at 2-3; Tr. 2586 (Coleman); Booher, ff. Tr. 4175 at 3; Stier Report, Vol. VI(B), Congdon 4/10/80 Interview at 2). Despite the fact that some CROs felt pressure, that pressure did not translate into a sense that adverse action would be taken against them if they failed to obtain a good leak rate test result (Booher, ff. Tr. 4175 at 3; Board Exh. 6, OI Report, Exh. 18, Wright Interview at 109-10). Some shift foremen felt pressure to keep the plant on line as much as possible. Board Exh. 1-A, Stier Report, Vol. VI(B), Conaway 2/21/85 Interview at 37-38; Board Exh. 6, OI Report, Exh. 30, Guthrie Interview at 45-46.

V. DISCARDING LEAK RATE TESTS

> Were unacceptable leak rate surveillance test results required by Technical Specification 4.4.6.2.d discarded? If so, who knew of, condoned or directed this practice? Were unacceptable leak rate surveillance test results discarded in an attempt to hide them from the NRC?

CLI-85-18, 22 NRC at 880, Issue (c).

The Board adopts and sets forth below GPUN's Proposed Findings 180-191, except as changes are indicated by ". . ." or by brackets.

1. "The third issue specified by the Commission in this proceeding concerns whether unacceptable leak rate surveillance test results required by Tech Spec 4.4.6.2.d were discarded. If the Board found that records were discarded, it was supposed to determine who condoned or directed this practice and whether there was an attempt to hide unacceptable leak rate surveillance test results from the NRC. CLI-85-18, 22 NRC at 880. In connection with this issue of documentation, we also explored the operators' compliance with related paperwork requirements, including logging and filing of E&Ds."

2. "The administrative procedures applicable to the documentation of leak rate testing are discussed at [GPUN's] ¶¶81, 91-94, *supra*. [Summarizing the key requirements, records of "surveillance activities" — including the results of leak rate tests — were required by Tech Spec 6.10 to be retained for 5 years. Furthermore, AP 1010 required that any surveillance test that had an unsatisfactory result — e.g., a leak rate test showing unidentified leakage in excess of 1 gpm — had to be documented on an "Exception and Deficiency List" and filed.] The plant records at TMI-2 show that the only leak rate tests ever 'filed' were those showing unidentified leakage under 1 gpm. Board

Exh. 1-A, Stier Report, Vol. I at 60; *id.*, Vol. III(A), Table 1. Stier estimated that at least 50% of all the tests performed were discarded because the results showed unidentified leakage exceeding 1 gpm. *Id.*, Vol. I at 60. MPR Associates performed two statistical analyses of recorded tests. *Id.* First, they determined that the variability of the frequency with which tests were filed was high, indicating that tests were filed at irregular intervals and raising the possibility that significant numbers were discarded. *Id.* Second, MPR plotted test results as histograms, and from the apparent truncation of the resulting distributions, estimated that about half or more of the expected results would have exceeded 1 gpm but were not filed. *Id.*; *id.*, Vol. IV(A) at V.2-V.8. Testimony obtained from TMI-2 personnel indicated that as many as two or three leak rate tests may have been discarded for every one that was filed. *Id.*, Vol. I at 61 (*citing* the Interviews of Smith, 2/8/85 at 70; McGovern, 2/6/85 at 15; Illjes, 2/7/85 at 10-11, 114; Faust, 2/19/85 at 138; and Adams, 3/8/85 at 81)."

3. "The practice of discarding leak rate test results greater than 1 gpm began at TMI-1 and carried over to TMI-2. Tr. 4325 (Smith); Floyd, ff. Tr. 4894 at 2; Board Exh. 1-A, Stier Report, Vol. I at 58. Every CRO, shift foreman, and shift supervisor who appeared before the Board, except Frederick,[34] testified that he was either aware of the practice of discarding tests or personally discarded tests. Tr. 2250 (Hartman); Tr. 2544 (Faust); Coleman, ff. Tr. 2579 at 2; Tr. 2673 (Wright); Congdon, ff. Tr. 2709 at 4; Tr. 2795 (Scheimann); Cooper, ff. Tr. 2835 at 4; Tr. 2958 (Zewe); Illjes, ff. Tr. 3010 at 2; Tr. 3110 (Conaway); Tr. 3204 (McGovern); Tr. 3243 (Mell); Kidwell, ff. Tr. 3285 at 3; Tr. 3487 (Chwastyk); A. Miller, ff. Tr. 3608 at 3; Hitz, ff. Tr. at 3; Adams, ff. Tr. 3776 at 2; Mehler, ff. Tr. 3842 at 5; Tr. 4007-08 (Olson); Hemmila, ff. Tr. 4039 at 3; Tr. 4115 (Guthrie); Booher, ff. Tr. 4175 at 2; Hoyt, ff. Tr. 4233 at 3; Tr. 4325 (Smith); Phillippe, ff. Tr. 4432 at 2-3; Bryan, ff. Tr. 4540 at 2."

4. "Descriptions of the practice of discarding tests differed somewhat among the witnesses. Some witnesses testified that CROs or auxiliary operators were dispatched to search for leaks before a test was invalidated and discarded. Tr. 2250 (Hartman); Tr. 3109-10 (Conaway); Booher, ff. Tr. 4175 at 2; Smith, ff. Tr. 4331 at 4. Other witnesses testified that they compared the leak rate test to plant parameters. If they found that the leak rate test results were inconsistent with the plant parameters, they discarded the leak rate test results greater than 1 gpm. Tr. 2817 (Scheimann); Zewe, ff. Tr. 2946 at 3. Some operators testified that results over 1 gpm were given to the shift foreman to discard. Faust, ff. Tr. 2511 at 3; Congdon, ff. Tr. 2709 at 4. Most operators, shift foremen, and shift supervisors testified that leak rate test results above 1 gpm were retained until a leak rate test result below 1 gpm was obtained; and then

[34] Frederick testified that he gave the leak rate tests to his shift foreman and was unaware that the tests were being discarded. Frederick, ff. Tr. 2447 at 6.

the tests above 1 gpm were discarded. Coleman, ff. Tr. 2579 at 2;[35] Congdon, ff. Tr. 2709 at 4; Cooper, ff. Tr. 2835 at 4; Illjes, ff. Tr. 3010 at 2; Tr. 3243 (Mell); Kidwell, ff. Tr. 3285 at 3; Tr. 3487 (Chwastyk); A. Miller, ff. Tr. 3608 at 3; Adams, ff. Tr. 3776 at 2."

5. "James Floyd, the Unit 2 Supervisor of Operations, was aware that . . . leak rate tests were being discarded. Floyd, ff. Tr. 4894 at 2. Floyd maintained that he never directed that leak rate tests be discarded, but the practice of discarding tests carried over from TMI-1. *Id.* Floyd was also of the 'opinion that blatantly bad leak rates (for example, excessively negative ones) had no connection with reality; consequently, it was permissible to discard them.' *Id.* at 2-3." [Be that as it may, Floyd was in charge of Operations at Unit 2 and he probably knew, or certainly should have known, that many of his subordinates were systematically throwing out tests showing unidentified leakage over 1 gpm, without regard to their validity.]

6. "In early October of 1978, James Seelinger, the Unit 2 Superintendent of Technical Support, became aware of the practice of discarding [seemingly][36] valid tests above 1 gpm and running another test. Tr. 4745 (Seelinger). The extent of Seelinger's knowledge of the practice of discarding tests, and the actions he took when he discovered the practice, are discussed at [GPUN'S], ¶¶ 103-105, 108-113, *supra*. In sum, Seelinger testified that after a meeting with Floyd in early October, he (Seelinger) agreed that the Tech Specs required one leak rate test under 1 gpm every 72 hours and entry into the Action Statement only at the end of such a 72-hour period. Tr. 4764-65 (Seelinger). Because Seelinger 'did not particularly care for the interpretation' and he 'was not particularly crazy on having the NRC involved with that interpretation or finding out about that interpretation,' he subsequently advised one or more shift supervisors 'that the tests were not to be left out and lying around,' where the NRC

---

[35] Coleman testified that on one occasion he obtained a leak rate test in excess of 1 gpm, signed the test, put it on his shift foreman's desk, and a short time later, three people came out of the shift supervisor's office and one told him that they did not want to see leak rates that exceeded the Tech Specs. After that incident, Coleman began throwing away leak rate test results over 1 gpm. Coleman, ff. Tr. 2519 at 3.

[36] We say "seemingly" valid because, as we have found (*see* § IV, ¶ 44, above) the errors built into the leak rate test made it inherently unreliable. The test at TMI-2 never was "valid" in the sense of consistently giving an accurate measurement of unidentified leakage. On the other hand, the operators did not understand the technical defects in the test and had to deal with the test results as they appeared. Thus, for example, when an operator ran a test showing 1.2 gpm and there was nothing he could point to (such as operator error) to invalidate the test, he was required to go into the Action Statement.

Stier and MPR attempted to determine through sump pump data times during which actual identified leakage probably did exceed the 1-gpm LCO. *See* Stier Report, Vol. IV(A). The Numerous Employees dispute the Stier findings, arguing that excessive unidentified leakage only occurred during a brief period in October. PFs 225-236. We are making no findings on actual unidentified leakage partly because it would be extremely difficult to do so on the record before us but, more fundamentally, because such findings are not necessary to resolve the issues before us. Even if it were possible now to determine historic unidentified leakage, the fact remains that the employees did not know what it was at the time, except for the erratic data being given them by the leak rate test. They nevertheless continued to run the reactor without any reliable basis for believing that its operation was in continuing conformity with the 1-gpm LCO.

might find them. Tr. 4756 (Seelinger). After Haverkamp's visit, Seelinger stated that he interpreted the Tech Specs to require immediate Action Statement entry on obtaining a test result greater than 1 gpm. Tr. 4758-59 (Seelinger). Such an interpretation should have ended the practice of discarding tests. *Id.* Seelinger acknowledged, however, that he never effectively put the word out to the shift supervisors to adopt the new interpretation of the Tech Specs. *Id.* Therefore, the practice of discarding leak rate tests apparently continued up to the accident at TMI-2."

7. "Operators did not log the starting time of the leak rate test [as required by AP 1012.] *See, e.g.*, Tr. 2496 (Frederick); Congdon, ff. Tr. 2709 at 3; McGovern, ff. Tr. 3148 at 3; Hitz, ff. Tr. 3664 at 5; Tr. 4116 (Guthrie); Bryan, ff. Tr. 4540 at 3. Some operators did log the completion time of leak rate test results below 1 gpm. *See, e.g.*, Chwastyk, ff. Tr. 3407 at 3; Smith, ff. Tr. 4331 at 3."

8. "No E&Ds were ever filed with any of the leak rate test results at TMI-2. Tr. 2268 (Hartman); Board Exh. 1-A, Stier Report, Vol. I at 60. Most witnesses testified that they just did not think about using E&Ds with the leak rate test or had no explanation for why E&Ds were not used with the leak rate test. Tr. 2452 (Frederick); Tr. 2671 (Wright); Congdon, ff. Tr. 2709 at 3; Tr. 2794 (Scheimann); Tr. 2988-89 (Zewe); Tr. 3668-69 (Hitz); Mehler, ff. Tr. 3842 at 4; Tr. 4078 (Hemmila); Tr. 4742 (Seelinger). Some witnesses testified that they thought that the E&D procedure may have been inapplicable to the leak rate test because the test was conducted on the computer. Tr. 2911 (Cooper); Tr. 3018 (Illjes); McGovern, ff. Tr. 3148 at 4; Tr. 3524 (Chwastyk); Tr. 4346 (Smith); Bryan, ff. Tr. 4540 at 5. Finally, some witnesses claimed that the E&D procedure did not apply to the leak rate test because the test was a routine surveillance. Tr. 2545 (Faust); Tr. 3018 (Illjes); Floyd, ff. Tr. 4894 at 3."

9. "Based on the evidence in the record, it is clear that TMI-2 personnel uniformly failed to document leak rate testing properly . . . . Leak rate tests were routinely discarded by CROs and shift foremen [if they registered more than 1 gpm without regard to their validity.] Shift supervisors were aware of this practice . . . . Further, James Seelinger, at one point, told TMI-2 personnel not to leave leak rate tests lying around. This instruction may have led at least some TMI-2 personnel to discard leak rate tests so that the NRC would not discover them."

10. "In addition, TMI-2 personnel failed to log the start times of leak rate tests and failed to file E&Ds. Board Exh. 1-A, Stier Report, Vol. I at 60. Floyd failed to enforce the application of the E&D procedure to the leak rate test. Floyd, ff. Tr. 4894 at 3. He claimed that E&Ds were not filed because the leak rate test was run more frequently than required by the Tech Specs. *Id.*" [While true, that factor is irrelevant. The practice of discarding seemingly valid tests only

because they showed unidentified leakage in excess of 1 gpm — engaged in by virtually all the CROs with the knowledge (and some participation) of the shift foremen and supervisors — was, in the Board's view, much more than a mere administrative default. The individuals knew or should have known that the tests were supposed to have some safety significance. Detection of "unidentified leakage" is a red flag of that. When coupled with the practice, by the same individuals, of keeping *all* tests that registered unidentified leakage of less than 1 gpm (but for which there was no technical basis for the differentiation) this pattern of conduct borders on falsification of test results.[37] It is no answer to say that the discarding of tests "came over from Unit 1." The people involved should have known better and many of them surely did.]

11. "No members of management above Floyd and Seelinger apparently knew that tests were being discarded where unidentified leak rate results exceeded 1 gpm. Floyd was the most senior person who admitted E&Ds were not filed when leak rate tests failed to meet acceptance criteria. *See* Board Exh. 1-A, Stier Report, Vol. I at 133; Tr. 4745 (Seelinger); Floyd, ff. Tr. 4894 at 3. By their very nature, the practices of discarding tests and failing to follow procedures for documenting test results tended to conceal such conduct. Board Exh. 1-A, Stier Report, Vol. I at 135. Although the CROs and shift foremen openly followed these practices, the evidence does not show that any management officials participated in their activities, and, other than Floyd and Seelinger, observed their conduct."

12. "Both Kunder and Logan testified that they did not know that operators were discarding leak rate tests. Tr. 4839 (Kunder); Tr. 5138 (Logan). G. Miller also had no knowledge operators were discarding leak rate tests. As Station Superintendent, G. Miller had no direct involvement in leak rate testing. Miller testified that he depended primarily on the morning conference call as a means of identifying operational problems. G. Miller, ff. Tr. 5039 at 19. Miller did not believe that the subject of continuing leak rate surveillance difficulties was ever discussed during those calls. *Id.* It was his belief that surveillance records were retained and collected by the Surveillance Coordinator. Board Exh. 1-A, Stier Report, Vol. II(B), G. Miller Summary at 1. Herbein was informed of the daily status of the plant through subordinates. Herbein, ff. Tr. 5268 at 7. Herbein's

---

[37] There are indications in the record that some operators in signing tests they ran, and some foremen signing their approval thought they were merely certifying that the result was less than 1 gpm. *See* Stier Report, Vol. I at 54. That is an impermissibly narrow, indeed, fatuous, view of the significance of these signatures. As to all filed tests, it is clear from the face of the computer-generated test result that the result was less than 1 gpm. No signatures were necessary for that determination. Although the significance of these signatures apparently was not spelled out in company directives, we believe that any reasonable operator should have known that, by his signature, he was warranting that he had conducted the test in accordance with prescribed procedures and that, at a minimum, he had no specific bases (as distinguished from general skepticism) to believe that the particular test was not accurate. Similarly, in our view, a foreman by his signature was warranting that the results, at least on their face, appeared to be valid and that he too had no specific bases to believe that the particular test was not accurate.

subordinates never informed him that CROs or others were discarding or failing to document unsatisfactory leak rate tests. *Id.* at 13."

VI. INDIVIDUAL RESPONSIBILITY OF CROs, THEIR FOREMEN AND SUPERVISORS, AND THE SUPERVISOR OF OPERATIONS FOR LEAK RATE DATA MANIPULATION AND KNOWING CERTIFICATION OF FALSE TESTS AND FOR OTHER VIOLATIONS OF LEAK RATE TEST PROCEDURES

Introduction

1. In this section, we make findings with respect to the individual involvement of each CRO, shift foreman, and shift supervisor in leak rate testing at TMI-2 in 1978-1979, in response to the following Commission question:

> Did operators manipulate data or take other actions during leak rate surveillance testing in an attempt to improperly influence test results? Who performed, condoned, directed or was knowledgeable of data manipulation or other improper actions during leak rate surveillance testing?

Our findings cover thirty individuals, twenty-eight of whom appeared as witnesses in the proceeding. We also make further findings concerning the responsibility of the Supervisor of Operations, Mr. Floyd.

2. Our findings on individual responsibility are grouped according to the shift on which each person served. The individual CROs and shift foremen (and to some extent, the shift supervisors) cannot be viewed realistically in isolation, for several reasons. The performance of a leak rate test was often a "joint enterprise" involving two, and sometimes more, people on a shift. Thus if water were added during a test, that would normally be done by the CRO assigned to the panel, who should then inform the surveillance CRO — the person who took the computer readings and signed the test. Alternatively, the surveillance CRO might ask the panel CRO if he had added water during the test. *See, e.g.*, Stier, Vol. IV, Interviews with Olson (10/22/84 at 8); McGovern (2/6/85 at 96); Coleman (2/5/85 at 5). Tr. 2843-46 (Cooper). The surveillance CRO would, in turn, present the test to the shift foreman for approval. The point is well illustrated by Stier's discussion of water manipulation by Shift D, as follows:

> On January 11, 1979, the first accounted-for water addition during the course of a leak rate test occurred on Coleman's shift. He was the test performer while Olson was the Control Room Operator operating the control room panel. Testimony from numerous members of the Operations Department makes it clear that water was usually added to the system by the Control Room Operator controlling the panel.
>
> The next water addition appears on February 16, 1979. On that occasion, Olson was performing the test while Coleman was controlling the panel.

> Thereafter, 11 tests containing logged water additions in February and March were performed on as many of Coleman's consecutive assigned shifts. In each case, the water addition was made near the end of the test, suggesting some degree of collaboration between the operator assigned to the panel and the operator performing the test. Coleman and Olson performed all of these tests, sometimes with assistance from Wright. . . .
>
> This test data makes it clear that it is unlikely Coleman acted alone when making logged water additions during the course of the leak rate test in an effort to manipulate results. The evidence also makes it clear that Coleman had to be aware of the participation of others during this period, although he insists he does not recall at this time.

Stier, Vol. II(A), Coleman Assessment at 12-13.

3. Pointing to testimony that the roles of the CROs in leak rate testing varied from time to time and/or that tests were often performed in a perfunctory or sloppy manner (Tr. 3024, 3079, 3306, 3995), the Numerous Employees propose that the Board "cannot conclude that any given leak rate test that may have been falsified or that violated procedures was necessarily the responsibility of any particular CRO or SRO." Employees' Proposed Finding 275. We emphatically reject that conclusion, a conclusion that would render this proceeding largely futile. While the roles of shift members varied from time to time, it is equally clear that there were routine ways of doing things, and that such routines were generally followed. Such routines provide some basis for an inference that the routine was followed in the particular case.[38] Thus, if there is evidence that a particular water addition was made in order to manipulate a test result, the "joint enterprise" aspect of the test procedure would usually provide some independent evidence that the surveillance CRO, the panel CRO, and perhaps the shift foreman knew about the manipulation.

4. An inference of shared knowledge of manipulation may also be supported by direct testimony of a CRO concerning his shiftmates, or by an apparent pattern of manipulation involving a single shift, based upon expert analysis of test records. In the latter regard, the clear pattern of manipulation by underrecording water additions by all three CROs on Shift D — discussed in detail below — constitutes the strongest evidence in the record of manipulation by an entire shift.

5. We stress, however, that merely because we may have found evidence of manipulation of a test by a particular person, we did not automatically impute knowledge of or participation in such manipulation to other members of that shift. Rather, we looked at all the facts and circumstances surrounding that test

[38] Apart from the "joint enterprise" aspect that is most relevant here, some CROs even testified that they may have signed tests as "operator" when they had not themselves run the test. For example, John Kidwell testified that he might simply have taken a test printout from the computer and signed it if it reflected less than 1 gpm. Tr. 3305-07. Given the cynicism of the operators toward the test, that may sometimes have occurred. However, we think it fair to assume that the person listed as "operator" on the test (1) was primarily responsible for its performance, (2) performed the calculations required, and (3) certifies the test as accurate. The individual operators were given an opportunity to deny the attributions of test performance by NRR and MPR. Such denials were not made.

and other tests run by that shift, including the testimony of the CROs, levels of communication among that shift, and other relevant factors.

6. We use the terms "manipulate" and "falsify" in a similar sense. Both terms connote an intent to deceive and to produce a false result. We generally use the term "manipulate" with reference to data — e.g., by adding water, knowing it will be underrecorded, an operator "manipulates" a test result from one value to another. We generally use the term "falsify" to mean the act of certifying a test as accurate when the CRO making the certification knows that the test data have been manipulated. We believe that our use of these terms is consistent with the Commission's use of the same terms. We reject the Numerous Employees' argument to the contrary. *See* PF 394.

7. In general, the operators are directly responsible for their own violations of procedure. The concept of "dereliction" or "culpable neglect" — the terms used by the Commission — came into play at the foreman level and above. In some respects, however, the foreman may be personally chargeable with a procedural violation — e.g., where he was personally involved. In other respects, most notably manipulation, the foreman's responsibility may be based entirely upon culpable neglect. Again speaking generally, the shift supervisors were one step removed from the leak rate test process and were not usually involved in particular tests. Although circumstances vary, the shift supervisors are responsible only on a "culpable neglect" basis.

8. The Commission did not define the words "dereliction" or "culpable neglect," nor is a dictionary definition particularly helpful in the circumstances of this case. We reject the Numerous Employees' suggestion that the words "connote an element of scienter, or knowledge." PF 49. That suggestion would place too high a premium on ignorance and effectively immunize from responsibility supervisors who exhibited a disregard for the conduct of their subordinates. We agree with the following language proposed by GPUN:

> The Board has not applied a standard whereby a managerial position alone carries with it a basis for finding fault in this proceeding. We do not interpret the Commission order as requiring a standard of vicarious or imputed responsibility, but rather one of negligence that considers the particular tasks and duties of a position and what the individual knew or reasonably should have known. PF 195.

9. Mr. Hartman had alleged, among other things, that leak rate tests had been manipulated by "taking advantage of discrepancies between the level indication read by the two make-up tank level indicators." Faegre & Benson Report, Vol. I at 48. All of the investigators attempted to document this allegation in the test records. Similarly, there were concerns that operators might have used "feed and bleed" operations as a cover for test manipulation, and this possibility was fully investigated. Although several tests raise questions along these lines, there is no solid evidence in the record that any operator either switched level

indicators or used a "feed and bleed" operation to manipulate a test. In view of that conclusion, it is not necessary for us to address the numerous findings proposed to us in those areas concerning particular test records. We may refer to such tests, not as evidence of manipulation, but for other purposes, such as to illustrate sloppy performance.

Shift A

10. Shift A was made up of the Shift Supervisor William H. Zewe, Shift Foreman Frederick J. Scheimann, and two CROs, Craig C. Faust and Edward R. Frederick. The record shows that there were no communications problems among its members.

11. The shift had some of the problems common to most of the shifts in that neither of the CROs followed Administrative Procedures 1010 and 1012 (filing exceptions and deficiencies and logging start and stop time of leak rate tests), and neither supervisor required them to do so. Tr. 2460 (Frederick); Faust Prep. St., ff. Tr. 2511 at 4; Tr. 2544 (Faust); Tr. 2794 (Scheimann); Tr. 2988-89 (Zewe).

12. Insofar as manipulating or falsifying leak rate tests or test results is concerned, the NRR and Stier investigators could find no evidence that any such manipulations or falsifications ever occurred. We discuss that subject and that of discarding leak rate tests below.

Craig C. Faust

13. In 1973, Mr. Faust began employment with Met-Ed as an AO. He became a CRO at TMI-2 in 1977. He is currently employed in the GPU nuclear training department as an Instructor IV, and he maintains an SRO license. Faust Prep. St., ff. Tr. 2511 at 1. Mr. Faust was assigned to "A" Shift during the 1978-1979 period.

14. Mr. Faust's shift generally divided its responsibilities by assigning one CRO to operate the plant and maintain the CRO log and the other CRO to perform surveillance tests. Tr. 2559-61. If Mr. Faust were assigned to perform surveillances, he would usually conduct a leak rate test within the first hour of his shift. Tr. 2526. He tried to obtain a leak rate test on a shiftly basis, if plant conditions permitted. Tr. 2542. He did recall that he performed leak rate tests on the day shift, if the computer was available. Tr. 2543.

15. Mr. Faust regarded the leak rate test as the principal way to satisfy the 1-gpm LCO for unidentified leakage. Tr. 2533. He did not question the accuracy of the leak rate test and he believed that the test had some relationship to actual plant leakage. Tr. 2533-34.

16. If a leak rate test result was under 1 gpm of unidentified leakage, or within a fairly narrow range of negative values, Mr. Faust would sign the test without detailed analysis. Tr. 2534. If Mr. Faust obtained a leak rate test result in excess of 1 gpm, he attempted to determine whether the result was valid. Tr. 2522. If he could invalidate the leak rate test result, he threw it away and started another test. *Id.* He did not need supervisory approval to discard the test. Faust Prep. St. at 3; *also see* Tr. 2959 (Zewe).

17. Mr. Faust discarded leak rate test results regardless of the value for unidentified leakage if he had either conducted the test improperly, added water but inadvertently failed to account for it, or encountered a change in power level. Tr. 2524, 2571. If Mr. Faust could not invalidate a leak rate test result, he discussed it with the shift foreman or placed it on the shift foreman's desk. Tr. 2524-25. At times, he would be ordered to check the test result further for inaccuracies or to search for leakage. Stier Report, Vol. VI(C), Tab F, Faust 2/19/85 Interview at 122-23; Tr. 2524. Mr. Faust presumed that either he or the shift foreman found a reason to invalidate all leak rate test results not meeting the 1-gpm LCO, because excessive leak rate tests did not cause his shift to enter the Action Statement of Tech Spec 3.4.6.2. Faust Prep. St. at 3-4.

18. The record contains four negative leak rate tests signed and filed by Mr. Faust. They are NRR Test No. 98 (Stier Test No. 60); NRR Test No. 102 (Stier Test No. 56); NRR Test No. 118 (Stier Test No. 40); and NRR Test No. 149 (Stier Test No. 9). Exh. 5-B, Attachment 5, Table 11; Stier Report, Vol. III(A), Table 2 (Faust). All of these tests were within the range of −0.1 gpm to −0.9 gpm. Stier Report, Vol. IV(E) (Test Nos. 56 and 60); *id.*, Vol. IV(D) (Test No. 40); *id.*, Vol. IV(C) (Test No. 9). In light of Mr. Faust's awareness, in 1978-1979, that instrument errors and plant oscillations could result in negative leak rate test results, we find that Mr. Faust acted reasonably in treating such tests as valid. Tr. 2529, 2532 (Faust).

19. Mr. Faust never manipulated or falsified a leak rate test. Tr. 2547. The record is devoid of any allegations that he did so. Tr. 1486-87 (Mr. Russell exonerated Mr. Faust of any involvement in intentional leak rate test manipulation); Stier Report, Vol. II(A), Tab F, Faust Assessment at 9-13.

20. Mr. Faust did not know, during 1978-1979, that the addition of water could cause the MUT level strip chart to record a greater addition than the amount of water actually added. Faust Prep. St. at 5. While he heard a rumor that hydrogen added to the MUT could affect the leak rate test, he did not believe the theory and he never added hydrogen to the MUT during a leak rate test to determine its effect. *Id.* at 5-6.

21. Mr. Faust is aware of LER 78-62/1T only through subsequent investigations. *Id.* at 6. He would not have changed his interpretation of Tech Spec 3.4.6.2 because of that LER, because he knew during 1978-1979 that his shift

would have to enter the Action Statement if they could not invalidate a leak rate test result in excess of the 1-gpm LCO. *Id.* at 7.

22. In summary, we found Mr. Faust to be "a forthcoming and candid witness." Tr. 2577 (Kelley, J.). It is clear from the record that Mr. Faust never attempted to manipulate or falsify a leak rate test.

Edward R. Frederick

23. Mr. Frederick began employment with Met-Ed in 1973 as an AO. He obtained his TMI-2 RO license in 1977. He is currently an Instructor V for GPU Nuclear in its training department, and he holds an SRO license. Frederick Prep. St., ff. Tr. 2447 at 1; Exh. 5-B, Attachment 5, Table 1. In 1978-1979, Mr. Frederick was assigned to "A" Shift in TMI-2 as a CRO.

24. As a licensed operator, Mr. Frederick realized that he had an obligation to ensure that TMI-2 was operated safely. He believed that one part of this obligation was to obtain a leak rate test result depicting unidentified leakage less than 1 gpm once every 72 hours while the plant was in operation. Frederick Prep. St. at 2. He understood that to perform the leak rate test properly, he had to establish the appropriate conditions for the test. *Id.* While running a leak rate test, he habitually monitored pressurizer level, MUT level, RCS average temperature, and other plant parameters, so that there was no disruption of steady-state conditions. Tr. 2471. Mr. Frederick recalled knowing that the purpose of the leak rate test was to give the operator an indication of a developing leak which might propagate and thereby lead to a more hazardous condition. Tr. 2462.

25. After Mr. Frederick obtained a leak rate test result, he examined the printout for obvious inaccuracies. Tr. 2476. In examining a leak rate test result, Mr. Frederick went beyond merely verifying that the value for unidentified leakage was less than 1 gpm, because he regarded the test as a valid indicator of leakage. Tr. 2478.

26. Mr. Frederick gave all leak test results to his shift foreman (including any depicting negative unidentified leakage), Tr. 2459, although he did hold the belief that negative leak rate test results were attributable to normal instrument errors. Tr. 2458.

27. If Mr. Frederick determined that the leak rate test result was inaccurate, he gave it to the shift foreman, along with an explanation of the inaccuracy. Tr. 2477. He did not recall discarding any leak rate test, Frederick Prep. St. at 9, because he gave all the tests that he completed to the shift foreman and left the ultimate decision about the validity of the test to him. Tr. 2475. Mr. Frederick presumed that his shift foreman must have discarded leak rate tests that he invalidated. Frederick Prep. St. at 6. Although Mr. Scheimann could not corroborate Mr. Frederick's recollection that he (Frederick) gave Mr. Scheimann all of his completed leak rate tests, Mr. Scheimann did acknowledge that he

reviewed leak rate tests given to him by his shift, and that he (Scheimann) discarded tests he determined to be invalid. Tr. 2785, 2787, 2820 (Scheimann).

28. Mr. Frederick was neither aware of, nor involved in, leak rate test manipulation at TMI-2. Mr. Frederick has testified that he never manipulated leak rate tests in any fashion. Frederick Prep. St. at 8-10; *see also* Stier Report, Vol. II(A), Frederick Assessment at 1 (insufficient evidence that Mr. Frederick intentionally manipulated leak rate tests through either water or hydrogen additions to the MUT); Exh. 5-A, Enclosure 7 at 2 (Mr. Frederick's "testimony regarding his lack of personal involvement in leak rate test manipulation or falsification is consistent with NRR's technical analysis"). He was not aware that leak rate tests could be manipulated through either hydrogen additions to the MUT (Frederick Prep. St. at 7; Stier Report, Vol. VI(D), Tab F, Frederick 3/12/85 Interview at 31-32, 68-69), or "underrecorded" water additions to the MUT (Frederick Prep. St. at 7; Stier Report, Vol. VI(D), Tab F, Frederick 3/12/85 Interview at 33).

29. Mr. Frederick tried to avoid water additions to the MUT during a leak rate test. Tr. 2498. If he added water during a leak rate test, he did so only for legitimate operational reasons such as to maintain proper MUT water inventory or RCS boron concentration. Tr. 2497-98.

30. Mr. Frederick took precautions in setting up a leak rate test because he doubted that the test was perfectly accurate. *Id.* at 3. We find that Mr. Frederick's diligence did produce a high percentage of valid results; in fact, of the twelve Shift A tests labeled "questionable" in Exh. 5-B, Attachment 5, Table 8, only five were signed by Mr. Frederick and none involved manipulation. Exh. 5-A, Enclosure 7 at 5; Tr. 1486-87, 1493 (Russell).

31. Mr. Frederick did sign two tests during which the plant might have, arguably, been in nonsteady-state condition, but these are disputed; the first by Mr. Frederick, the second by MPR. The first test, NRR Test No. 10, occurred while the shift began a reactor startup. Exh. 5-B, Attachment 5, Table 11; Stier Report, Vol. III(A), Table 2 (Frederick). Mr. Frederick disputed the contention that the startup made conditions unstable. Tr. 2463. He emphasized that the startup to criticality did not affect temperature or pressure, and that the numbers printed out at the beginning and end of the test were steady. *Id.* According to MPR, the second test, NRR Test No. 108, was also not performed during a period when plant conditions were unstable. Exh. 1-B (Green Volume), Stier Test No. 50.

32. NRR agreed that Mr. Frederick did not sign any tests involving a hydrogen addition to the MUT; however, NRR alleged that two of the tests signed by Mr. Frederick involved an unrecorded or "underrecorded" water addition to the MUT. Exh. 5-B, Attachment 5, Tables 7 and 11. As to the unrecorded water addition attributed to him by NRR (NRR Test No. 98), MPR refuted NRR's conclusion that there was a water addition during the test. Exh.

1-B (Green Volume), Stier Test No. 60. As to the test allegedly involving an underrecorded water addition to the MUT according to NRR (Exh. 5-B, Attachment 5, Table 11, NRR Test No. 149), MPR concluded that there was a legitimate reason to add water to the MUT during that test. Stier Report, Vol. III(A), Table 2 (Frederick).

33. Mr. Frederick stated that he was aware, during 1978-1979, of the need to enter the Action Statement of Tech Spec 3.4.6.2 if his shift obtained a valid leak rate test with unidentified leakage in excess of 1 gpm. Frederick Prep. St. at 9-10. Mr. Faust had a similar understanding prior to the accident. Faust Prep. St., ff. Tr. 2511 at 7. However, both Messrs. Frederick and Faust agreed that it was the shift foreman's decision whether to enter the Action Statement. Tr. 2475 (Frederick); Tr. 2524-25, 2556 (Faust).

34. We agree with Mr. Frederick's assessment of his leak rate tests: He had a good record, with a relatively high percentage of valid leak rate tests. Frederick Prep. St. at 10. He obviously tried to perform the leak rate tests with a degree of care, and the arguably invalid tests he performed are remarkably few, given the defects in the test procedure. Accordingly, we agree with Mr. Russell's and Mr. Stier's exoneration of Mr. Frederick of any involvement in the intentional manipulation of leak rate tests at TMI-2. Tr. 1486-87; Stier Report, Vol. II(A), Tab F, Frederick Assessment at 1.

Frederick J. Scheimann, Jr.

35. During 1978-1979, Mr. Scheimann was the shift foreman assigned to "A" Shift. Mr. Scheimann currently is employed as a training consultant by Mechanical Equipment Consultants, and he is stationed at the Crystal River Nuclear Power Plant. Scheimann Prep. St., ff. Tr. 2831 at 1. He does not maintain a license to operate a nuclear power plant. Exh. 5-B, Attachment 5, Table 1; Tr. 2790.

36. Mr. Scheimann's view of compliance with Tech Spec 3.4.6.2 was that if one leak rate test meeting the 1-gpm LCO was obtained during a 72-hour period, Mr. Scheimann believed that he did not have to enter the Action Statement of Tech Spec 3.4.6.2, even if another leak rate test result exceeded the 1-gpm LCO during that period. Tr. 2802-03, 2805. However, Mr. Scheimann testified that he responded to leak rate test results depicting unidentified leakage in excess of 1 gpm by checking for operator error or searching for leakage. Tr. 2803.

37. Mr. Scheimann viewed the leak rate test as a tool to aid in the detection of RCS leakage. Tr. 2792-93. He did not recall that the leak rate test had inherent problems, or that satisfactory leak rate test results became increasingly difficult to obtain during February-March 1979. Tr. 2789. Presumably, Mr. Scheimann was not aware of problems with the leak rate test because he did not have to

perform it (*id.*), and because his shift encountered fewer difficulties than other shifts in obtaining leak rate test results meeting the 1-gpm LCO. Scheimann Prep. St., ff. Tr. 2831 at 5; Tr. 1493 (Mr. Russell concluded that "Shift A did not have the high percentage of invalid or questionable tests that the other shifts had").

38. Mr. Scheimann directed his shift to perform the leak rate test during every shift if conditions permitted. Scheimann Prep. St. at 2-3. As a general rule, if the CROs on his shift obtained a leak rate test result over 1 gpm, they gave it to Mr. Scheimann if they could not invalidate it. Tr. 2787. Mr. Scheimann did not dispute Mr. Frederick's assertion that he gave Mr. Scheimann all of his completed leak rate test results. Tr. 2785. Mr. Scheimann also agreed with Mr. Faust's recollection that Mr. Faust invalidated and discarded some leak rate test results on his own. Tr. 2818. Mr. Scheimann was most likely to review test results sometime after they had been performed because he was frequently out of the control room. Tr. 2787-88. He claimed that he never ignored leak rate test results (Tr. 2822), and he discarded only those test results that he deemed invalid. Tr. 2820. As part of his validation process, Mr. Scheimann reviewed MUT level and, on occasion, pressurizer level. Tr. 2788, 2830. Since Shift A never entered the Action Statement, Mr. Scheimann claimed, in effect, to have "invalidated" every test reflecting leakage in excess of 1 gpm. The Board is somewhat skeptical of this claim because of the erratic results the test produced and the consequent likelihood that some tests could not have been invalidated by the methods Mr. Scheimann described. However, in the absence of other evidence, we accept Mr. Scheimann's description of his actions.

39. It is also clear that Mr. Scheimann himself was unaware, during 1978-1979, that leak rate tests could be manipulated by either "jogging" water into the MUT (Scheimann Prep. St. at 4), adding water to the MUT and obtaining a "bonus" effect (Tr. 2809), or adding hydrogen to the MUT (Scheimann Prep. St. at 4).

40. Mr. Scheimann did not receive classroom training on the performance of leak rate tests. Tr. 2799. He learned how to perform the leak rate test on shift as a TMI-2 CRO. Scheimann Prep. St. at 1; Tr. 2799. It is apparent to the Board that Mr. Scheimann's knowledge was no more adequate than the operator's. As a shift foreman, Mr. Scheimann generally did not participate in the training process. *Id.* If he had been asked to supervise a trainee, Mr. Scheimann would have directed his CROs to assume responsibility for leak rate test instruction. Tr. 2801.

41. Although Mr. Scheimann knew that the existence of a negative rate of leakage was theoretically impossible (Tr. 2798), he did approve negative leak rate test results for filing. Tr. 2789. Mr. Scheimann believed that negative leak rate test results were caused by normal changes in plant parameters, such as slight temperature increases, and as such were not aberrant. *See* Tr. 2788-89,

2798. However, he did not approve negative leak rate test results in excess of – 1.0 gpm of unidentified leakage. Tr. 2798; *see* Stier Report, Vol. III(A), Table 1 (Stier Test Nos. 9, 40, 56, 60, 75, and 152) (all between 0 and – 1 gpm).

42. Mr. Scheimann did not approve any tests involving manipulation through either hydrogen or water additions to the MUT. Tr. 1484-94 (Russell); Tr. 1494-98 (Stier). According to NRR, Mr. Scheimann approved two tests involving "questionable" water additions to the MUT: NRR Test No. 98 (Stier Test No. 60) and NRR Test No. 149 (Stier Test No. 9). Exh. 5-B, Attachment 5, Tables 9 and 11; Stier Report, Vol. III(A), Table 1.

43. NRR claimed that its Test No. 98 had a possible water addition to the MUT 6 minutes before the end of the leak rate test. Exh. 5-B, Attachment 5, Table 11 at 14. MPR did not agree that water was added during that test because it appeared the trace deflections during the test were similar to others around the time of the test, and the level trace had a uniform overall slope before and after the end of the test. Exh. 1-B (Green Volume), Stier Test No. 60.

44. NRR Test No. 149 involved an alleged water addition to the MUT 19 minutes before the end of the leak rate test that caused a 36-gallon differential between the amount of water recorded and the amount shown on the MUT level strip chart; nevertheless, we accept MPR's conclusion that a legitimate operational reason existed for that water addition. Accordingly, we find no basis to agree with NRR's allegations about its Test Nos. 98 and 149.

45. NRR found that Mr. Scheimann's shift did not add hydrogen to the MUT during leak rate tests (Exh. 5-A, Table 10) and Mr. Stier agreed. Tr. 1494-98 (Stier).

46. During 1978-1979, Mr. Scheimann never realized that he was not complying with Administrative Procedure 1010, the "Exceptions and Deficiencies" Procedure, by not applying that procedure to invalid leak rate tests. Tr. 2794. His noncompliance did not result from management pressure to refrain from applying that procedure, but rather, it resulted from the fact that no one informed him that the procedure applied to leak rate tests. Tr. 2795.

47. Mr. Scheimann did not require that his operators log the start or the stop time of leak rate tests in accordance with Administrative Procedure 1012. *See* Frederick Prep. St., ff. Tr. 2447 at 5. Mr. Scheimann was following the consistent practice at TMI in not applying AP 1010 and AP 1012 to leak rate tests. *See* Floyd Prep. St., ff. Tr. 4894 at 2-3. The Board does not accept this as an excuse for not following proper procedures.

48. Mr. Scheimann agreed that it was his responsibility to communicate the meaning of an LER to his CROs. Tr. 2812. He was unable to recall whether he analyzed LER 78-62/1T, or instructed his shift about the interpretation of the Tech Specs that it reported. Tr. 2807. Mr. Scheimann was unsure whether he ever changed his interpretation that only one leak rate test result depicting

unidentified leakage of less than 1 gpm was required every 72 hours. Tr. 2804-05.

49. In summary, we find that Mr. Scheimann was an accessible, conscientious shift foreman. Tr. 2557 (Faust). As we have found, the majority of the leak rate tests he approved for filing were valid (Exh. 5-B, Attachment 5, Table 9); none of the leak rate tests he approved involved manipulation. Tr. 1484-94 (Russell); Tr. 1494-98 (Stier).

50. The investigators were unanimous in concluding that "A" Shift did not falsify or manipulate leak rate tests. Tr. 1486-87 (Russell), 1494-98 (Stier); *see* Stier Report, Vol. II(A), Tab F, Assessments of Messrs. Faust and Frederick. The Board agrees. However, as shift foreman, we find that Mr. Scheimann failed to meet his responsibilities to ensure that the performance of leak rate tests by his CROs followed the applicable Tech Specs and administrative procedures. The record shows that Mr. Scheimann did little or nothing to adequately inform his people, and in that regard the Board finds him to be culpably negligent.

William H. Zewe

51. Mr. Zewe began employment with Met-Ed in 1972 as an AO. In 1973, he was promoted to shift foreman, and in 1976 he was promoted to shift supervisor. At Unit 2, he supervised "A" Shift. Zewe Prep. St., ff. Tr. 2946 at 1. Mr. Zewe is still employed by Met-Ed as Manager of Titus Generating Station. *Id.* He no longer holds a license to operate a nuclear power plant. Exh. 5-B, Attachment 5, Table 1.

52. Mr. Zewe acknowledged that, as shift supervisor, it was his ultimate responsibility to ensure that unidentified leakage was below the 1-gpm LCO prescribed by the Tech Specs. Tr. 2951. The shift foreman directed actual compliance with leak rate testing practices, however. Zewe Prep. St. at 2. Mr. Zewe could not recall ever performing a leak rate test (Tr. 2949), and he never formally approved a test for filing from September 30, 1978, to March 28, 1979. Exh. 5-B, Attachment 5, Tables 9 and 11.

53. Mr. Zewe knew that to comply with the Tech Spec requirement that unidentified leakage be kept within the 1-gpm LCO, his shift sought a leak rate test depicting unidentified leakage of less than 1 gpm during a 72-hour period while the plant was in operation. He recalled that his shift tried to perform a leak rate test at least every day and sometimes every shift. Zewe Prep. St. at 2. He, unlike Scheimann, thought that his shift would have entered the Action Statement of Tech Spec 3.4.6.2 in response to a valid leak rate test result over 1 gpm (*id.*, Tr. 2972-73, 2979), although he does not recall his shift ever doing so. Tr. 2961, 2974.

54. Mr. Zewe testified that his operators were not authorized to discard leak rate tests in excess of the 1-gpm LCO, unless they had made a de-

termination that the test was invalid. Tr. 2958; Zewe Prep. St. at 3. Mr. Zewe expected his operators to make this determination on their own. *Id.* They did not have to explain their decision to Mr. Zewe or to his shift foreman, Mr. Scheimann. Tr. 2959. Mr. Zewe does not recall ever discarding a leak rate test. Tr. 2995.

55. The record does demonstrate that members of "A" Shift were conscientious in evaluating leak rate test results against other plant parameters. Tr. 2817 (Scheimann); Tr. 2524-25, 2533 (Faust); Tr. 2475-78 (Frederick). Indeed, Mr. Zewe recalls that he personally investigated for, and inspected, leaks in the plant on many occasions. Zewe Prep. St. at 2-3.

56. Mr. Zewe thought that the 1-gpm standard for unidentified leakage was "too conservative," because of Unit 2's oscillation problems and because of the large volume of water in the RCS. Tr. 2955-56. He recalls believing that it would be merely a matter of time until the oscillations and inaccuracies in the leak rate test procedure were resolved, and the leak rate program and the new plant became compatible. Tr. 2953, 2957.

57. During 1978-1979, Mr. Zewe was not aware of leak rate tests being manipulated through any method. Tr. 2691. Specifically, he had no awareness of leak rate test manipulation through the addition of either hydrogen or water to the MUT (Zewe Prep. St. at 6; Stier Report, Vol. VI(K), Tab Z, Zewe 3/29/84 Interview at 43-45). Prior to the TMI-2 accident, Mr. Zewe was not aware of the effect that hydrogen additions to the MUT could have on leak rate test results. Zewe Prep. St. at 6; Stier Report, Vol. VI(K), Tab Z, Zewe 3/29/84 Interview at 50. .

58. Mr. Zewe could not recall any of the circumstances leading to the issuance of the November 1, 1978 LER concerning leak rate testing, although he does recall that leak rate test results were rounded to whole numbers for a short period of time. Zewe Prep. St. at 6-7; Tr. 2969-70. He did try to read all documents on the required reading list. Tr. 2969. He understood that it was his responsibility to see that his shift received and understood the information contained in the LER. Tr. 2968. Neither Mr. Faust nor Mr. Frederick recall being given any instruction on the implication of the LER. Faust Prep. St., ff. Tr. 2511 at 6-7; Frederick Prep. St. ff. Tr. 2447, at 8. Inasmuch as Mr. Zewe had the responsibility to ensure that his shift was aware of the actions that resulted from the LER, but evidently did nothing substantive about it, we must find Mr. Zewe guilty of culpable negligence.

59. The investigators have agreed that Mr. Zewe's shift did not manipulate leak rate tests. Tr. 1486-87 (Mr. Russell stated that "there was insufficient evidence to support a conclusion that they [Messrs. Faust, Frederick, *et al.*] engaged in intentional leak rate manipulation."); *see* Stier Report, Vol. II(B), Tab Z, Zewe Assessment at 1; Tr. 1494-98 (Stier). Accordingly, we find that there is no evidence that Mr. Zewe was aware of, or involved in, leak rate

test falsification or manipulation at TMI-2. We do find, however, that it was Mr. Zewe's responsibility in his capacity as shift supervisor to make sure that all the people on the shift were properly applying the relevant Tech Specs and administrative procedures. This he did not do. We therefore find that Mr. Zewe was guilty of culpable neglect of this part of his duties.

Shift B

60. This shift included CROs Theodore F. Illjes and John M. Kidwell and a trainee, Mr. Charles F. Mell. The shift foreman was William T. Conaway, II, and the shift supervisor was Joseph J. Chwastyk.

61. Shift B misinterpreted the Tech Spec requirements and considered it sufficient to obtain at least one leak rate test below the 1-gpm LCO during a 72-hour period. Ff. Tr. 3010 at 2-3 (Illjes); ff. Tr. 3285 at 1 (Kidwell); ff. Tr. 3239 at 2 (Mell); Tr. 3128-29 (Conaway); ff. Tr. 3407 at 2 (Chwastyk). They regularly discarded tests that showed exceedance of the 1-gpm limit and regarded the tests as a meaningless administrative requirement, rather than as an accurate measure of leakage. Ff. Tr. 3010 at 2 (Illjes); ff. Tr. 3285 at 3 (Kidwell); ff. Tr. 3239 at 2 (Mell); Tr. 3104 (Conaway); ff. Tr. 3407 at 3 (Chwastyk).

62. The shift members had not been given adequate training with respect to the leak rate test and its safety implications. Tr. 3019 (Illjes); Tr. 3288-89 (Kidwell); Tr. 3247, 3274 (Mell); Tr. 3105 (Conaway); ff. Tr. 3407 (Chwastyk). The shift did not follow Administrative Procedures 1010 and 1012 that required the filing of exception and deficiency statements and the logging of start and completion times for surveillances. Tr. 3018 (Illjes); Tr. 3293 (Kidwell); Tr. 3108 (Conaway); ff. Tr. 3407 at 3 (Chwastyk).

Theodore F. Illjes

63. Mr. Illjes began employment with Met-Ed in 1971 and became a CRO at TMI-2 in 1976. Mr. Illjes is still employed at TMI-2 by GPU Nuclear as a licensed shift supervisor. Illjes Prep. St., ff. Tr. 3010 at 1.

64. Mr. Illjes testified that "it would appear, now, that the leak rate test procedures I followed were not always in strict compliance with the requirements imposed on us, in that I usually discarded test results showing unidentified leakage greater than 1 gpm." *Id.* at 2. He also admitted that he did not understand the Tech Specs by testifying that "during 1978 and 1979, I thought it sufficient to obtain at least one leak rate test result below 1 gpm during a 72-hour period." *Id.* at 2-3. The Board has reviewed the ten tests signed by Mr. Illjes, and we find many other kinds of noncompliance with procedural requirements and that 70% of his surveillances were not valid.

65. On October 31, 1978, Mr. Illjes carried out and signed a leak rate test in blatant disregard for the procedural requirement that the test only be performed during steady-state conditions. This test was carried out with primary plant testing in progress and large changes in pressurizer level (+ 10.5 inches) and MUT Level (−7 inches) occurred. Exh. 5-A, Enclosure 9 at 3 of Enclosure 1.

66. On December 5, 11, and 20, 1978, and January 7, 1979, Mr. Illjes conducted leak rate tests with an unstable and erroneous level sensor connected to the computer. Mr. Illjes testified that "I do not recall a problem with a fluctuating transmitter . . . ." Prep. St., ff. Tr. 3010 at 4. Mr. Stier noted in his evaluation of Mr. Illjes that:

> There is testimony that the makeup tank level instrumentation problem was well known in the Operations Department. This testimony is corroborated by plant records that demonstrate an awareness of the problem, particularly on the shift to which Illjes was assigned. During the relevant period, Illjes' shift submitted two work requests to repair the level transmitter and filed a Shift Supervisor turnover note indicating that the transmitter was out-of-service.

Stier Report, Vol. II(B), Tab I at 7.

67. The Board cannot understand how Mr. Illjes could have been unaware of level transmitter malfunctions. The implication is that he was very inattentive to the control room situation and, thus, incompetent.

68. On February 12, 1979, a leak rate test was conducted while Mr. Illjes was the control panel operator. The MUT strip chart shows that ca. 150 gallons of water were added to the MUT, but Mr. Illjes did not record this addition in his log. While this behavior could reflect deliberate falsification of the test, it may also be a careless mistake by Mr. Illjes. Also the RCDT was pumped down in violation of procedural controls. At any rate, the Board finds this test reflects discredit on his performance as an operator.

69. On February 17, 1979, Mr. Illjes conducted a leak rate test and was also the operator assigned to the control panels. According to the Auxiliary Operator's log, hydrogen was added at 0500. The hydrogen addition was not logged by Mr. Illjes. The strip chart (*see* Figure 2) shows an upward offset of the MUT level coincident with the hydrogen addition and which biased the unidentified leak rate toward a falsely lower value than would have been otherwise obtained. If there were additional tests implicating Mr. Illjes in hydrogen manipulation, this test might be viewed as "clear and convincing" evidence that Mr. Illjes carried out such manipulation. Since this test may represent inadvertence with the hydrogen added to the MUT for legitimate purposes, we regard this test as inconclusive evidence of manipulation.

70. Two leak rate tests were conducted on February 19, 1979, when Mr. Illjes was the panel operator. NRR Test Nos. 124 and 125. Mr. Kidwell signed as the operator on these surveillances, and both Mr. Stier and NRR have

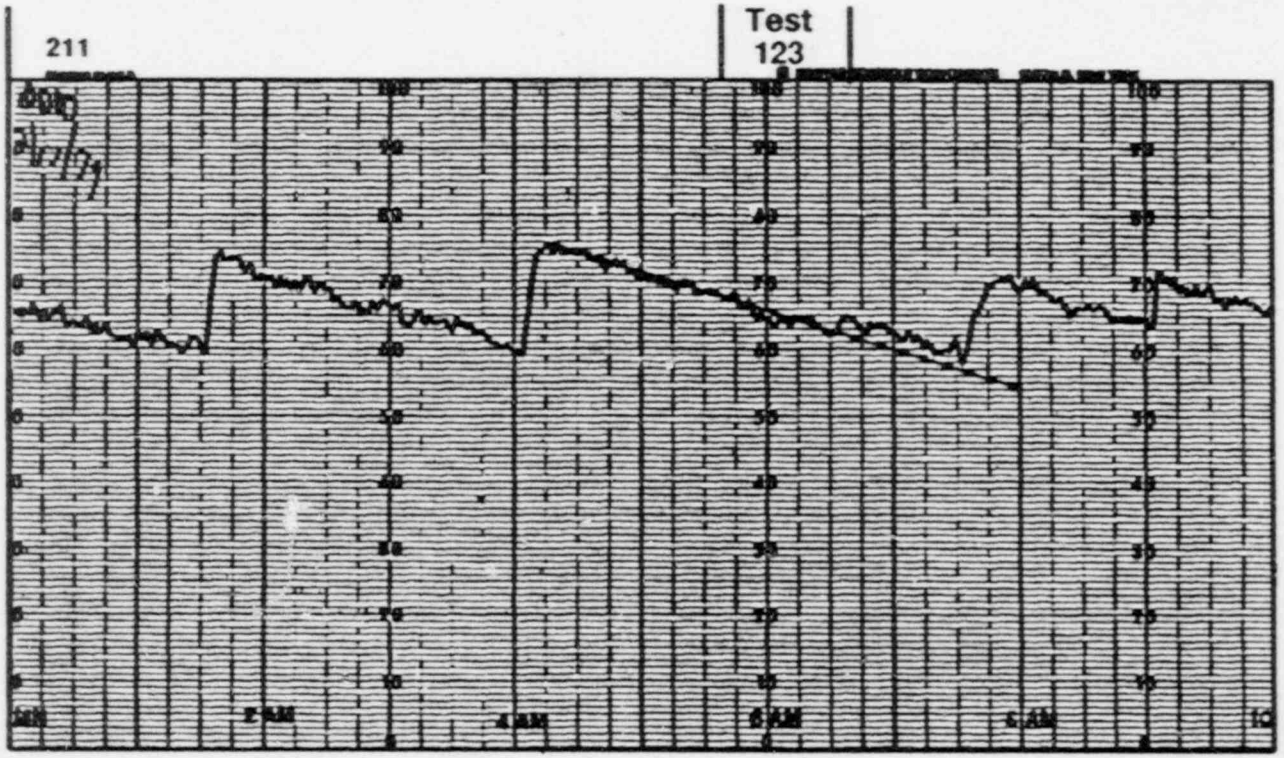

Figure 2. MUT strip chart record on February 17, 1979, showing the upward offset in the level indicator associated with the addition of hydrogen. There was a 1-hour and 30-minute difference between actual time and the preprinted chart time. Thus, the hydrogen addition at 0500 a.m. corresponds to a chart time of 0630 a.m.

taken the posture that these tests represent manipulation with hydrogen and that Mr. Illjes would have been involved in the postulated hydrogen additions. Stier Report, Vol. II(B), Tab I at 8 to 13; Exh. 5A, Test Evaluation Worksheets for Test Nos. 124 and 125. These tests merit careful scrutiny because of the potential implications concerning Mr. Illjes, and also Mr. Kidwell, with regard to test manipulation by hydrogen additions.

71. The Board finds these tests (NRR Test Nos. 124 and 125) represent ambiguous evidence for the following reasons:

a. There was no logging of any hydrogen addition. The experts' allegations of hydrogen additions during these tests represent speculations: Mr. Stier imputes hydrogen additions and NRR alleges either water or hydrogen. *Id.*

b. Figure 3 is a copy of the MUT water level strip chart record for part of February 18 and 19, 1979, that includes the time interval when the tests were conducted. As may be seen, this strip chart record displays numerous anomalies before, during, and after the times of the tests. We do not see anything distinctive or diagnostic in this strip chart, except that the level-sensing system was providing erratic data. The clear upward offset associated with a logged hydrogen addition two days previously (Figure 2) is not apparent, and the absence of this potentially diagnostic pattern precludes a conclusion that these tests reflect manipulation by hydrogen additions.

72. In a September 30, 1986 letter that was served on all parties, Mr. Stier provided copies of strip chart records showing the effects of hydrogen additions at times when leak rate tests do not appear to have been performed. At 1540 and 2235 hours on February 21, 1979, there were logged hydrogen additions, and the strip chart record shows clearly, for both of these additions, an upward, persistent offset that closely resembles the pattern of hydrogen effect that is shown in Figure 2 for February 17, 1979. The fact that the strip chart hydrogen response was plainly observable both 2 days before and 2 days after the tests on February 19, 1979, contributes strongly to our view that hydrogen additions did not influence the tests on February 19, 1979, because the expectable effect is not present in the strip chart for that date.

73. Mr. Stier's opinion is that these tests (NRR Test Nos. 124 and 125) represent some experimentation carried out by Mr. Chwastyk, the shift supervisor. Mr. Chwastyk had stated that he had become aware that adding hydrogen could affect the leak rate test and he had observed it. Stier Report, Vol. VI(B), Chwastyk 4/24/84 at 25-27. Mr. Chwastyk stated that he was not sure when he became aware of the problem, but he believed that it was sometime in the latter half of 1978. *Id.* NRR has cited this interview and noted that NRR Test No. 69 conducted by Mr. Illjes on December 20, 1978, might have involved a hydrogen addition which would be in a time frame consistent with

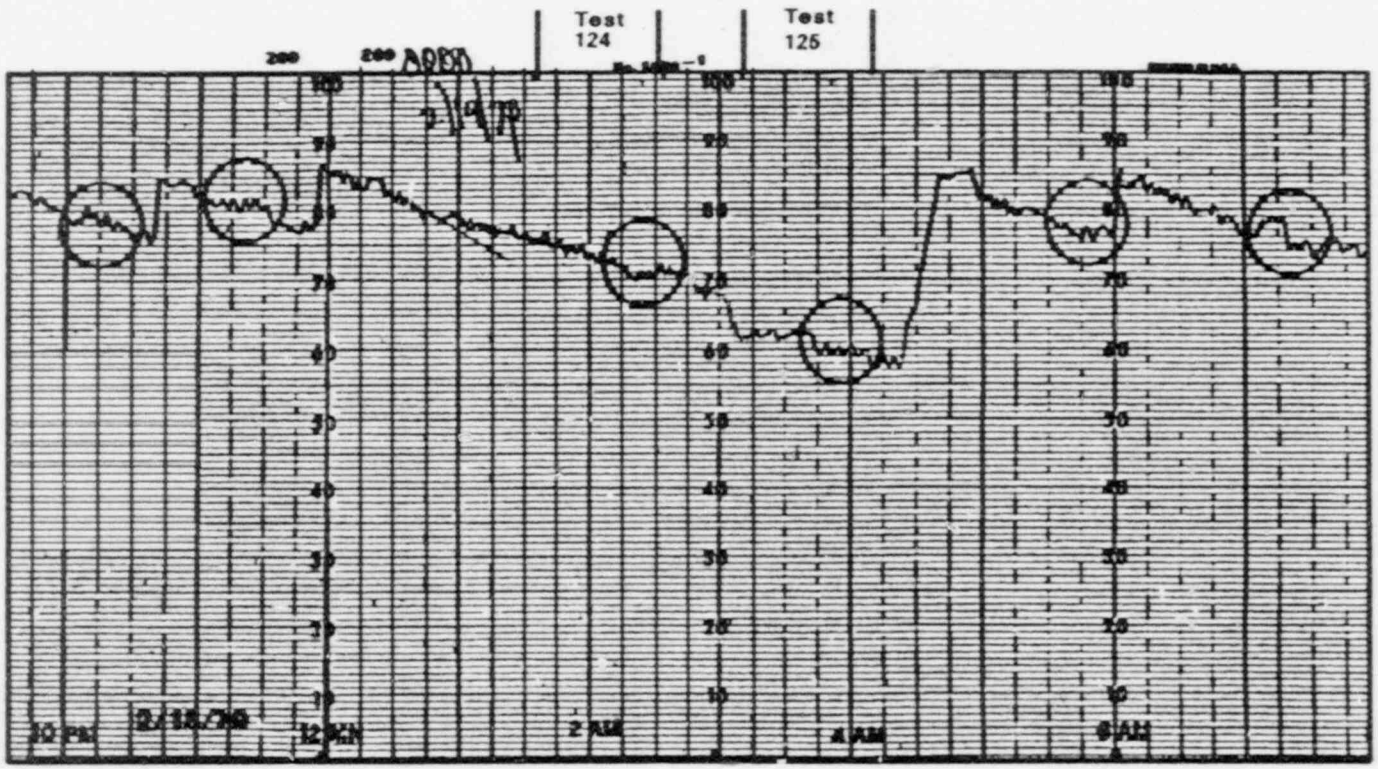

Figure 3. MUT strip chart record for February 18 and 19, 1979, showing anomalous traces before, during, and after two leak rate tests. Lack of persistent upward offset suggests hydrogen additions were not made during these tests.

Mr. Chwastyk's testimony. Exh. 5-A, Enclosure 9 at 11. We find that a hydrogen addition cannot be reliably ascribed to this test.

74. However, Mr. Stier reports a turnover note as indicating this experiment was conducted on February 19, 1979. Mr. Stier quotes the note and expresses his view as follows:

> The Shift Supervisor turnover notes for February 19, 1979, written by Chwastyk, contain the following, "At 60" level in MUT & 5-6 psig H_2 overpressure we get good LR."[43] The clear implication of this is that the experimental hydrogen addition was made during the course of the second leak rate test on February 19, 1979. A review of the makeup tank level strip chart reveals an elevation in the trace close to the 60 inch level at a point corresponding to the running of the test.[44] In light of the foregoing, we have concluded that the offsets in the strip chart for that date were caused by hydrogen additions.

---

[43] Shift Turnover Notes, February 19, 1979 (Tab 10).
[44] Vol. IV (MPR Report), App. K, Test No. 33. *Id.* at 21.

Stier Report, Vol. II(B), Tab I at 11.

75. The Board questioned Mr. Chwastyk at length concerning this turnover note and NRR Test Nos. 124 and 125. Tr. 3412-61. Mr. Chwastyk was unable to determine unequivocally from the test records that these corresponded to the time when he did hydrogen experiments. Tr. 3459. As the Board reads the total turnover note — not just the Stier excerpt — the thrust relates to "[l]eakage out of RCS looks Like is due to MU-RI (outlet relief from MUT)." The last part of the note reads "may want to break flange downstream of MU-RI to check for leakage." Stier Report, Vol. V(B), Tab 10 at 00325. Mr. Chwastyk appears to be reporting a suspected leak, rather than the results of experimentation with hydrogen — whether or not Test Nos. 124 and 125 represent attempts to estimate the magnitude of the suspected leak would be conjecture that cannot be resolved on this record. Since there is an alternative view to Mr. Stier's opinion that seems quite plausible, we conclude that manipulation with hydrogen in these tests is not established in this record.

76. On March 14, 1979, Mr. Illjes conducted a leak rate test. The test results are blatantly invalid, because Mr. Illjes added a large amount of water during the test and then included the addition in the wrong step in the computer program. This simple mistake is not remarkable. What is remarkable is that Mr. Illjes would run a test that produced a calculated gross leak rate of *minus* 6.7 gpm and then sign it as a valid work product.

77. NRR evaluation of Mr. Illjes concluded that:

> The weight of available evidence, including statements by his former Shift Supervisor (Mr. Chwastyk) and the technical analysis, strongly suggests that Mr. Illjes was either not truthful in answering questions regarding his role in or knowledge of leak rate test manipulation or he was grossly negligent in performing leak rate tests.

Exh. 5-A, Enclosure 9 at 6.

78. At the hearing, Mr. Illjes stated that "I did not have the motivation or inclination in 1978 or 1979 to manipulate leak rate tests." Illjes Prep. St., ff. Tr. 3010 at 4. The Board finds that the seven invalid tests signed by Mr. Illjes demonstrate a careless and unprofessional performance of his duties. While one test was influenced by a hydrogen addition, we do not see a "clear and convincing" pattern of test manipulations, and, therefore, agree with the NRR view that he was grossly negligent.

John M. Kidwell

79. Mr. Kidwell began employment with Met-Ed in 1974 as an auxiliary operator at TMI-1. In 1978, he was promoted to CRO at TMI-2. He left Three Mile Island in 1980. Kidwell Prep. St., ff. Tr. 3285 at 1.

80. From October 1978 through March 1979, Mr. Kidwell conducted eight leak rate tests that he signed. Exh. 5-A, Table 11. While an unstable sensor was used in one test and he failed to account for added water in another test, we find no evidence of manipulation or falsification in these tests. In a test on February 14, 1979, hydrogen was added near the end of the leak rate test; but Kidwell came on watch only 5 minutes before the hydrogen was added by the auxiliary operator. It seems improbable that this hydrogen addition represents deliberate manipulation.

81. Mr. Kidwell testified that:

> Prior to Harold Hartman's allegations, I had no knowledge whatsoever of operators deliberately adding hydrogen or water to the makeup tank for the purpose of manipulating the end result of the leak rate calculation. I do not recall receiving instruction in any form that provided me with guidance that I was to refrain from adding hydrogen during leak rate tests.

Kidwell Prep. St., ff. Tr. 3285 at 4.

82. The two leak rate tests on February 19, 1979, that we have discussed in detail in our above review of Mr. Illjes were signed by Mr. Kidwell. We do not find reliable evidence that these represent manipulation by adding hydrogen. We find that this record substantiates Mr. Kidwell's claim that he did not manipulate the tests.

Charles F. Mell

83. Mr. Mell became employed by Met-Ed as an auxiliary operator in 1976. He became a CRO trainee in 1978 and received his RO license in the summer of 1979. Mell Prep. St., ff. Tr. 3239 at 1; Tr. 3263.

84. From October 1978 through February 1979, Mr. Mell carried out seven leak rate tests that he signed. Only two of the tests are not questionable and the several questionable tests reflect the woefully inadequate training program with respect to this surveillance. Mr. Mell testified that he did not get a feeling that the test was a useful tool and that it would make a contribution to the safe operation of the plant. Tr. 3275.

85. On October 29, 1978, and February 11, 1979, Mr. Mell's surveillances were invalid because water had been added to the MUT and was not included in the computer calculation. These appear to be examples of careless conduct.

86. On October 13, Mr. Mell performed and signed a leak rate test that showed an unidentified leak rate of *minus* 8.5 gpm, which is a result without any possible physical reality. This test reflects great discredit on the CRO's training of Mr. Mell and the shift foreman for approving such nonsense, but also demonstrates that Mr. Mell did not take his duties in running this surveillance in a properly serious manner.

87. Mr. Mell carried out two tests using a malfunctioning MUT level sensor. His behavior appears to have been in accord with the general lack of professionalism with which this shift conducted the leak rate tests.

88. Mr. Mell testified that he was unaware that adding "hydrogen could effect the leak rate test or that anyone was deliberately trying to do this." He also testified that he did not remember

> the performance of an experiment with hydrogen on his shift. I do not remember Joseph Chwastyk cautioning us not to add hydrogen during a leak rate; in my opinion, if he had noticed a problem with hydrogen, he would have kept it close to his chest until he had so fully checked it out that he could explain it. I recall that I first discussed the hydrogen phenomenon with my crew after the Hartman allegations were made known, and we were all surprised by Hartman's claims.

Mell Prep. St., ff. Tr. 3239 at 3 and 4.

89. The Board finds no evidence of manipulation or falsification of leak rate tests by Mr. Mell.

William T. Conaway, II

90. In 1973, Mr. Conaway began employment with Met-Ed. He was an AO at TMI-1 until he was promoted to CRO at TMI-2 in 1975. In 1978, he was promoted to shift foreman at TMI-2. He is currently a Radioactive Waste Support Manager at TMI-2, and he no longer holds an NRC license. Conaway Prep. St., ff. Tr. 3097 at 1.

91. Mr. Conaway testified that "we did not have a lot of faith in the leak rate test itself. The Operations Department in general had little confidence in the validity of the leak rate test. A lot of the tests were not valid. For example,

we got a lot of high negative leak rates." *Id.* at 3. Mr. Conaway approved the October 13, 1978 test that showed unidentified leakage of −8.5 gpm and the March 14, 1979 test that showed gross leakage of −6.7 gpm. The Board finds that Mr. Conaway could have easily ascertained that these tests were due to nonsteady-state plant operation and a computational error. His failure to do so is a clear case of culpable neglect.

92. The many invalid tests that he approved reflect the perfunctory way in which the tests were reviewed and approved by him. Mr. Conaway testified that:

> We were primarily concerned with the safe operation of Unit 2 in 1978-79. We were not as concerned with the administrative requirement of demonstrating that the plant was operating within the limiting conditions for operation for RCS leakage. We regarded the actual plant safety as more important than the leak rate tests, the pieces of paper, that were often invalid.

Id.

93. Mr. Conaway was guilty of culpable neglect in his attitude toward the test and in allowing the CROs under his supervision to treat the test in a casual manner.

94. Mr. Conaway testified that the safety implications of the leak rate surveillance had never been explained to him. Tr. 3105. The Board finds his profound lack of knowledge and understanding to be an egregious example of the poor training at TMI-2.

95. With respect to the hydrogen experiment that Mr. Chwastyk carried out, Mr. Conaway testified that "I have no recollection of being involved in that test and I do not recall any discussion by the CROs of the effect of hydrogen additions on leak rate tests. Nobody ever brought it to my attention as far as I know, with the exception of Marty Cooper, after the accident." *Id.* at 5-6. While Mr. Chwastyk has testified that he issued a brief oral instruction that hydrogen should not be added during a leak rate test (Tr. 3451), we accept Mr. Conaway's assertion that Mr. Chwastyk's brief statement did not make any impression on him. The Board does not find any evidence that Mr. Conaway was aware of or involved in any manipulation of leak rate tests.

Joseph J. Chwastyk

96. Mr. Chwastyk began employment with Met-Ed in 1968. In 1969 he became a CRO at TMI-1. In approximately 1973, he became a shift foreman at TMI-1, and shortly thereafter a Unit 1 shift supervisor. In 1977, he became a dual-licensed shift supervisor for both TMI-1 and TMI-2. Chwastyk Prep. St., ff. Tr. 3407 at 1.

97. If his shift obtained a leak rate test result over 1 gpm, they would run another leak rate test; if the next one was under 1 gpm, they would discard the first one. *Id.* at 3. At the time, Mr. Chwastyk approved the discarding of leak rate tests because he thought that once a test had been declared invalid, there was no reason to keep it. Tr. 3490. Mr. Chwastyk believed that if the test result was not discarded, and it was later reviewed, it could not be determined at that later time if the test was in fact a valid test or not. Tr. 3490. Mr. Chwastyk now recognizes that recordkeeping practices at TMI-2 were deficient. Tr. 3535-36.

98. Mr. Chwastyk has stated that he was aware in the latter half of 1978 that the addition of hydrogen might have an effect on the leak rate test results. Stier Report, Vol. VI(B), Chwastyk 4/24/84 Interview at 26. When asked who brought this to his attention, Mr. Chwastyk replied "I believe it was my CROs. And I think I remember, specifically, it was Ted Illjes." *Id.* at 27. Mr. Chwastyk did not identify Mr. Illjes specifically before this Board when asked if "sitting here today do you have any independent recollection of Illjes or anybody else telling you that?" Tr. 3411. We give little weight to the fact that Mr. Chwastyk was unable to confirm his previous identification of Mr. Illjes. On the other hand, in view of the repeated denials of Mr. Illjes that he had knowledge of the hydrogen addition's effect on the leak rate test and in the absence of any corroboratory evidence, the Board finds that this reference to Mr. Illjes falls short of a "clear and convincing" implication of leak rate test manipulation by Mr. Illjes.

99. As we have described above, Mr. Chwastyk has testified that he gave attention to the rumors that hydrogen additions had an effect on the leak rate test. In his GPU interview, Mr. Chwastyk stated that "it was right after commercial operation had started," which further reinforces our view that February 19, 1979, was not the time when he carried out the experiments. Stier Report, Vol. VI(B), Tab C, Chwastyk 4/24/84 Interview at 27. Be that as it may, Mr. Chwastyk testified that, as a result of his observations, he requested the I and C to "go look at it." *Id.* However, there is not any evidence in this record that Mr. Chwastyk's verbal request produced any resolution to the leak rate test problem.

100. Mr. Chwastyk does not remember his shift being aware of his experiment, but he does remember later ordering that hydrogen not be added to the MUT during leak rate tests, and recalls that Messrs. Illjes and Conaway were in the room when he gave that directive. Tr. 3451, 3456.

101. Mr. Chwastyk acknowledged that Messrs. Illjes and Conaway might not have recalled his directive to refrain from adding hydrogen to the MUT during leak rate tests, because he did not involve them in the experiment (Tr. 3451-52), and when he gave them the direction to refrain from adding hydrogen during leak rate tests, it was extremely brief and was not followed up with additional instructions or discussion. Tr. 3537, 3551.

102. Mr. Chwastyk recalled receiving some instruction on the meaning of LER 78-62/1T. Tr. 3502. He was told by the TMI-2 Supervisor of Operations, Mr. Floyd, that he was to enter the "Action Statement" of the Tech Specs if his shift obtained a valid leak rate test result with unidentified leakage greater than 1 gpm. Tr. 3502-04. The LER did not change Mr. Chwastyk's interpretation of the Action Statement requirement. Tr. 3509. Therefore, Mr. Chwastyk did not instruct the operators on his shift on the meaning of the LER, because he assumed they already knew how to interpret the Tech Specs. *Id.* As the record shows, his assumption that the shift properly understood the Tech Specs was in error, and we find Mr. Chwastyk is guilty of culpable neglect because he failed to properly instruct Shift B.

103. We found Mr. Chwastyk to be a candid and knowledgeable witness who made a sincere effort to recall the facts concerning leak rate testing at TMI-2. We found no evidence that he had knowledge of involvement in test manipulations or falsifications. We do find that, in view of the numerous sloppy and invalid tests filed by his shift, his performance in supervising Mr. Conaway reflects culpable neglect.

Shift C

104. Shift C was made up of two CROs, Joseph Congdon and Martin Cooper; one CRO-in-training, Mark Phillippe; the Shift Foreman, Charles Adams; and the Shift Supervisor, Brian Mehler. The record shows that this was a "friendly" shift, with good personal relationships and no communications problems.

105. This shift exhibited many of the problems and practices in leak rate testing observed in other shifts:

- They misinterpreted the Tech Specs to require only one "good" test, i.e., not over 1 gpm, every 72 hours, regardless of the results of other tests. Cooper Prep. St., ff. Tr. 2835 at 5; Tr. 2718 (Congdon). Phillippe Prep. St., ff. Tr. 4432 at 2; Adams Prep. St., ff. Tr. 3776 at 2; Tr. 3848 (Mehler).
- Tests reflecting excessive leakage were routinely discarded; "good" tests were routinely filed. This was a direct violation of the TMI-2 Tech Specs. Tr. 2715-16, 2780 (Congdon); Cooper Prep. St. at 4; Phillippe Prep. St. at 3; Adams Prep. St. at 2; Mehler Prep. St., ff. Tr. 3842 at 3-6.
- The operators did not receive any significant training in leak rate testing. Tr. 2713-14 (Congdon); Tr. 4485 (Phillippe); Tr. 2839-40 (Cooper).

— The operators did not follow Administrative Procedures 1010 and 1012 requiring the filing of exception and deficiency statements and the logging of start and stop times for the leak rate tests. Tr. 2911-15 (Cooper); Congdon Prep. St. at 3; Tr. 4439 (Phillippe); Stier Report, Vol. VI(A), Tab A, Adams 3/8/85 Interview at 123-24; Tr. 3870 (Mehler).

106. There are no disputes about the foregoing points. The operators and supervisors either conceded them in their testimony or they are conclusively demonstrated by the record. Therefore, as to those points, there is no need to freight this opinion with detailed findings about each member of the shift, beyond the foregoing summary.

107. There is evidence of culpable negligence and test manipulation for Shift C. We discuss this evidence in the following findings for each member of the shift.

Mark D. Phillippe

108. Mr. Phillippe appeared at the Board's request; he waived the issuance of a subpoena. Mr. Phillippe is presently employed as a Quality Engineer–Nuclear at Waterford 3. Phillippe Prep. St., ff. Tr. 4432 at 1.

109. Mr. Phillippe began employment at TMI-2 in 1976 as an AO. He commenced training to become a CRO in May 1978 (Tr. 4435) and received his RO license in July 1979. During late 1978 and until March 28, 1979, Mr. Phillippe was assigned to "C" Shift as a CRO trainee.

110. Mr. Phillippe testified that if a water addition was made to the MUT during a leak rate test or water was removed from inventory during the test, it was the practice of his shift to invalidate the results and discard them. Phillippe Prep. St. at 3. He said that he was never aware of anyone on his shift adding water to the MUT during a leak rate test in order to falsify the test result. *Id.*

111. Mr. Phillippe had a general recollection of being informed that the addition of hydrogen to the MUT during a leak rate test could improve the test result. Tr. 4440-42. He did not recall who informed him of this phenomenon. *Id.* Questioned specifically about whether he had discussed the effect of hydrogen additions with his co-workers, Messrs. Congdon and Cooper, he denied having done so. Tr. 4443-55. Mr. Phillippe stated that he did not learn about the effect of a hydrogen addition through participation in an experiment conducted on his shift to determine the effect of adding hydrogen to the MUT during a leak rate test. Phillippe Prep. St. at 3. It appears from the CRO logs and plant daily attendance records that Mr. Phillippe was not on shift following February 11, 1979, and consequently was not present when a hydrogen experiment was performed on his shift on February 15, 1979. Tr. 4445, 4451-53.

112. Mr. Phillippe stated that he never added hydrogen to the MUT during a leak rate test for purposes of falsifying the test result. His testimony is borne out by the fact that the experts found no evidence of hydrogen additions to the MUT during any of the six tests that he submitted. *See* Exh. 5-B, Attachment 5, Table 11. Mr. Phillippe further stated that he had no knowledge that others on his shift added hydrogen to the MUT during a leak rate test for the purpose of falsifying the result. Tr. 4440.

113. The Board accepts Mr. Phillippe's testimony as candid and truthful, and finds that he was not involved in leak rate test falsification through the addition of hydrogen to the MUT, and that he was unaware that others on his shift might have been purposely adding hydrogen during leak rate tests.

Joseph R. Congdon

114. Mr. Congdon became employed by Met-Ed in 1974 as an AO in Unit 1 after 7 years of service in the United States Navy. He obtained his RO license in 1977 and was a CRO in TMI-2 throughout 1978-1979. Congdon Prep. St., ff. Tr. 2709 at 1. Mr. Congdon is a shift foreman at TMI-2, and he maintains an NRC license in that position. Exh. 5-B, Attachment 5, Table 1.

115. The Board finds that the record does not support any claim that Mr. Congdon added water to the system in order to manipulate the results of leak rate tests. He denies that he knew of any water effect, and states that he made every effort not to add water to the make-up tank during a leak rate test. Board. Exh. 1, Stier Report, Congdon 2/13/85 Interview at 77-81. Both NRR and Stier agree that no tests by Mr. Congdon involved other than incidental water additions. Tr. 1585 (Russell); Board Exh. 1, Stier Report, Vol. 3, Tables 1 and 2.

116. Although we find no evidence that tests were manipulated by water additions, the record shows a situation concerning the addition of hydrogen to the MUT to affect leak rate test results. At some point during 1978-1979, Mr. Congdon became aware that hydrogen additions to the MUT sometimes affected the MUT level indicator. Tr. 2725, Stier Report, Vol. VI(B), Tab C, Congdon 2/13/85 Interview at 52. His best recollection was that he heard about this effect from operators on another shift. *Id.* at 53.

117. In order to determine if such an effect existed, Mr. Congdon participated in an experiment during a leak rate test (NRR No. 120) in which the MUT level strip chart was deliberately marked at the time the hydrogen was added. He cannot remember what the effect on the leak rate test result was, but does recollect adding hydrogen to other tests in an effort to enhance the results. *Id.* at 56, 57. He went on to testify:

Q You did know at that time that, in fact, the make-up tank would be reflecting an inaccurate level?

A I knew that it could. Not always did the make-up tank level go up when you added hydrogen. Sometimes it did and sometimes it did not. Sometimes it didn't have any change at all. I couldn't really explain that in my own mind why it should have any effect on it due to the type of level transmitters we had. The level transmitter is supposed to compensate for the overpressure, but I did observe that sometimes it did affect the level indicator.

Q And you would file the test if it was a successful test?

A That's correct.

Id. at 57, 58.

118. It is clear, from his own admission, that Mr. Congdon was aware of the potential effect of hydrogen additions to the MUT. He also admits that he deliberately added hydrogen during leak tests in order to "enhance" the results. He also admits that, after adding hydrogen, the test would be accepted if the result was under 1 gpm. The Board accepts his admission that he both manipulated and falsified leak rate tests and test results.

119. The Board found Mr. Congdon to be a candid and cooperative witness.

Martin V. Cooper

120. Mr. Cooper became employed by Met-Ed at TMI-2 following 6 years of Naval service and employment with Stone & Webster Corporation as an engineering aide. Cooper Prep. St., ff. Tr. 2835 at 1-2. His first position at TMI-2 was as an AO; he became a CRO in 1977 and obtained his RO license in 1978. *Id.* at 2. In 1980, he obtained an SRO license and became a shift foreman. Subsequently, he became a shift supervisor. He left the employ of Met-Ed in 1982. He is now employed by Southern California Edison Company at its San Onofre nuclear facility as a shift supervisor. *Id.* at 1-2. He is not a party to the proceeding (*id.* at 2) but appeared as a Board witness under subpoena. At the Board's request, Mr. Cooper travelled to Bethesda to testify, although he had expressed a preference for testifying near his home or work. Tr. 2944.

121. Mr. Cooper's duties as a CRO included conducting the actual operation of the plant and performing the switching and tagging operations and necessary surveillance testing. Mr. Cooper recalled having difficulty with the leak rate test, including widely varying results from back-to-back tests despite there being no significant change in plant conditions. Mr. Cooper recalls that several changes were made to the computer program for leak rate testing "to improve the leak rate calculations." *Id.* at 5-6. However, he continued to believe "that the tests were almost meaningless because we got such inconsistent results." *Id.* at 6.

122. Mr. Cooper denied adding water during a leak rate test and not accounting for it, and he also denied adding water to manipulate leak rate tests. Tr. 2921. Mr. Capra testified that "[w]e did not conclude that Mr. Cooper was involved in manipulation of tests through the use of water additions." Tr. 1552. We conclude that Mr. Cooper did not manipulate leak rate tests through water additions.

123. Mr. Cooper recalled that he was aware that the addition of hydrogen during a leak rate test might affect the MUT level, but he denied that he ever added hydrogen to affect leak rate test results. Cooper Prep. St. at 6-7. However, in the course of the NRR and OI investigations, Mr. Cooper has also testified as follows:

> MR. CHRISTOPHER: Your statement is that you personally deny that you ever initiated any action to intentionally manipulate leak rate test results.
>
> THE WITNESS: I told you that I did realize that if I added hydrogen during a leak rate, it could affect it, and it may very well give me the result but it wasn't done with the intent of getting a good result. If I got one, I accepted it.
>
> MR. CHRISTOPHER: But you are saying you did not specifically take the action of adding hydrogen for the purpose of affecting a leak rate test result?
>
> THE WITNESS: Yes.
>
> MR. McBRIDE: The answer —
>
> MR. CHRISTOPHER: It is a little unclear.
>
> MR. McBRIDE: Are you, or are you not saying that you ever added hydrogen to affect a leak rate test result? Answer it in words rather than yes or no so the transcript will be clear of exactly what you are saying.
>
> THE WITNESS: Okay. As I said, I wouldn't add hydrogen to affect the result of the leak rate, though I was aware that if I did add hydrogen while the leak rate was occurring, it could affect the result and did.

Board Exh. 6, OI Report, Cooper 9/28/84 Interview at 82-83.

> THE WITNESS (Cooper): It may be splitting hairs. I think the final line is it wasn't okay, we are doing a leak rate, let's add hydrogen and maybe we'll get a good leak rate out of it. It is more like okay, we've got a leak rate in progress, the hydrogen is low, I've got to add hydrogen, let's see how that affects the result. If the result came out good, we accepted it.

Id. at 49; *also see* Tr. 2895.

124. With these somewhat more complete statements, we can come to several conclusions. Mr. Cooper was aware that the addition of hydrogen could sometimes cause a reduction in the leak rate test results. Even though he

knew this, when a leak rate test was being run he would add hydrogen if the overpressure indicator was low. If the test turned out to be a "good one," i.e., under 1 gpm, he would accept the results.

125. If Mr. Cooper had not known about the potential effect of adding hydrogen to the MUT, the Board would, in all probability, have found nothing culpable in this actions. Even if he had known about it, but had aborted the leak rate test if hydrogen needed to be added to the MUT, there would be no culpability. He did none of these things. The Board therefore must, and does, find that Mr. Cooper knowingly manipulated and falsified the results of leak rate tests by the addition of hydrogen to the make-up tank.

Charles Adams

126. Mr. Adams served in the United States Navy for 8 1/2 years; upon his discharge he went to work for Carolina Power & Light Company in Southport, North Carolina. At Carolina Power he was a CRO and obtained his SRO license. He began employment with Met-Ed in October 1975 as a shift foreman at TMI-2. Adams Prep. St., ff. Tr. 3776 at 1. He was the only TMI-2 operator to have had prior experience at a nuclear facility other than TMI and the only foreman not to have been a CRO. Stier Report, Vol. VI(A), Tab A, Adams 3/19/85 Interview at 50; *see* Tr. 3656 (A. Miller). During 1978-1979, he was assigned to "C" Shift under the supervision of Mr. Mehler.

127. Mr. Adams stated that he was not aware, in 1978-1979, that a hydrogen addition to the MUT could have an effect on MUT level. He testified that he does not recall any discussion about the hydrogen effect among the CROs or his supervisors. Stier Report, Vol. VI(A), Tab A, Adams 3/19/85 Interview at 36.

128. Mr. Adams was shown a copy of the MUT level strip chart for NRR Test No. 120 with the words "Pressurized MUT" written on it. *See* Exh. 18. He was unable to identify the person who wrote those words. Tr. 3805. He stated that it was possible that he had participated in an experiment involving that test and written those words on the MUT level strip chart, but he could not recall doing so. Tr. 3808. Mr. Adams further testified that the first time he recalled being shown the MUT level strip chart for NRR Test No. 120 was in 1985, 6 years after the event, and that he could not recall anything about that test after that length of time. Tr. 3806.

129. Both Mr. Congdon and Mr. Cooper recall that Mr. Adams probably participated in an "experiment" to determine the effect on leak rate test results when hydrogen was added to the MUT.

Q Do you remember personally participating in the addition of hydrogen during a leak rate test as an experiment? Do you have any personal recollection of your personally being involved in that?

A [Cooper] I don't personally recollect, like this leak rate test 120 or any specific test. But I believe that I did participate in some kind of experiment to see what kind of effect we could get for a hydrogen addition. And I think it happened more than once.

Q All right. In connection with that recollection, do you have any recollection as to who was working with you?

A Specifically, no. I would assume it would be my shiftmates: Joel Congdon, Mark Phillippe, and Chuck Adams.

Tr. 2927 (Cooper).

Q Having been involved in this test, Mr. Congdon, can you explain those words?

A What I believe occurred is at that time frame I had heard something to the effect that hydrogen did have an effect on makeup tank level indication. I thought it might be good to attempt to pressurize it and note what effect it did have. In the course of doing that, to the best of my recollection, Chuck suggested why don't we mark the chart at that point, so we referenced what time we actually add the hydrogen. And I processed to log it in the book and, to my best recollection, Chuck made that notation on that chart. I might be wrong on that.

Q The notation that we are looking at right now that says, "pressurized MUT"?

A That's correct, sir.

Tr. 2730 (Congdon).

130. In view of Mr. Adams' lack of any recollection of such an event, but his refusal to deny that it happened, coupled with the apparent close working relationship on this shift, the Board believes, and so finds, that Mr. Adams was at least aware that adding hydrogen to the MUT could affect leak rate test results.

131. Both Mr. Congdon and Mr. Cooper gave testimony that indicated that they thought Mr. Adams was probably aware of their hydrogen additions during leak rate tests

Q Okay. In terms of knowledge, you say Floyd — speaking generally, at least — knew about leak rate problems. Are you aware of whether the phenomenon of hydrogen added during a test when you were adding it to keep the band up, that phenomenon, do you know whether that was known to him?

A I don't know that.

Q It was known to Adams, I assume?

A Yes, sir.

Tr. 2905 (Cooper)

Q Did other people on your shift know that from time to time you would do this?

A I think they probably did.

Q And, specifically, who would know?

A Probably Marty Cooper, probably Chuck [Adams].

Stier Report, Vol. VI(B), Tab C, Congdon 2/13/85 Interview at 58, 59.

132. When Mr. Adams was advised that there was testimony that implied that he was aware that the CROs on his shift were adding hydrogen in order to affect leak rate tests, Mr. Adams testified that this was possible, but that he had no recollection of being aware of it. Stier Report, Vol. VI(A), Tab A, Adams 3/19/85 Interview at 43-44. However, he testified that, if he had been aware, in 1978-1979, that a CRO was adding hydrogen to the MUT in an effort to affect leak rate test results, he would not have approved the practice. *Id.* at 45.

133. There is no evidence that either Mr. Adams or Shift C was involved in leak rate test manipulations through any method other than hydrogen additions. Stier Report, Vol. II(A), Tab A, Adams Assessment at 16; *see* Tr. 1552, 1585 (Messrs. Congdon and Cooper did not manipulate leak rate test results through water additions).

134. The record shows that Mr. Adams tolerated and participated in the procedural violations cited in § VI, ¶ 105, above. We find that in his supervisory position as shift foreman, such violations clearly constitute culpable neglect of his duties. Additionally, the Board finds that the high probability that he knew of the potential effect of adding hydrogen to the MUT during a leak rate test and his allowance of this practice by his CROs constitutes culpable neglect.

Brian A. Mehler

135. Mr. Mehler commenced employment with Met-Ed in 1967. From 1969 until 1976, he was a CRO at TMI-1. Thereafter, he became a shift foreman at TMI-2, and a dual-licensed shift supervisor in April 1978. Mehler Prep. St., ff. Tr. 3842 at 1. In 1978-1979, Mr. Mehler supervised "C" Shift in both Units. Tr. 3861.

136. As a shift supervisor, Mr. Mehler generally had little direct involvement in leak rate testing: "it was very unusual for [him] to run a leak rate test [himself]." Mehler Prep. St. at 2; *see* Tr. 3858. Only when he was advised of

a particular problem with a specific leak rate test would he get involved. He testified that he was unaware of significant problems with the leak rate test procedures, and he believed that the test was the only tool available to quantify unidentified RCS leakage. Tr. 3852-67. During January-March 1979, Mr. Mehler knew that CROs were having a difficult time obtaining satisfactory leak rate test results; he attributed the problem to unidentified leakage from the pressurizer valves. Tr. 3862-63.

137. Mr. Mehler expected his operators to determine the validity of leak rate test results exceeding 1 gpm of unidentified leakage. Mehler Prep. St. at 3. He testified that the operators did this by running another leak rate test, and by evaluating the leak rate test result against other plant indications. *Id.* Mr. Mehler was aware of the practice of discarding leak rate tests considered to be invalid. He relied upon the CROs under his supervision to determine the validity of a given test. *Id.* at 3-6. He believed that his operators would have known to enter the Action Statement if a leak rate test exceeding the 1-gpm LCO appeared valid. *Id.*; Tr. 3854.

138. At Unit 1, Mr. Mehler had observed that an addition of hydrogen to the MUT produced a slight increase or decrease in the MUT level indication. This negligible change convinced him that adding hydrogen to the MUT would have no significant effect on leak rate test results. Mehler Prep. St. at 7. During 1978-1979, he had no knowledge of anyone adding hydrogen or water to the MUT to manipulate a leak rate test. Tr. 3845.

139. Mr. Mehler also was unaware that the MUT level strip chart could depict a water addition greater in volume than that actually added. Mehler Prep. St. at 7. No one on Mr. Mehler's shift manipulated leak rate tests through water additions to the MUT. *E.g.*, Tr. 1485, 1552.

140. Mr. Mehler could not recall whether he was on duty on February 15, 1979, when the words "Pressurized MUT" were written on the MUT level strip chart. Tr. 3898. (Given his dual responsibilities for the two units, and our observation that TMI-2 shift supervisors had little direct involvement in leak rate testing (*see* Tr. 3844) it is not surprising that Mr. Mehler would be unaware of the notation.) Mr. Mehler testified that the handwriting was not his. Tr. 3899. He could not identify the handwriting as that of his shift foreman, Mr. Adams. Mr. Mehler was not familiar enough with the handwriting of Mr. Congdon, Mr. Cooper, or Mr. Phillippe to say whether the handwriting was theirs. Tr. 3899.

141. Mr. Mehler did not recall LER 78-62/1T, although he thought that he read it because his initials were on the cover sheet. Tr. 3858 (Mehler). The only action he thought was necessary was the placing of the LER in the required reading file. Tr. 3858-59 (Mehler). Neither Mr. Cooper nor Mr. Congdon recalls the LER, and do not remember that any instruction from Mr. Mehler on a change in the 72-hour interpretation of the Tech Spec was to be made. It is clear that

it was never adequately explained to them, as they continued their previous interpretation of the Tech Spec. Cooper Prep. St., ff. Tr. 2835 at 6; Tr. 2717-18 (Congdon). The Board finds that Mr. Mehler did not adequately carry out his supervisory duties and was therefore guilty of culpable neglect.

142. Mr. Mehler could not recall receiving any specific training on the safety significance of the leak rate test. Tr. 3859-60. He did recall that he had general training on the Tech Specs and their bases. Tr. 3860. However, most of his knowledge about the leak rate test came from his experience as a CRO in Unit 1. Tr. 3853.

143. Other than NRR Test No. 13 (Stier Test No. 144), the only leak rate test in which Mr. Mehler appears to have been involved is NRR Test No. 68 (Stier Test No. 90). Exh. 5-B, Attachment 5, Table 9. No investigator has alleged that it was manipulated. Exh. 5-B, Attachment 1; Stier Report, Vol. IV(F), Test No. 90. Accordingly, we find that Mr. Mehler had virtually no direct involvement with leak rate testing at TMI-2, and we exonerate Mr. Mehler of any awareness of, or involvement in, leak rate test falsification or manipulation at TMI-2.

144. Mr. Mehler did, however, have knowledge of procedural violations of the Tech Specs and administrative procedures in force at TMI-2, as we see in § VI, ¶ 105, above. He did nothing to correct these practices, which was a clear dereliction of his duties as a shift supervisor. The Board therefore finds Mr. Mehler to be culpably negligent in this matter.

Shift D

145. Three CROs were assigned to Shift D — Mark Coleman, Dennis Olson, and Lynn Wright. The Shift Foreman was Adam Miller and the Shift Supervisor was Gregory Hitz.

146. Shift D's understanding and handling of leak rate tests was typical of other shifts in the following respects:

- They misinterpreted the Tech Specs to require only one "good" test in 72 hours, regardless of the results of other tests. Tr. 2588 (Coleman); Olson Prep. St., ff. Tr. 3911 at 2; Wright OI Interview of 3/27/85 at 45; Miller Prep. St., ff. Tr. 3608 at 2; Tr. 3718-19 (Hitz).
- Tests reflecting excessive leakage were routinely discarded. "Good" tests were filed, without regard to their validity. Thus, leak rate tests were regarded as a meaningless administrative requirement, not as a real measure of leakage. Tr. 2589, 2592, 2637 (Coleman); NRR Table 5 (Olson); Tr. 2704 (Wright); Miller Prep. St., ff. Tr. 3608 at 3; Tr. 3611, 3615 (Miller); Tr. 3720, 3677-78 (Hitz).
- The operators did not receive any significant training in leak rate testing. Tr. 2582 (Coleman); Tr. 4009 (Olson); Tr. 2672 (Wright); Tr. 3628 (Miller); Tr. 3707 (Hitz).

— The operators did not follow Administrative Procedures 1010 and 1012 requiring the filing of exception and deficiency statements and logging of start and stop times. Tr. 2636 (Coleman); OI Interview at 42, 54 (Wright); Olson Prep. St., ff. Tr. 3911 at 3; Stier Vol. VI(I), 3/20/85 Interview at 76; Tr. 3611 (Miller); Tr. 3668-69 (Hitz).

There are no disputes about the foregoing points. Either the operators, foreman, and supervisor conceded them in their testimony, or the point is irrefutably demonstrated by other record evidence. For example, almost all bad tests were discarded and no "E&Ds" were ever filed. Therefore, as to those points, there is no need to freight this opinion with detailed findings about each member of Shift D, beyond the foregoing summary.

147. There is very clear and convincing evidence, and we find that all three CROs on Shift D manipulated test data and falsified test results by making water additions toward the end of leak rate tests for the purpose of influencing test results. Coleman admitted the practice. Wright admitted adding water during tests but claimed — falsely, the Board finds — that he did so to make the tests more accurate. The Board did not believe Olson's denials of manipulations through water additions.

148. Striking proof of these manipulations is provided by the NRR analyses of a series of tests performed by Shift D. According to NRR, all of these tests were manipulated by adding water toward the end of the test, with the knowledge that the level sensor in the make-up tank (MUT) would sometimes inaccurately register the addition of more water than was actually added. *See* §IV, ¶26, above, for more detailed discussion of the so-called "loop seal" effect. For example, if 200 gallons were added to the MUT by the batch controller and included in the leak rate test computation by the surveillance CRO, the level sensor might "tell" the computer that the MUT level had risen 260 gallons as a result of the 200-gallon addition. The extra 60 gallons, on a 1-hour test run, would decrease the unidentified leak rate by 1 gpm. Coleman testified that he knew about this "loop seal" effect and took advantage of it to manipulate data and falsify leak rate tests.

149. The repeated pattern evident from test analyses and involving not only Coleman, but Olson and Wright as well, virtually compels the conclusion that all three were involved in this method of manipulation. These patterns are clearly shown in NRR Tables 7 and 10. Thus, NRR Table 7 reflects that the CROs on Shift D were involved in underrecorded water additions to a far greater extent than any other CROs. Furthermore, for an extended period of time — February 10 to March 13, 1979 — Shift D was the only shift involved in underrecorded water additions. There were eleven such tests during that period, and each of Shift D's three CROs — Coleman, Olson, and Wright — had some role in several of these tests, as shown by the following table:

NRR Test No.	CRO		Water Added Minutes Before End of Test	Approved by
122	Surveillance: Panel:	Olson Coleman	13	Miller
129	Surveillance: Panel:	Coleman Wright	4	Miller
131	Surveillance: Panel:	Coleman Olson	17	Miller
133	Surveillance: Panel:	Olson Wright	4	Miller
137	Surveillance: Panel:	Olson Olson	3	Hitz
138	Surveillance: Panel:	Coleman Coleman	2	Miller
139	Surveillance: Panel:	Olson Wright	10	Miller
140	Surveillance: Panel:	Wright Olson	1	Miller
141	Surveillance: Panel:	Olson Wright	3	Miller
142	Surveillance: Panel:	Wright Olson	3	Hitz
146	Surveillance: Panel:	Olson Coleman	5	Miller

The additions of water in the last 5 minutes of most of these tests — additions that were to be avoided "if at all possible" — provide a distinctive signature of manipulation.[39] Although NRR and MPR differed in their technical analyses of some tests, there were *no* disagreements between them on these particular tests.

---

[39] There were frequent discrepancies in the times shown on leak rate test results and the times reflected on the leak rate strip charts. Thus it was necessary to adjust the chart times by reference to timed entries in the log books, in order to determine whether a particular evolution (such as a water addition) occurred during a leak rate test. It was not always possible to reconstruct the timing of evolutions and tests precisely and, in a few cases, one probably cannot say for certain whether a particular evaluation occurred during a test. In general, however, it was possible to reconstruct the time of evaluations and tests. There was good agreement between the times reconstructed by NRR and MPR. Tr. 1298-99. None of the tests cited by the Employees as involving questionable timing (Employees' IF 286) is important to our findings. Finally, there was no dispute about the timing of the water additions in the series of tests under discussion here. Nor, except by Olson, could there be, since Coleman and Wright admitted adding water at the end of the tests.

150. As to the roles of the three CROs in these tests, the foregoing table shows:

CRO	Surveillance CRO Tests	Panel CRO Tests
Coleman	129, 131, 138	122, 138, 146
Wright	140, 142	129, 133, 139, 141
Olson	122, 133, 137, 139, 141, 146	131, 137, 140, 142

The record indicates that normal levels of communication existed between these three CROs. (Compare the conflicts among CROs on Shift E, as described below.) Therefore, there is no reason to believe that information about manipulation would not have been shared by all three CROs. While we would not expect the CROs to recall details of such discussions, we find not credible their professed inability to remember anything about the knowledge of their fellow CROs, particularly in light of the very striking pattern of their joint involvement in manipulation that emerges from the records analysis.

151. We note, in conclusion, other circumstances indicating common knowledge of manipulation by every member of Shift D, including Adam Miller, the Shift Foreman, and possibly including Gregory Hitz, the Shift Superintendent. As previously discussed, it was increasingly difficult to get a "good" leak rate during February and March 1979 because of increasing leakage from the pressurizer and code safety values. *See* § IV, ¶ 13, above. During the period between 2:30 a.m. on March 3 and 3:20 a.m. on March 9, 1979, Shift D was the *only* shift that was able to produce "good" leak rates at TMI-2. Shift D produced six consecutive "good" leak rate tests in that period, each of which was manipulated by an underrecorded water addition. Miller approved four of these tests (138-141) and Hitz approved two (137, 142). Under the circumstances, we think it unlikely that Shift D's unique ability to produce "good tests" can be attributed to coincidence or that that ability would have gone unnoticed by Miller and Hitz and perhaps other supervisory personnel.

Mark S. Coleman

152. Mr. Coleman began his employment with Met-Ed as an AO at TMI-1 in January 1974. In 1976, he became a CRO at TMI-2, and subsequently received his RO license. Coleman Prep. St., ff. Tr. 2579 at 1. Mr. Coleman was a CRO in TMI-2 until the date of the accident. Stier Report, Vol. VI(B), Tab C, Coleman 2/5/85 Interview at 3-4. During part of 1978 and through the 1979 accident, Mr. Coleman was assigned to "D" Shift, under the supervision of Gregory Hitz and Adam Miller. The other CROs assigned to the shift were Messrs. Olson and Wright. Coleman Prep. St. at 1.

153. Shortly after Mr. Coleman began performing leak rate tests at TMI-2, he signed and turned in a test result showing unidentified leakage of over 1 gpm. He was then told by a supervisor (whose identity he could not recall and whom we could not identify) that they did not want to see tests that exceeded the 1-gpm LCO for unidentified leakage. That incident prompted Mr. Coleman to discard leak rate test results exceeding the 1-gpm LCO. *Id.* at 2-3; Tr. 2583-84. Mr. Coleman felt that he was under a lot of pressure to obtain a leak rate test result meeting the 1-gpm LCO when the 72-hour period since the last satisfactory leak rate test was about to expire. Tr. 2589-91.

154. Mr. Coleman admitted adding hydrogen to the make-up tank to manipulate leak rate tests, testifying as follows:

> When I was first interviewed by the NRC in April 1980, I informed the investigators that on some occasions I added hydrogen to the makeup tank during the performance of a leak rate test in order to get a good result. I first found out about this phenomenon when a control room operator from another shift, I believe it was Harold Hartman, told me about it. I experimented myself and determined that sometimes if you added hydrogen, usually toward the end of the test, it could affect the makeup tank level indicator.

Coleman Prep. Test., ff. Tr. 2579 at 3-4. The analyses by NRR and MPR of retained tests include no clear examples of hydrogen manipulation involving Coleman. (The references in Stier to MPR Test Nos. 39 and 122 are inaccurate because those tests did not involve Coleman. Stier Report, Vol. I, Coleman at 9-10.) On the other hand, as his prepared testimony indicates, some of Coleman's attempts to manipulate with hydrogen would have been unsuccessful and the tests would have been thrown away. We find that Coleman at least *attempted* to manipulate leak rate tests with hydrogen, whether or not he was successful.

155. Mr. Coleman also admitted adding water to the make-up tank to manipulate leak rate tests, testifying as follows:

> I became aware that the water additions sometimes had the same effect on the level transmitter as did hydrogen additions. If water were added toward the end of a test, for a short period of time the level indicator would reflect a higher level in the makeup tank.

Id. at 4. With reference to specific tests, the Board finds that Coleman participated in manipulation of NRR leak rate Test Nos. 129 and 131 as the surveillance CRO and that he falsified those same tests when he signed and thereby certified them as accurate, knowing that the data had been manipulated. We further find that Coleman was the CRO assigned to the panel and that he participated in manipulating NRR Test Nos. 122 and 146. As to NRR Test No. 138, Coleman both ran the panel and signed the test, manipulating and falsifying it by himself.

156. While Coleman appears to have been candid with prior investigators and the Board about his own manipulations, the Board did not believe that he was

candid before us with respect to his knowledge of his shiftmates' involvement in manipulations, and their common knowledge and cooperation with one another in test manipulations. To begin with, the CROs on all the shifts were facing a common problem — how to get an erratic, seemingly arbitrary test procedure to produce a result under 1 gpm. We would think it perfectly natural for three people, working closely together over time, to share any helpful technique one of them might discover. This is particularly true if we are to believe Coleman's claim that he did not, at the time, think that he was doing anything wrong, that he just "took advantage of a glitch in the system." Tr. 2588.

157. More importantly, given the normal division of responsibilities among CROs on a shift, we find that there was collaboration between the panel CRO and surveillance CRO on most if not all of the tests in which we have found manipulation by Shift D. As the Stier Report points out, "[t]estimony from numerous members of the Operations Department makes it clear that water was usually added to the system by the Control Room Operator controlling the panel." Stier Report, Vol. II(A), Coleman at 12. Yet the surveillance CRO was in overall charge of the test. Presumably, he would have to tell the panel CRO when to add water in order to take advantage of the "loop seal" effect which (so Coleman thought) had to be done at the end of the test. Coleman's testimony before us on this point was very evasive. Tr. 2601-04, 2607-12. While repeatedly failing to provide straight answers to the Board's questions, Mr. Coleman attempted to suggest that manipulation *might* have been accomplished by a CRO acting alone, a proposition that was not in question. Coleman finally agreed with a prior statement by shiftmate Olson that "the person assigned to the control panel was generally responsible for adding water, although this could be done by other operators." Tr. 2615.

158. Coleman did not flatly deny discussing test manipulation with other operators or his supervisors. He denied recollection of such discussions, except for one incident in which Olson allegedly walked away from a manipulation discussion Coleman had begun. Tr. 2604-07. Coleman's denials in that regard are not credible. Given the circumstances described above, the Board finds that Coleman did discuss and collaborate in manipulations with Olson and Wright.

159. In his prepared testimony, Mr. Coleman stated that at the time he was making hydrogen and water additions during leak rate tests, "I never thought I was falsifying leak rate tests." Coleman Prep. St. at 3. Of course, Mr. Coleman's recollection of his subjective beliefs at the time, even if we were to credit it, would not be controlling on the issue of falsification. Mr. Coleman is responsible for the natural and foreseeable consequences of his own acts and he must be deemed to have intended those consequences. He intentionally added hydrogen and water for the purpose of changing a test result, knowing that that change would not be related to any actual change in unidentified leakage from the plant. In that sense, Coleman intended to and did falsify leak rate tests. Indeed,

under examination by the Board, Coleman admitted that several tests he had manipulated with water were false. Tr. 2629.

Dennis I. Olson

160. Mr. Olson is not a party to these proceedings; he testified under subpoena. Nevertheless, he filed a prepared statement discussing his involvement in leak rate testing at TMI-2. Olson Prep. St., ff. Tr. 3911.

161. Mr. Olson became employed by Met-Ed at TMI as an AO in 1971, after 8 years of Naval service. After approximately 5 years as an AO, he became a CRO at TMI-2 in 1976. He received his RO license in 1978; during 1979, he was assigned to "D" Shift. He left TMI in 1981. At that time, he became employed by Louisiana Power and Light Company at its Waterford III reactor, where he was a control room supervisor with an SRO license. He resigned from Waterford III in 1985. He no longer holds an NRC RO or SRO license. *Id.* at 1-2; Tr. 3914.

162. As discussed above, both the NRR and MPR experts found that a series of leak rate tests conducted by D Shift between February 10 and March 13, 1979, were manipulated by underrecorded water additions at the end of the test. *See* § VI, ¶ 149, above. With reference to these tests, Olson testified that he could "no longer recall why water was added, or explain its addition based on available plant records." Prep. Test., ff. Tr. 3911 at 5. He further testified that he "never falsified leak rate test results . . . ." *Id.* The Board does not believe Mr. Olson's denials. For the reasons summarized below, we find that he manipulated test results with underrecorded water additions and certified test results knowing them to be false.

163. As shown in § VI, ¶ 149, above, of the three CROs on D Shift, Olson was the most heavily involved in the water manipulations of February 10 to March 13, 1979 tests. Specifically, Olson was involved in three such tests — as the panel CRO in NRR Test Nos. 31, 137, 140, 142, and as the surveillance CRO in NRR Test Nos. 122, 133, 137, 139, 141, and 146. Had he been involved in only one or two of these tests, he might have been able to convince us that his involvement was innocent, that any manipulation was being done by Coleman or Wright without his knowledge. But that claim is simply not credible, in light of his very extensive involvement in highly suspect tests. Indeed, on the basis of test record analysis, Olson's involvement in such manipulation was more extensive than any other CRO at TMI-2.

164. In the proposed findings for Mr. Olson, an attempt is made to persuade us that Mr. Olson did not know what Coleman and Wright were up to in manipulating tests. *See* Numerous Employees' PFs 797-799. This attempt is not persuasive. Of course it is true that communications among CROs were not perfect, and that normal assignments of responsibilities were not rigid and

unvarying. Nevertheless, even according to Olson, the CRO assigned to the panel generally made water additions (Tr. 3919, 3928), while the surveillance CRO "ran the test." Tr. 4003. Given the pervasive pattern of manipulation reflected in the record, the suggestion that Olson was an innocent bystander on Shift D is not credible.

165. Mr. Olson was asked about the distinctive pattern whereby Shift D CROs consistently added water at the end of leak rate tests. Tr. 1368-71. Coleman has testified, it will be recalled, that he believed his manipulation technique only worked when performed at the end of the test. *See* § VI, ¶ 155, above. As shown in § VI, ¶ 149, above, the nine manipulated tests in which Olson participated all involved additions at the end of the test. Olson failed to offer any explanation for this pattern in his tests. Tr. 3971. Olson suggested that he may have added water to change the boron concentration in the reactor coolant system in order to keep the control rods from moving out of the prescribed band. Tr. 3918, 3973, 4018-22. We find this suggestion unpersuasive, for several reasons.

166. First, while it may have been occasionally necessary to change the boron concentration to affect rod position, it is not credible to suggest that such a need would have arisen consistently a few minutes before the end of each in a long series of leak rate tests. That asks too much of coincidence.

167. Second, while the records of the individual tests are not conclusive on this claim, several record indications are inconsistent with it. Thus, in Olson's Test Nos. 137 and 140, the CRO log indicates that the water was added from reactor coolant bleed tank, not the demineralized water tank. Such an addition would not significantly affect rod position. Furthermore, in Olson Test Nos. 133, 141, and 146, Olson filled out a "Data Sheet 4" which required him to "identify operation that caused change." In each case, the cause Olson gave was "increase MUT tank level." He gave no indication that the water addition had anything to do with boron concentration or rod position. In two of the three tests — 133 and 141 — there was not even an arguable operational justification for adding water before the end of the test to raise the MUT level — the reason Olson gave for the addition. The MUT level at the time of the addition was well above the prescribed 60-inch minimum. Even in the third test, 146, the MUT level was slightly above the 60-inch level, and the water addition could have readily been postponed 5 minutes, until the end of the test, to raise the MUT level — the reason Olson gave for the addition.

168. Finally, while the addition of small quantities of demineralized water, as occurred in several of Olson's tests (122, 131, 139, 141, 142, 146) could alter boron concentration and reactivity levels (Tr. 1210-11), an addition of demineralized water alone was not the usual or most efficient method for altering boron concentrations to the degree that rod positions would be changed. As stated in the NRR Report, "feed and bleed operations were used routinely

to increase or decrease the boron concentration in the RCJ." NRR Report, Enclosure 1 at 7. *See also* Tr. 1312-16. According to NRR's analysis, only one of the eleven tests that involved manipulation by Shift D (141) also involved a feed-and-bleed operation. For all of these reasons, we conclude that Mr. Olson's claim that he may have added water to keep the control rods in position is not credible.

169. We note in this connection the letter of February 17, 1987, from Counsel for GPUN to the Board confirming the existence of hourly recordings of rod positions taken by a plant computer, information we were not aware of during the hearing and which, of course, is not in the record. It is possible that information of this type could be useful in determining whether a particular water addition might have been made in order to change boron concentration and move control rods. It is also possible, however, that such hourly data would not be close enough in time to the water addition to shed much light on that issue. In any event, there is nothing to indicate that Stier, Rockwell, or the NRC investigators used these data in their test analyses. We do not find it necessary to consider these data in resolving Olson's (or any other operator's) claim that they added water for the purpose of moving control rods. While we appreciate Mr. Blake's bringing these data to our attention, we see no need to call for their addition to the record. None of the parties has done so.

170. According to NRR's analysis, Mr. Olson was not involved in hydrogen additions during leak rate tests. Exh. 5-13, Attachment 5, Tables 7 and 10.

171. Mr. Olson recalled discarding leak rate tests until the Havercamp incident of October 18, 1979, but that thereafter he did not discard excessive leak rate tests. Olson Prep. St., ff. Tr. 3911 at 3; Tr. 4007. He recalled giving all leak rate test sheets to his foreman, and stated that he did not know what became of them. Tr. 4007-08. His testimony in the latter regard is inconsistent with the testimony of his shiftmates, Coleman and Wright. Tr. 2583, 2673. However, the Board gives Olson the benefit of the doubt on this point.

Lynn O. Wright

172. Mr. Wright began employment with Met-Ed as an AO at TMI-1. Exh. 6, OI Report, Exh. 18, Wright 3/27/85 Interview at 4 (hereafter "OI Interview"). In 1975, he began training for his CRO license at TMI-2, and was assigned to "D" Shift. *Id.* at 5. Mr. Wright left TMI-2 in 1984 to open his own business. *Id.* He no longer holds a license to operate a nuclear power plant. Exh. 5-B, Attachment 5, Table 1.

173. Mr. Wright recalled that it was always difficult to obtain a leak rate test result meeting the 1-gpm LCO. Tr. 2704. He had little faith in the computer-generated leak rate test. Tr. 2670. He believed management personnel were

aware that it was difficult to obtain reliable leak rate test results from the computer. Tr. 2676.

174. Mr. Wright testified that he sometimes added water toward the end of a leak rate test. That much is clear from our earlier discussion of tests in which Wright was involved. *See* § VI, ¶ 149, above. To repeat, Wright was surveillance CRO in NRR Test Nos. 140 and 142 and the panel CRO in NRR Test Nos. 129, 133, 139, and 141 — in each of which water was added in the final minutes of the test. However, he denied knowledge of the so-called "loop seal" phenomenon, and he denied any intent to falsify the test. Tr. 2862; OI Interview at 93, 104.

175. Mr. Wright claimed that his purpose in adding water at the end of leak rate tests "was to bring the make-up tank back up to its original level so as to minimize instrument error." Tr. 2678; OI Interview at 78. Wright claimed he had been concerned at the time that the make-up tank level sensor might introduce inaccuracies into the leak rate calculation because of "calibration" problems, and that such problems could be minimized, in his view, by returning the level in the tank to the point it had been at the start of the test. He would then include the amount of water he had added in the computation of the leak rate. In that connection, Wright claimed that there were problems with the batch controller at times, and that when that happened he would derive the amount of the water addition by eyeballing the strip chart. Tr. 2685-87; Wright OI Interview at 74, 103. Wright's claim that he added water to enhance the accuracy of the test is not supported by the record. For the reasons that follow, we reject that claim and find that Wright was manipulating and falsifying leak rate tests in the same manner and for the same reasons as Coleman and Olson.

176. The Board agrees that, in theory, Wright's claimed approach might have enhanced the accuracy of the test, provided he had applied his approach consistently and provided he had used an accurate method to measure water additions. However, the evidence indicates inconsistencies in his approach and raises questions about his water addition computations.

177. In order to maximize the effectiveness of Wright's approach, it would have been necessary to restore the make-up tank water level to the same point at which the test began. In that regard, Wright did not claim a high degree of precision, only that the level was restored "approximately. Within, I'd say, you know, an inch or so." Tr. 2684. The records of the suspect tests in which Wright participated show that most of his end-of-test levels were more than an inch away from start-of-test levels.

NRR Test No.	Wright's Role	Start-of-Test Level	End-of-Test Level	Net Change
140	Surveillance	79.2	77.8	-1.4
142	Surveillance	67.8	66.1	-1.6
129	Panel	79.5	78.2	-1.3
133	Panel	74.6	72.9	-1.7
139	Panel	68.2	67.2	-0.9
141	Panel	73.5	73.6	0.1

Even employing an eyeball method, it should have been easy to return the make-up tank level to within half an inch or less of the starting point. Wright's failure to do that bespeaks a sloppiness inconsistent with his professed desire for greater instrument accuracy.

178. There are a number of other inconsistencies in Mr. Wright's asserted rationale for adding water. He claimed that there were problems with the batch controller (Tr. 2685) and that when those problems arose, he computed amounts of water additions from the strip chart. The record does not support that claim. In each of the six tests in the table above, it is clear that the water addition included in the calculation was derived from the log and probably from the batch controller. For example, in two tests, the amount included in the test was given to single digits (Test No. 142 — "181" gallons; Test No. 139 — "128" gallons). In all six cases, had the size of the addition been derived from the strip chart, it would have been substantially larger. To be sure, the water addition amounts included in the leak rate computations in these tests appear to be accurate but, by virtue of the "loop seal" effects in the level sensor, the leak rate test result was artificially low. It seems very unlikely that an operator who watched strip charts as closely as Wright claimed he did, would not have been aware of the large errors being produced by the "loop seal" effect.

179. Assuming, contrary to the record, that Mr. Wright may have derived the size of some water additions from the strip chart, such a practice casts further doubt on his professed desire to minimize instrument inaccuracy. For one thing, it is difficult to derive a gallonage reading accurate to, say, 10 gallons or less, by eyeballing a strip chart. Yet Wright said he chose that method rather than trust a specific meter reading from the batch controller. More fundamentally, and assuming for the moment that Wright did derive some of his water addition amounts from the strip chart, he would have been building back into his calculation the very inaccuracy he claimed he was seeking to avoid in the first place. Tr. 2687-90.

180. Wright was aware of the fact that SP 2801-3D1 directed operators to avoid adding water to the make-up tank during leak rate tests "if at all possible." OI Interview at 74. He must have known that that direction had been

given to provide accuracy in the test. Yet, if we are to believe Mr. Wright, he took it upon himself to implement a procedure of his own devising that was directly contrary to SP-2301-3D1, supposedly to enhance accuracy of the test.

181. One would think that if a CRO like Mr. Wright had devised a better way to run an erratic surveillance test, he would have at least shared it with his fellow CROs. Wright claimed not to recall discussing his water additions with Coleman and Olson. Tr. 2678, 2682, 2703. On this record, that claim is not credible. Wright testified that the three CROs — himself, Coleman, and Olson — "communicated well" and that there were no serious antagonisms among them. Tr. 2698-99. The great weight of the evidence including our generally negative assessment of Wright's credibility, supports, clearly and convincingly, a finding that Wright's claimed reason for adding water to leak rate tests — enhanced "instrument accuracy" — was a fabricated cover story for test manipulation.

Adam W. Miller

182. Mr. Miller is currently Manager, Plant Operations, at TMI-2. He holds an SRO license. Exh. 5-B, Attachment 5, Table 1. Mr. Miller began employment with Met-Ed in 1973 as an AO at Unit 1. He was promoted to CRO in August 1975 and shift foreman at TMI-2 in August 1978. Miller Prep. St., ff. Tr. 3608 at 1. Between March and August 1978, he was a CRO at TMI-2. Tr. 3612. He appears to have been assigned to "C" Shift during that period. Stier Report, Vol. III(A), Table 1.

183. Between August 1978 and March 1979, Mr. Miller was the foreman on "D" Shift in TMI-2. Miller Prep. St. at 2. Mr. Miller was responsible for supervision of the monitoring of RCS leakage, including the leak rate test. Stier Report, Vol. VI(I), Miller 3/20/85 Interview at 9, 34; Miller Prep. St. at 2.

184. Mr. Miller learned how to perform the leak rate test as a CRO from the people who ran leak rate tests from TMI-1. Tr. 3614. He believes that he understood that the 1-gpm LCO for unidentified leakage was related to plant safety, but he was not trained on the safety significance of the leak rate test. Tr. 3628; Stier Report, Vol. VI(I), Miller 3/20/85 Interview at 18-23. As a CRO, Mr. Miller discarded leak rate tests himself. Tr. 3611, 3615. When he became a shift foreman, he permitted his operators to discard leak rate test results reflecting unidentified leakage in excess of the 1 gpm, and he did not conduct a review of the tests that the operators discarded. Tr. 3615; Stier Report, Vol. VI(I), Miller 3/20/85 Interview at 98. He filed all leak rate tests reflecting unidentified leakage under 1 gpm, without regard to their validity. Tr. 3646. Stier Report, Vol. VI(I), Miller 3/20/85 Interview at 53, 56. Indeed, according to Stier and the MPR investigators, "almost two-thirds of the tests that Miller approved

should have been determined invalid." Stier Report, Vol. II(B), Assessment of Adam Miller at 6.

185. Mr. Miller believed that the leak rate test was inaccurate because test results varied considerably despite no apparent changes in plant conditions. Tr. 3647. However, he did not further investigate those inaccuracies or take any other action to see that they were corrected.

186. On the contrary, as we have already indicated, Mr. Miller adopted — and displayed to his subordinate CROs — an utterly cynical attitude toward the leak rate test. He did not treat the test as an important and the only quantified indication of unidentified leakage in the plant, but rather as a meaningless gesture required to be performed periodically. To repeat, he would perfunctorily approve any test reflecting leakage under 1 gpm, and he sanctioned his CROs' practice of automatically discarding any test result over 1 gpm. Miller's actions must have sent a clear message to Coleman, Olson, and Wright: Foreman Adam Miller doesn't care how leak rate tests are performed, as long as the paper result from the computer reads less than 1 gpm.

187. The most serious issue involving Mr. Miller is whether he knew of or participated in the manipulations of tests engaged in by Coleman, Olson, and Wright between February 10 and March 13, 1979. In that regard, Mr. Miller claimed that he "had absolutely no knowledge that the practice was going on, if it was." Prep. St., ff. Tr. 3608 at 4. For their part, none of the CROs could recall discussing water additions with Miller. The other evidence on this point is indirect and conflicting.

188. Pointing toward knowledge of manipulation, if not participation, on Miller's part is the very striking and consistent pattern shown by the numerous suspect tests, especially as shown in the strip charts. Miller himself acknowledged that pattern when asked to review the test records. Tr. 3638, 3643. Furthermore, Shift D was the only shift that was consistently able to produce a "good" leak rate test during that period. When all the other shifts were having so much difficulty, one would think that foreman Miller would have at least been curious about his shift's secret of success. Mr. Miller was unable to offer a persuasive explanation why he simply signed the tests but made no inquiry at the time. Tr. 3644.

189. On the other hand, Mr. Miller's total lack of concern about the validity of leak rate tests constitutes the most persuasive indirect evidence that he did not know about manipulations by his CROs. Again, the strip charts, viewed together, provided the clearest evidence of the manipulations in question. But Miller testified that he did not review the strip charts for trends, a claim we can readily credit in light of his cavalier attitude toward the test. Tr. 3639.

190. Part of the reason we found that the Shift D CROs knew of and collaborated in one another's manipulations was that the normal operational performance of the test involved two CROs working together. But a foreman,

like Miller, had no operational role in the test. And if, like Miller, the foreman was indifferent to how the test was run, there is little reason to believe that he would have known how tests were run.

191. We have no clear and convincing evidentiary basis for finding knowledge or collaboration by Miller in test manipulations. However, we do find that Miller was guilty of culpable neglect in his attitude toward the test, in his total failure to supervise his CROs in performing the test, and in creating a work atmosphere where repeated manipulations could occur.

192. Mr. Miller did not apply or require his CROs to apply Administrative Procedure 1010, the "Exceptions and Deficiencies" Procedure, to leak rate test printouts in excess of 1 gpm. Miller was unable to provide any substantial explanation for his consistent failure to follow an applicable and important procedure. Stier Report, Vol. VI(I), Miller 3/20/85 Interview at 76. Tr. 3648.

193. Mr. Miller did not require his CROs to log the start and completion times of all leak rate surveillance tests. Tr 3611. He did recall that his shift logged the completion of "good" leak rate tests — i.e., tests under 1 gpm — to keep track of the 72-hour period. Stier Report, Vol. VI(I), Miller 3/20/85 Interview at 81. His shift did not log the start or finish of unsatisfactory leak rate tests, i.e., tests over 1 gpm. No valid reason was offered for this violation of procedure. *See id.* at 82-83 for an invalid reason.

194. Mr. Miller had no independent recollection of LER 78-62/1T, although he did initial the checkoff sheet associated with it. Tr. 3618-19. He believes that the meaning of that LER was never made clear to him (Tr. 3620), because he does not recall ever going into the Action Statement. Stier Report, Vol. VI(I), Miller 3/20/85 Interview at 55.

Gregory R. Hitz, Sr.

195. Mr. Hitz began employment with Met-Ed in 1969. After working as an AO and a CRO, he was promoted to shift foreman in 1975 at Unit 1. He became a dual-licensed shift supervisor in 1977. Hitz Prep. St., ff. Tr. 3664 at 1-2. Mr. Hitz was assigned to supervise "D" Shift at TMI-2 during the latter part of 1978 and early 1979. *Id.* at 2.

196. Mr. Hitz had interpreted the leak rate Tech Specs as requiring a leak rate test result depicting unidentified leakage below 1 gpm every 72 hours while the plant was in operation. Tr. 3718. If a satisfactory leak rate test result could not be obtained within that 72-hour period, they were required to invoke the Action Statement of Tech Spec 3.4.6.2. Tr. 3719.

197. It was Mr. Hitz' responsibility to see that leak rate tests were performed and that the plant was operating within specified leakage limits. Prep. St. at 3. Generally, however, leak rate tests did not go beyond Adam Miller, his shift foreman. Tr. 3630. Mr. Hitz understood that leak rate tests depicting unidentified

leakage in excess of 1 gpm were discarded by his shift, without entry into the Action Statement. Tr. 3720. Mr. Hitz assumed that before the operators on his shift discarded a leak rate test they, but not the foreman, engaged in a determination whether the test was valid. Tr. 3677; Hitz Prep. St. at 3. Mr. Hitz acknowledged, however, that he never observed his operators engaging in that process. Tr. 3677-78. The record demonstrates that, in fact, the members of D Shift did not attempt to validate test results by reference to other plant parameters. On the contrary, Shift D accepted any test under 1 gpm and discarded any test over 1 gpm. *See* Tr. 3615, 3644, and § VI, ¶ 146, above. Mr. Hitz had no factual bases for his assumptions about validation.

198. In 1978-1979, Mr. Hitz knew that his shift at TMI-2 was having problems obtaining leak rate test results meeting the 1-gpm LCO. Tr. 3666. He recalled seeing highly variable leak rate test results. Tr. 3667. At the time, Mr. Hitz did not blame these problems on inaccuracies in the computer program used to conduct leak rate tests. *Id.* Rather, he attributed the difficulties to plant oscillations and to secondary-side plant problems which, he believed, would be corrected over time. Tr. 3670. He acknowledged that, in retrospect, these problems prevented anyone from knowing, with certainty, whether the 1-gpm LCO for unidentified leakage was being met. Tr. 3695.

199. The existence of plant oscillations prompted Mr. Hitz to accept as valid leak rate test results depicting small negative numbers for unidentified leakage. Tr. 3680-81. He was convinced that such negative results were likely to occur, and were therefore acceptable. Tr. 3682, 3686; *see* Exh. 21 at 3.

200. Mr. Hitz recalled receiving classroom training concerning the Tech Specs, as well as the bases for those Specs. Tr. 3707. When he became a shift supervisor, he received training by observing other shift supervisors performing their administrative work. Hitz Prep St. at 2. He testified that there was no on-the-job training focusing specifically on the leak rate test, however. Tr. 3707.

201. Mr. Hitz had no recollection of the incident described by his CRO, Coleman, in which three individuals emerged from the shift supervisor's office and told Mr. Coleman they did not wish to see leak rate tests with unidentified leakage in excess of 1 gpm. Tr. 3678. Mr. Hitz believed that it was not a fair assumption that he was the shift supervisor involved, because Mr. Coleman's uncertainty about the timing of this occurrence other than that it was "early on," made it likely that he was not yet Mr. Coleman's shift supervisor. Tr. 3678. The Board believes that Mr. Coleman's recollection is too vague to support the conclusion that Mr. Hitz gave Mr. Coleman the instruction in question, especially in the face of Mr. Hitz' denial.

202. Mr. Hitz remembered hearing of the MUT "loop seal" phenomenon after the March 28, 1979 accident at Unit 2. Tr. 3712. Prior to learning of that phenomenon, he was unaware that a hydrogen addition to the MUT could affect the leak rate test. *Id.* As a Unit 1 CRO, Mr. Hitz had seen a brief, temporary

effect on the MUT level caused by a hydrogen addition, but he believed that the effect was insignificant. Tr. 3690, 3692.

203. In retrospect, Mr. Hitz could not justify the practice of not applying the "Exceptions and Deficiencies" Procedure to invalid leak rate tests. Tr. 3668-69.

204. Mr. Hitz could not remember the November 1, 1978 Licensee Event Report (78-62/1T), but recognized that his initials were on the coversheet for the version sent to the control room. Hitz Prep. St. at 6; Tr. 3698. Mr. Hitz presumed that the LER had no effect on operations at TMI-2. Tr. 3722. He agreed that it would have been his responsibility to ensure that all those under his supervision knew the importance of this LER, and he agreed that after the issuance of the LER, he should have verified that his shift was entering the Action Statement upon obtaining leak rate test results over 1 gpm. Tr. 3721, 3723.

205. Mr. Hitz had no knowledge of any operator falsifying or manipulating leak rate tests. Tr. 3725. He was convinced that his shift foreman, Mr. Adam Miller, was also unaware of any pattern of falsification or manipulation. Tr. 3728-29.

206. We know of no evidence that Mr. Hitz was aware of leak rate test falsification or manipulation. Mr. Coleman, for example, could not recall discussing his leak rate testing activities with Mr. Hitz. Tr. 2604. He was rarely involved even in the approval of leak rate tests, and signed only two tests (Stier Test Nos. 16 and 21); therefore, it is understandable that he would not have been aware of the practice of Messrs. Coleman, Olson, and Wright, during February-March 1979, of adding water to the MUT during leak rate tests to affect test results. As Mr. Hitz explained, "once you [become] a shift supervisor, you kind of get removed from the Control Room Operator somewhat." Stier Report, Vol. VI(F), Hitz 3/29/84 Interview at 26.

207. We find, however, that Mr. Hitz must be charged with culpable neglect in two respects. First, he failed to keep himself adequately informed about the conduct of leak rate tests and to oversee Adam Miller's direct supervision of such tests, particularly in light of his knowledge that the test was presenting problems. Those failures, coupled with Miller's dereliction as direct supervisor of the Shift D CROs, allowed those CROs to manipulate leak rate tests for a substantial period of time. Second, Hitz conceded that it should have been his responsibility to see to it that those under him understood and implemented the LER correcting the previous misinterpretation of the Action Statement requirement. Tr. 3721-23. We agree, and make the same finding as to each shift supervisor, except Bryan.

Shift E

208. Three CROs were assigned to Shift E — Harold W. Hartman, Jr., Raymond R. Booher, and John R. Blessing. Mr. Blessing was initially a trainee on this shift. The Shift Foreman was Kenneth P. Hoyt, and the Shift Supervisor was Bernard G. Smith.

209. Mr. Hartman and Mr. Blessing had admitted, previous to this proceeding, manipulation of leak rate tests by adding hydrogen to the MUT. Mr. Booher denies involvement in manipulation or falsification of the tests. Mr. Hoyt and Mr. Smith denied any knowledge of Mr. Hartman's or Mr. Blessing's activities that produced falsification. In view of Hartman's and Blessing's admissions, we make only limited findings with respect to them.

210. This shift, in common with others, misinterpreted the Tech Specs to require only one "good" leak rate test in 72 hours, regardless of the results of other "bad" tests. Ff. Tr. 4175 at 2 (Booher); ff. Tr. 4233 at 3 (Hoyt); ff. Tr. 4331 at 3 (Smith). They routinely discarded tests that indicated leakage in excess of 1 gpm, and they filed "good" tests, even though they had had serious doubts about the accuracy of the test results. Ff. Tr. 4175 at 2 (Booher); Tr. 4236 (Hoyt); ff. Tr. 4331 at 3 (Smith).

211. The shift did not receive adequate training with regard to the potential safety significance of the leak rate test. Tr. 4229-30 (Booher); Tr. 4361-62 (Smith). Administrative Procedures 1010 and 1012, requiring filing of exception and deficiency statements and the logging of *all* start times of surveillances, were not followed. Ff. Tr. 4175 at 3 (Booher); Tr. 4269 (Hoyt); Tr. 4344 (Smith).

Harold W. Hartman, Jr.

212. Mr. Hartman precipitated the several investigations that led to this proceeding by alleging in a television interview on March 24, 1980, that various methods had been used at TMI-2 by several personnel to obtain false leak rate test results. Stier Report, Vol. I at 1. Mr. Hartman did not become a party to this proceeding, but appeared voluntarily to respond to Board questions.

213. At the hearing, Mr. Hartman confirmed that he had used hydrogen additions during leak rate tests as a means of manipulating the test. He testified that he could not recall seeing anyone else using hydrogen but that he got the information on the hydrogen effect from other operators and he believed that there was common knowledge of the hydrogen effect among operators. Tr. 2240. Mr. Hartman was unable to specifically identify any operator who had told him of the hydrogen effect. *Id.* He could not recall any knowledge of hydrogen additions by Mr. Blessing, even though Blessing has admitted such actions. Tr. 2304. Mr. Hartman did not claim that his shiftmates were involved in manipulation by hydrogen additions.

214. With respect to Mr. Hoyt and Mr. Smith, he stated that "I'd never do it during a day shift you know when there was a lot of people around, that's it, you know and I even kind of hide it from Shift Foreman, Shift Supervisor so that they didn't see me generally that was no problem." Stier Report, Vol. VI(E), Hartman 3/26/80 Interview at 29.

215. With respect to the addition of water to the MUT for the purpose of manipulating the leak rate test, Mr. Hartman denied that he used this technique. Tr. 2242. However, he testified that he believed that he had observed Mr. Booher making slow (jogged) additions of water for the purpose of test manipulation on one occasion. *Id.* He thought the time frame might have been 3 months before the accident. He also stated, however, that the incident occurred during a period of considerable leakage through the pressurizer relief valves, which on this record probably was 6 weeks or less before the accident. *Id.* Mr. Hartman could not identify the particular time when this occurred, which poses difficulties in confirming this allegation.

John R. Blessing

216. Mr. Blessing did not respond to the Board's invitation to participate in this proceeding and also disobeyed the Board's subsequent subpoena requiring an appearance. Board Chairman letters, dated August 6, 1986, and October 22, 1986. Since Mr. Blessing had admitted to having added hydrogen to the MUT on numerous occasions during leak rate tests in his April 10, 1980 interview by Mr. Christopher and Mr. Martin of the Region I office, the Board did not pursue Mr. Blessing. The Board finds his admission sufficient basis to conclude that Mr. Blessing manipulated tests and falsified the tests by signing the test result document. We find his excuse that on nine out of ten occasions the hydrogen addition did not work totally lacking as a justification. Indeed, on those nine unsuccessful attempts, Mr. Blessing was guilty of attempted manipulation, which reflects as unfavorably on him as successful manipulation.

217. Mr. Blessing was interviewed by NRC Staff on April 10, 1980, and December 14, 1984, and summaries of these two interviews were admitted into the record of this inquiry as Exhs. 5 and 6 included in Exh. 6 of our proceeding. Mr. Blessing was provided copies of these interview summaries in a Board mailing on August 6, 1986. Absent any response from Mr. Blessing, and noting that at the December 14, 1984 interview, he affirmed the correctness of the April 10, 1980 interview summary, the Board accepts these two documents as reliable and probative.

Raymond R. Booher

218. Prior to joining Metropolitan Edison in 1971, Mr. Booher was in the United States Navy for 6 years. From 1971 to 1981, he was employed by Met-Ed, first as an auxiliary operator in TMI Unit 1, then as a control room operator in TMI Unit 2. He obtained a TMI-2 license in 1977 and retained it until he terminated his employment with Met-Ed in 1981. He then became employed by Louisiana Power & Light (LP&L) as a control room supervisor, licensed as a Senior Reactor Operator. In 1985, he terminated his employment with LP&L. He was then employed as Training Consultant at Palisades Nuclear Power Plant in Michigan.

219. Mr. Booher testified that he discarded tests that did not come out within the specified limit because he believed that he only needed one acceptable test with less than 1-gpm unidentified leakage during the 72-hour period. Booher Prep. St., ff. Tr. 4175 at 2. He stated that "I never felt that my job would be in jeopardy if I did not produce a successful test result." *Id.* at 3.

220. Mr. Booher testified that "although the NRC has accused me of deliberately adding water during the leak rate tests to affect the results, I never did this, and I believe that I have been unfairly accused." *Id.* at 5. He stated further that "I do not know why Harold Hartman stated I added water to falsify leak rate tests. According to the NRC investigators, he believed that I was not a good operator; perhaps that is why he feels that I was involved in the conduct similar to his." *Id.*

221. The "Results of Joint NRR/OI Investigation and Evaluation of Raymond R. Booher" are found as Enclosure 3 of Exh. 5-A of this inquiry. Mr. Russell concludes that "[i]n summary, the weight of the evidence, including technical analysis and statements by other operators on Mr. Booher's shift, strongly suggest that Mr. Booher was not truthful in answering questions regarding his participation in or knowledge of leak rate test manipulation at TMI-2 during the period September 30, 1978, to March 28, 1979." The basis for this appears to be Items 6 and 7 on page 3 of this report.

222. Item 6 on page 3 reads "Mr. Booher stated that he was unaware that hydrogen additions to the make-up tank could affect make-up tank level indication, and, thus favorably influence leak rate test results." Exh. 5-A, Enclosure 3 at 3. In contrast to this characterization of the Booher Interview on 11/15/84, page 46 of that interview reads in part:

> Q Were you aware that it could?
>
> A I remember of hearing discussions. I don't remember when the discussions were. But I thought it was kind of ridiculous, to tell you the truth, to have some kind of a gas make a level change. I still believe that, to tell you the truth.
>
> I don't understand how adding hydrogen to a tank would make the level change.

Q But you had heard about it back at that time?

A I heard that. I don't remember when.

The Board finds that Mr. Booher was aware that other operators thought adding hydrogen might have an effect. At any rate, the NRR technical analysis did not implicate Mr. Booher with respect to hydrogen additions. Also, Mr. Hartman at the September 25, 1986 hearing responded to a question "[i]s it a fact that you do not recall seeing any TMI-2 operator add hydrogen to the reactor coolant system to affect a leak rate test result?" with the response "That's correct." Tr. 2285-86. We do not find untruthfulness with respect to hydrogen additions.

223. Item 7 reads "Mr. Booher stated that he never added water to the make-up tank for the purpose of altering leak rate tests results." Exh. 5-A, Enclosure 3 at 3. It also states that "the technical analysis shows that during every leak rate test in which Mr. Booher took part from December 26, 1978, through the date of the accident (8 tests), all include water additions to the make-up tank that were not accounted for in the leak rate test calculation." *Id.*

224. Based on Table 11, Individual Test Synopsis, of Exh. 5-A, we take the referenced tests to be the following:

NRR Test No.	Date	CROs Surveillance/Panel
77	12/26	Booher/Hartman
94	1/13	Hartman/Booher
97	2/02	Blessing/Booher
128	2/23	Hartman/Booher
143	3/10	Hartman/Booher
144	3/12	Booher/Blessing
145	3/13	Hartman/Booher
148	3/15	Booher/Blessing

225. The Board has reviewed the individual test records and we find that they all involve possible water additions but in different manners and to different degrees; i.e., a clear pattern is not apparent.

226. Test 77 was conducted under unstable plant conditions and it is clear that Mr. Booher violated the surveillance procedure requirement of "steady state conditions." Staff speculation that there was a possible water addition of 20 to 30 gallons is impossible to confirm since the strip chart record shows transient changes or oscillations during the test and both before and after the test time period that are larger than the postulated small addition.

227. Test 94 appears to be a situation where Mr. Booher as the panel operator added 117 gallons of water and logged the addition. Mr. Hartman

Q But you had heard about it back at that time?

A I heard that. I don't remember when.

The Board finds that Mr. Booher was aware that other operators thought adding hydrogen might have an effect. At any rate, the NRR technical analysis did not implicate Mr. Booher with respect to hydrogen additions. Also, Mr. Hartman at the September 25, 1986 hearing responded to a question "[i]s it a fact that you do not recall seeing any TMI-2 operator add hydrogen to the reactor coolant system to affect a leak rate test result?" with the response "That's correct." Tr. 2285-86. We do not find untruthfulness with respect to hydrogen additions.

223. Item 7 reads "Mr. Booher stated that he never added water to the make-up tank for the purpose of altering leak rate tests results." Exh. 5-A, Enclosure 3 at 3. It also states that "the technical analysis shows that during every leak rate test in which Mr. Booher took part from December 26, 1978, through the date of the accident (8 tests), all include water additions to the make-up tank that were not accounted for in the leak rate test calculation." *Id.*

224. Based on Table 11, Individual Test Synopsis, of Exh. 5-A, we take the referenced tests to be the following:

NRR Test No.	Date	CROs Surveillance/Panel
77	12/26	Booher/Hartman
94	1/13	Hartman/Booher
97	2/02	Blessing/Booher
128	2/23	Hartman/Booher
143	3/10	Hartman/Booher
144	3/12	Booher/Blessing
145	3/13	Hartman/Booher
148	3/15	Booher/Blessing

225. The Board has reviewed the individual test records and we find that they all involve possible water additions but in different manners and to different degrees; i.e., a clear pattern is not apparent.

226. Test 77 was conducted under unstable plant conditions and it is clear that Mr. Booher violated the surveillance procedure requirement of "steady state conditions." Staff speculation that there was a possible water addition of 20 to 30 gallons is impossible to confirm since the strip chart record shows transient changes or oscillations during the test and both before and after the test time period that are larger than the postulated small addition.

227. Test 94 appears to be a situation where Mr. Booher as the panel operator added 117 gallons of water and logged the addition. Mr Hartman

did not include the water addition in the leak rate calculation. Since the water addition was logged, there was no hidden manipulation. Mr. Booher can be faulted for adding water and violating the procedure's stricture that water additions should be avoided "if at all possible." Mr. Hartman can be faulted for not inquiring whether water had been added and for failing to check the log book. This appears to us to be simple carelessness in conducting the test, primarily on the part of Mr. Hartman.

228. Test 97 is unusual in that Mr. Booher logged a 300-gallon water addition as having taken place at 0100, but there is no indication of such an addition on the strip chart record. It is conceivable that a feed-and-bleed operation could have taken place and water removed at the same time and at the same rate that water was added but we consider it more probable that this represents a logging error. Be that as it may, this test does not represent manipulation by water addition. However, it clearly reflects an error by Mr. Booher.

229. Test 128 has a strip chart record that shows a feed-and-bleed operation was carried out during the test time interval. Water addition of 150 gallons was logged by Mr. Booher at 1135. However, an additional 150 gallons appears to have been added as part of a second feed-and-bleed and was not logged. Mr. Hartman did not include the logged water addition in the leak rate calculation. Mr. Hartman can be blamed for failing to check the log or learn from Mr. Booher that water had been added. This erroneous test reflects sloppy performance by both Mr. Booher and Mr. Hartman with either a failure to communicate or a casual disregard for the test requirements.

230. Test 143 is regarded by NRR as displaying a jogged (added slowly) water addition. Figure 4 is a copy of the MUT strip chart for the time period that includes the test interval. MPR Associates reviewed the NRR conclusion and stated that the water addition was "not confirmed. Trace flattening appears typical of other times." Exh. 1-B. The Board agrees that the MUT strip chart record shows numerous slope flattenings (*see* Figure 4), and the change in slope near the end of the test may be only a chance occurrence. We note further that Hartman was conducting the surveillance and he has not alleged that he and Booher collaborated in manipulating tests by jogging water. We cannot reach a finding that this test is evidence for jogged water additions.

231. Test 144 was carried out by Mr. Booher, and NRR ascribed a 100-gallon jogged water addition starting at 0150. MPR Associates reviewed the NRR conclusion and stated "not confirmed. No clear deflection at 0150, trace deflection appears typical of others during the day" and also noted that "from 0130 to 0315 overall slope is clearly less than before or after that period" and "the test may have started before the 300-gallon addition logged at 0130 was complete. Note initial MUT level may be appr. 2 in. low." Exh. 1-B.

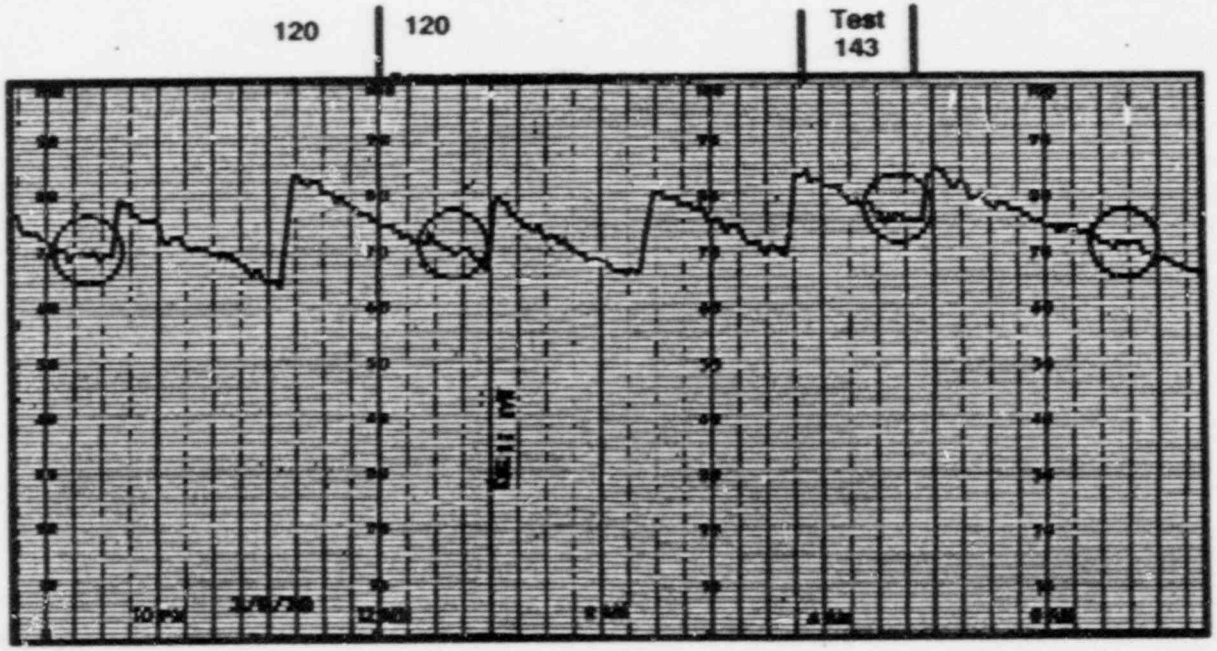

Figure 4. MUT strip chart record showing slope decrease near end of NRR Test No. 143 and similar decreases at times when tests were not being conducted. Sharp, vertical increases associated with logged water additions.

232. Figure 5 is a copy of the MUT strip chart record for the time interval encompassing Test No. 144. Mr. Russell testified that "NRR believes that the slope changes at 0150 and 0220 were caused by jogged water additions." Tr. 1716. The referenced slope changes are visible in Figure 5, but the Board finds such changes were not uncommon when the test was not being run. Transitory slope flattenings such as these or, for example, the more pronounced one at 1115 to 1130 on March 11, 1979, may be ascribed, in our view, to poor performance by the level-sensing system or plant transients rather than slow and intermittent addition of water by the operators. Also, we note that the anomalous slope persists for 30 minutes after Test No. 144 was completed — a very unlikely operator action.

233. Mr. Russell testified further that there were "no logged evolutions in progress that would cause this change in slope unless it were operator-induced . . . ." Tr. 1717. However, as seen in Figure 5, the level-sensing system produced an apparent reduced slope from ca. 7 to 8 p.m. on March 11, 1979, and we do not see anything in the panel operator's log that would have caused that reduced slope either. We find that the slopes tend to be uniform, but anomalies are to be found when no operator action would be postulated. The Board finds that Test No. 144 does not demonstrate jogged water additions by Mr. Booher.

234. Test No. 145 was conducted by Mr. Hartman. NRR concluded that water was added (jogged) near the end of the test. However, MPR Associates' review did not confirm this conclusion, and the Board agrees with the testimony by Mr. Stier that "there is a trace deflection during the course of this test, but you can see from examining our copy of the strip chart that it is similar to trace deflections in other positions of the strip chart where leak rate tests are not on file." Tr. 1727. We note that a water addition should produce a persistent upward offset, and this strip chart shows a temporary (15-minute) upward offset with a return to substantially lower values. The Board finds this test to be inconclusive with respect to manipulation.

235. Test No. 148 was executed by Mr. Booher while Mr. Blessing was the control panel operator. The MUT strip chart record shows a clear, persistent upward offset that starts near the middle of the test. NRR ascribed this offset to a possible jogged water addition, but MPR Associates did not confirm this as a water addition and felt that "because of the similarity of this trace to a known hydrogen addition on February 15th, that it was a possible hydrogen addition." Tr. 1730. Mr. Blessing has stated during his April 10, 1980 interview that "he had in fact added hydrogen to the make-up tank while running leak rates" and the Board finds that the possibility that hydrogen was added, as suggested by MPR, cannot be excluded. This is clearly a questionable test but, since a similar pattern can be found from midnight to 0030 when a leak rate test was not being run, there exists a question whether any clear conclusion can be reached.

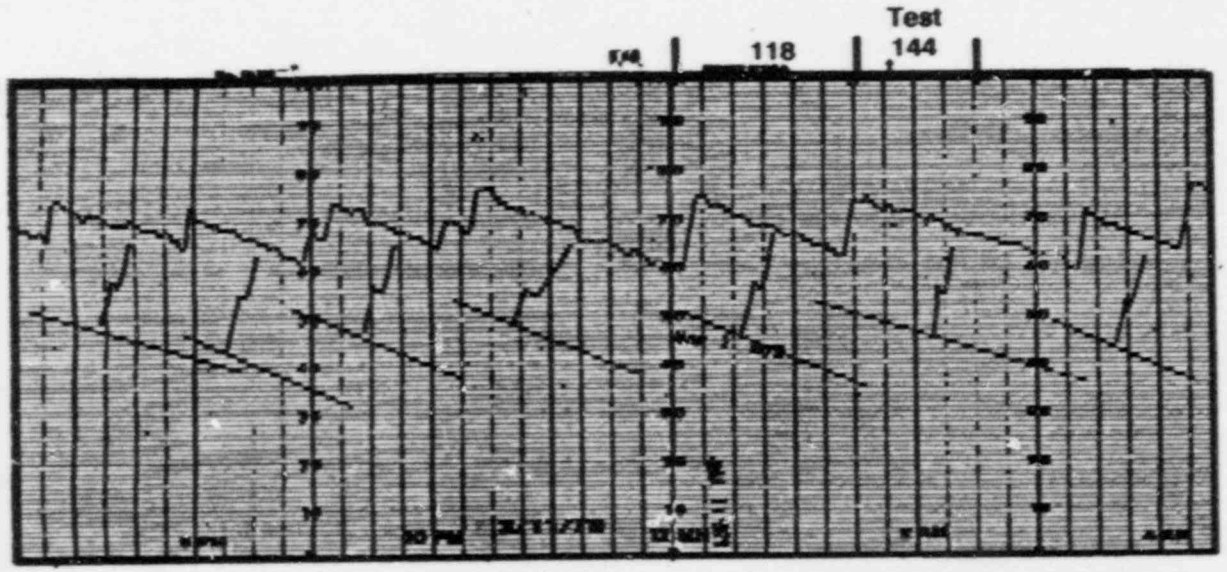

Figure 5. MUT strip chart record showing slope during Test No. 144 and slopes during other times.

236. In summary, the Board finds that the eight tests (above) show careless and unprofessional performances by this shift. The several cases where water was added and not considered in the test calculations are either failures to communicate or sloppy errors. There does not appear to be collusion by these operators. Mr. Booher testified that his relationship with Mr. Hartman was not "extremely close." Tr. 4184. Mr. Hartman thought Mr. Booher was not a good operator. Exh. 5-A, Enclosure 3 at 11. Mr. Blessing testified that neither he nor Mr. Hartman were friendly with Mr. Booher, and communications were particularly bad. Exh. 5-A, Enclosure 13 at 3. As a result, his activities as a trainee were supervised by Mr. Hartman and not Mr. Booher. *Id.*

237. In contrast to Mr. Hartman's negative views, Mr. Hoyt, the Shift Foreman, testified that Mr. Booher was his "right-hand man" when Mr. Hoyt was not in the TMI-2 Control Room, and that Mr. Booher was the CRO that "really carried the shift." Tr. 4287. We find that resentment of Mr. Booher by Mr. Hartman is a reasonable conjecture. At any rate, the Board is unable to confirm Mr. Hartman's allegation of manipulation with water by Mr. Booher on this record.

Kenneth P. Hoyt

238. Following almost 10 years in the United States Navy, Mr. Hoyt was employed by Metropolitan Edison in 1971 as an auxiliary operator at Unit 1. He became a CRO at Unit 2 in 1976 and a shift foreman in 1977. He is currently employed at GPU Nuclear Corporation as a Decontamination Supervisor in Recovery Operations. Hoyt Prep. St., ff. Tr. 4331 at 1.

239. Mr. Hoyt testified that he did not feel the inputs to the computer were "totally accurate" and he doubted the results of the leak rate tests. Tr. 4260, 4262. He stated that "I believe that I could ensure that unidentified leakage did not present a safety problem by checking other monitoring methods, which I used routinely. These methods included observing makeup tank level, pressurizer level, system temperature and the sump pump." Hoyt Prep. St., ff. Tr. 4331 at 2. He stated that he spent approximately one-half of his time touring and inspecting the plant. *Id.* at 1. Mr. Hoyt testified that he depended on these visual inspections to a substantial extent and, therefore, discarded all leak rate tests showing unidentified leakage in excess of 1 gpm "because in my judgment those tests were invalid." *Id.* at 3.

240. Mr. Hoyt testified that he talked about the problems in the test with his shift supervisor. Tr. 4265. He had the impression that the problems were being worked on and he had no control of the schedule. Tr. 4266.

241. The Board finds Mr. Hoyt's visual inspections were not a proper substitution for the Tech-Spec-required leak rate surveillance. His failure to

document the difficulties that Shift E had in conducting this surveillance and his written approval of unreliable tests constitute culpable neglect.

242. The Board found Mr. Hoyt to be straightforward and knowledgeable at the hearing. In contrast to many others, he understood the safety significance of leaks and the difference in importance between a valve stem leak and a pipe or weld crack. Tr. 4292-93. We find no evidence that he put pressure on the operators or was aware of any manipulation of the leak rate tests. As Mr. Hartman testified (*see* § VI, ¶ 214), he would not carry out manipulations when he could be observed, which confirms Mr. Hoyt's posture that he had no reason to be suspicious of the operators.

Bernard G. Smith

243. Mr. Smith was a shift foreman at Unit 1 and then became a shift supervisor in both units. During 1978-1979, he supervised "E" Shift at TMI-2. Smith Prep. St., ff. Tr. 4331 at 1.

244. Mr. Smith was aware that his shift encountered difficulties in obtaining leak rate test results that depicted unidentified leakage below 1 gpm. He attributed the problem primarily to the TMI-2 computer's software. Tr. 4341. Mr. Smith believed that those who were technically competent to do so were devoting time to correct the computer program. Tr. 4352-53; Smith Prep. St. at 5.

245. Mr. Smith placed greater reliance on his ability to detect leakage through visual review of plant parameters than he did on the numbers reflected on the leak rate test computer printout. Tr. 4367; Smith Prep. St. at 4. He recognizes now that his reliance on his own ability to visually detect leakage was misplaced. Tr. 4360.

246. Mr. Smith could not recall any training to comply with Administrative Procedure 1010 insofar as leak rate testing was concerned. Tr. 4344. Mr. Smith testified that, in retrospect, "we didn't do things the right way at that time." Tr. 4347. Mr. Smith also testified that, in general, the training he received was very limited compared to present industry practices. Tr. 4361-62.

247. Mr. Smith was unaware of any falsification or manipulation of leak rate tests that may have occurred on his shift. Tr. 4374; Smith Prep. St. at 6-7. His lack of knowledge of such actions was confirmed by Mr. Hartman. Tr. 2241, 2286, 2292, 2303. Mr. Hartman has consistently testified that Mr. Smith was not necessarily aware of his leak rate test falsification. Stier Report, Vol. VI(F), 7/16/82 *GPU v. B&W* Deposition at 1-2; *id.*, 8/18/82 *GPU v. B&W* Deposition at 276. Mr. Smith testified that he was surprised by Mr. Hartman's and Mr. Blessing's admissions regarding leak rate test manipulation. Tr. 4374; Smith Prep. St., ff. Tr. 4331 at 7.

248. The Board finds that Mr. Smith was tolerant of improper practices at TMI-2, which can be attributed to inadequate training and supervision. In

common with other shift supervisors, he failed in his duties to ensure that the Tech Specs were properly understood and applied, which constitutes culpable neglect.

Shift F

249. Shift F was constituted in early January 1979. It was comprised of two CROs — Hugh A. McGovern and Earl D. Hemmila — one CRO Trainee, Leonard P. Germer, Shift Foreman Carl L. Guthrie, and Shift Supervisor Kenneth P. Bryan.

250. Shift F's understanding and handling of leak rate tests was typical of other shifts in the following respects:

— They misinterpreted the Tech Specs to require only one "good" leak rate test in 72 hours, regardless of the results of other tests. Tr. 3219-20 (McGovern); Hemmila Prep. St., ff. Tr. 4039 at 2; Germer Prep. St., ff. Tr. 5236 at 2; Tr. 4115, 4121 (Guthrie); *cf.* Tr. 4564 (Bryan).

— Tests reflecting excessive leakage were routinely discarded. "Good" tests were filed, without regard to their validity. Thus, leak rate tests were regarded as a meaningless administrative requirement, not as a real measure of leakage. Tr. 3199, 3204 (McGovern); Hemmila Prep. St., ff. Tr. 4039 at 4; Germer Prep. St., ff. Tr. 5236 at 2-3; § VI, ¶ 272, below (Guthrie).

— The operators did not receive any significant training in leak rate testing. Tr. 3207 (McGovern); Germer Prep. St. at 2.

— The operators did not follow Administrative Procedures 1010 and 1012 requiring the filing of exception and deficiency statements and logging of start and stop times. Tr. 3221 (McGovern); Tr. 4024 (Hemmila); Tr. 4116 (Guthrie); Tr. 4588 (Bryan); Bryan Prep. St., ff. Tr. 4540 at 3-4.

There are no disputes about the foregoing points. The operators, foreman, and supervisor conceded them in their testimony; or they are conclusively demonstrated by the record. Therefore, as to those points, there is no need to freight this opinion with detailed findings about each member of Shift F, beyond the foregoing summary.

251. Shift F and its members can be discussed relatively briefly because we find that no manipulation occurred on that shift. There is no strong evidence of manipulation on Shift F, and none of the investigators believed that it had occurred. There is some indirect evidence of possible manipulation which we analyze below. Our negative conclusion about manipulation rested in part on our favorable impression of the Shift F members as witnesses, who came across as candid and responsible people.

Hugh A. McGovern

252. Mr. McGovern is currently employed by GPU Nuclear as Plant Operations Manager for TMI-2. McGovern Prep. St., ff. Tr. 3148 at 1. He maintains an SRO license in that position. *Id.* at 2. He commenced his employment with Met-Ed in 1976 as an AO at TMI-2, and he advanced to the position of licensed CRO at TMI-2 in late 1978. *Id.* at 2. In January 1979, he was assigned to "F" Shift in TMI-2.

253. Mr. McGovern's shift had the typical division of responsibilities. For example, water additions to the RCS typically would be made by the panel operator (Tr. 3164-65), and the individual assigned to perform surveillance tests typically would complete the questions that were part of the computer-generated leak rate procedure. Tr. 3165. His shiftmates attempted to communicate with each other concerning the commencement of a leak rate test, and Mr. McGovern could not remember having communication problems with respect to leak rate testing. Tr. 3165-66.

254. Mr. McGovern knew that he was to avoid adding water to the MUT during a leak rate test unless there was an operational need to do so. Tr. 3152. The typical operational reasons for adding water during a leak rate test were to maintain proper inventory and to adjust boron concentration. Tr. 3225. Mr. McGovern was unaware that the MUT level strip chart could reflect an amount of water higher than the amount actually added to the MUT. McGovern Prep. St. at 5.

255. Mr. McGovern signed four leak rate tests in which water was added during the course of the test, and the amount of water recorded in the log was different than the amount reflected on the MUT level strip chart. They are NRR Test No. 150 (Stier Test No. 8), NRR Test No. 151 (Stier Test No. 7), NRR Test No. 153 (Stier Test No. 5), and MPR Test No. 2 (which was not analyzed by NRR). These tests were performed between March 17 and 27, 1979. MPR found that these water additions, while carrying some indications of manipulation, could not be found "with certainty" to have been "made with the intention to influence the tests." Stier Report, Vol. I at 101. Stier and MPR analyzed these tests as follows.

> There are two factors that militate against a finding of intentional conduct. First, there is no direct evidence implicating any of the members of the two crews that performed all of the filed tests in this form of manipulation. Knowledge of the effect of water additions on the leak rate test does not appear to have circulated as widely as information about the effects of hydrogen. For example, Hartman stated that he was unaware that a water addition that was accounted for in the calculation could affect the leak rate test.
>
> Second, the pattern of water additions between mid-March and March 28 differed from the previous period. Water was not consistently added within the last few minutes of each test as had been the case from mid-February through mid-March. In addition, the reactor coolant

drain tank collection rate became so high by mid-March that water additions were required at short intervals to compensate for the loss to the reactor coolant system. Operators may have added water to the makeup tank during tests out of necessity. Therefore, we cannot be certain that the water additions made between mid-March and March 28 were for the purpose of manipulating tests.

Id. at 101-02. The NRR analysis of these tests is generally consistent with the Stier-MPR analysis. *See* NRR Report, Vol. I, Enclosure 10 at 4-5.

256. These tests, particularly Nos. 151 and 153 (where water was added near the end) suggest manipulation. However, the addition during No. 151 could have been caused by a perceived need to maintain make-up tank inventory. More importantly, the increased rate of leakage during this time period made frequent water additions necessary. In the absence of some other strong evidence of manipulation, we cannot find an intent to manipulate in these tests.

257. Mr. McGovern was unaware that the addition of hydrogen to the make-up tank could affect leak rate test results. Tr. 3167, 3202. He knew that hydrogen had to be added periodically to the make-up tank to maintain overpressure and to provide net positive suction head for the make-up pumps. Tr. 3201. NRR identified only one test involving Mr. McGovern (NRR Test No. 121) during which it alleges hydrogen may have been added to the MUT. Exh. 5-B, Attachment 5, Table 11 at 5. We reject NRR's analysis of its Test No. 121. MPR did not agree that there was a possible hydrogen addition during NRR Test No. 121, because the trace deflections on the make-up tank level strip chart did not show a definite offset similar to the confirmed hydrogen addition on February 15, 1979 (NRR Test No. 120, Stier Test No. 38). Exh. 1-B (Green Volume), Stier Test No. 37. Rather, MPR concluded that the MUT level strip chart trace deflections during NRR Test No. 121 appeared typical of other deflections that occurred on the same day. The Board agrees.

Earl D. Hemmila

258. Mr. Hemmila appeared in response to a subpoena issued by the Board; he agreed to come to Bethesda to testify. He is currently employed as a contract consultant at Davis-Besse in the plant training department. Hemmila Prep. St., ff. Tr. 4039 at 1. Mr. Hemmila was employed at TMI-2 from 1976 until 1982. *Id.* at 2. In 1978, he was a CRO in training. *Id.* He received his RO license on December 6, 1978. Tr. 4043. Beginning on January 1, 1979, he was assigned as a CRO on "F" Shift. Tr. 4044.

259. Mr. Hemmila was aware that the leak rate procedure cautioned against the addition of water to the MUT. Tr. 4050. However, there were occasions when it became necessary to add water to the MUT during a leak rate test. Hemmila Prep. St. at 4. For example, after mid-March 1979, water was being added with

increasing frequency to keep the MUT level above the required minimum or to keep the control rods within the proper operating band. Tr. 4051-52. TMI-2 had a low-level alarm on the MUT. Tr. 4140. The alarm would sound if the operator let the level go below 60 inches. Tr. 4148-49. Mr. Hemmila's shift foreman, Mr. Guthrie, testified that a prudent operator would endeavor to replenish the MUT level before the alarm went off. Tr. 4151-52. The frequency of required water additions is illustrated by NRR Test No. 150, at which time water was added ten times to the MUT during an 8-hour shift. Tr. 4059. Similarly, in connection with NRR Test No. 153, water was added 12 times during an 8-hour shift. Tr. 4090-93.

260. In 1978-1979, Mr. Hemmila was not aware of any phenomenon by which the volume of water added reflected in the make-up tank level strip chart was greater than the volume measured by the totalizer. Hemmila Prep. St. at 4-5; Tr. 4080. He testified that neither he nor any other operator, to his knowledge, deliberately falsified leak rate tests by making unrecorded or underrecorded water additions to the make-up tank. Hemmila Prep. St. at 5. He felt that a lack of communication between operators would account for any instances in which water was added during a test but not properly included in the test calculation. *Id.*

261. Mr. Hemmila was the CRO assigned to the panel during NRR Test Nos. 150-153. We have already discussed these tests in our consideration of Mr. McGovern. *See* § VI, ¶ 255, above. We reach the same conclusion here — that Mr. Hemmila was not engaged in manipulation in these or any other tests.

262. During 1978-1979, Mr. Hemmila was not aware that the addition of hydrogen to the MUT during a leak rate test could affect the test result. There was no explicit rule prohibiting the addition of hydrogen during a leak rate test. On the contrary, Mr. Hemmila was aware that Unit 2 Superintendent Logan checked hydrogen levels frequently, and so Mr. Hemmila believed that maintaining proper hydrogen pressure was very important. During 1979, when he was a licensed operator, it was not always possible to add hydrogen from the control room. When that happened, the addition had to be done manually by an AO. It is possible that an AO may have added hydrogen to the make-up tank during a leak test without the CROs knowing about it. *Id.*

263. Mr. Hemmila stated that he never added hydrogen to the make-up tank in an effort to falsify leak rate tests and that he had no knowledge that other operators had done so. *Id.* at 5-6. There is only one test (NRR Test No. 152) signed by Mr. Hemmila during which hydrogen was added. *See* Exh. 5-B, Attachment 5, Table 11 at 20. The hydrogen addition was duly noted in the CRO log (*id.*), and there is no evidence that it was made with intent to manipulate or that Mr. Hemmila even knew about it (he was not on the panel). *See* Stier Report, Vol. IV(C), Test No. 6, CRO log at 70.

Leonard F. Germer

264. In 1977, Mr. Germer began his employment with Met-Ed as an AO at TMI-2. Germer Prep. St., ff. Tr. 5236 at 1. Mr. Germer became a CRO trainee assigned to "E" Shift in October or November of 1978, and was transferred to "F" Shift in early January 1979. *Id.* at 1-2. As a trainee, Mr. Germer was permitted to perform leak rate tests only under the supervision of a licensed CRO. *Id.* at 2.

265. In light of our finding that as a CRO trainee, Mr. Germer's involvement in leak rate testing at TMI-2 was minimal (Tr. 4169 (Kelley, J.)), we decided not to call Mr. Germer as a witness. Tr. 4541. Instead, we ordered that Mr. Germer's prefiled testimony be bound into the record as the testimony he would have given had he been called as a witness. Tr. 5236.

266. Mr. Germer had very minimal involvement in the logging of leak rate tests during 1978-1979, because that typically was a function performed by a licensed CRO. Germer Prep. St. at 3. He has no present recollection of ever being instructed to conceal the fact that a leak rate test had been performed by not logging it. *Id.*

267. Mr. Germer did not falsify any leak rate result during 1978-1979, nor was he aware of any other operator who falsified any leak rate test during that time. *Id.* at 3-5.

268. Several findings of fact proposed for Mr. Germer (Numerous Employees' ¶¶ 536-540), seek to equate NRR's "questionable" label with deliberate manipulation of tests. That equation is not valid. When NRR classifies a test as "questionable," it is merely taking the position that the test appears to have been conducted in violation of procedures. That is *not* equivalent to charging the person or persons who conducted the test with manipulation. There is some basis for a finding of irregularity in each of the tests cited in NRR's Table 8 as involving Mr. Germer, either as surveillance CRO or panel operator.

Carl L. Guthrie

269. Mr. Guthrie was a shift foreman at TMI-2 during the 1978-1979 period. He had been employed by Met-Ed since 1971. His first assignment was as an AO at Unit 1, then as a Unit 1 shift foreman. In January 1979, he was assigned to "F" Shift in Unit 2. Mr. Guthrie currently is a radwaste foreman at TMI-2. Guthrie Prep. St., ff. Tr. 4413 at 1. He maintains an SRO license in that position. Exh. 5-A, Enclosure 2 at 11.

270. Leak rate tests were run by Mr. Guthrie's CROs. Stier Report, Vol. VI(D), Tab G, Guthrie 2/12/85 Interview at 7. Mr. Guthrie did not directly monitor their performance of leak rate tests. Moreover, he might not have been in the TMI-2 control room when a leak rate test was performed, because

the selection of the time for running the test was a decision left to the operator. *Id.* Mr. Guthrie did not personally perform a leak rate test at TMI-2. *Id.*

271. Mr. Guthrie recognized "his responsibility . . . to provide first line supervision of the control room operators." Prep. St., ff. Tr. 4113 at 1. He further stated that "[g]enerally, I directed the performance of various surveillance tests . . . and had to ensure compliance with the Technical Specifications." *Id.* at 1-2. The record reflects, however, that Mr. Guthrie did not provide proper supervision of the control room operators in performing leak rate tests and in ensuring that the 1-gpm LCO in the Tech Specs was being met. As previously noted, the Shift F CROs treated the leak rate test in a perfunctory manner. A test was considered valid or invalid depending entirely on its result, not upon the manner or conditions of its performance.

272. The Stier-MPR analyses of Shift F tests led them to conclude that:

> In addition to tolerating, and participating in, the discarding of all unsatisfactory test results obtained on his shift, Guthrie approved the filing of numerous satisfactory leak rate test results that were inaccurate or performed in violation of a test procedures. Almost half of the tests that Guthrie approved should have been determined to be invalid.

Stier Vol. II(A), Guthrie Assessment at 6. Similarly, the NRR investigation concluded that:

> Mr. Guthrie's review only involved looking at the "bottom line" test results. Thus, if a test result was greater than 1 gpm, it would be discarded and another test would be started. If a test was less than 1 gpm it would be retained with little or no review to ensure it was a valid test.

NRR Report, Enclosure 8 at 4. The record underlying the quoted statements amply supports them.

273. Mr. Guthrie spent substantial time attempting to detect plant leakage. He measured leaks in accessible areas of the plant and estimated leakage in inaccessible areas. Tr. 4117-18. Mr. Guthrie often found that leakage depicted by the leak rate test was inconsistent with his own assessment of plant leakage. *Id.* His inability to corroborate leak rate test results caused him to question the accuracy of the test. *Id.* Mr. Guthrie was also skeptical of the leak rate test because it did not produce consistent results. *Id.*

274. In 1978-1979, Mr. Guthrie heard a rumor from a source he has since forgotten, that the addition of hydrogen to the MUT during a leak rate test could affect leak rate test results. Tr. 4116. While in Unit 1, he had observed the effect of a hydrogen addition to the MUT, but he thought that the very temporary, very slight increase he observed could not affect a leak rate test result. Guthrie Prep. St. at 4; Tr. 4139. We find no substantial evidence to dispute Mr. Guthrie's

statement that he was unaware of the fact that the addition of hydrogen to the MUT could affect leak rate test results.

275. Mr. Guthrie did not know until after the March 28, 1979 accident that a water addition to the MUT, even if accounted for in the leak rate test procedure, could produce a more favorable leak rate test result, nor was he aware of any operator who manipulated leak rate tests in that fashion. Stier Report, Vol. VI(D), Tab G, Guthrie 2/12/85 Interview at 74-75; Tr. 4145-46. Mr. Guthrie was not aware of any unrecorded water additions to the MUT made to falsify a leak rate test. *See* Tr. 4116. None of the operators on his shift talked about this phenomenon or acted as though this was a method they might use to manipulate leak rate tests. *Id.*

276. Mr. Guthrie approved NRR Test No. 150 (Stier Test No. 8), NRR Test No. 151 (Stier Test No. 7), and NRR Test No. 153 (Stier Test No. 5). We have previously discussed these tests and concluded that no manipulation occurred. *See* § VI, ¶ 255.

277. In conclusion, we find that, in addition to the procedural violations cited in § VI, ¶ 250, above, in which he was personally involved (e.g., discarding tests, not filing E&Ds), Mr. Guthrie was guilty of culpable neglect in his attitude toward the test and in allowing the CROs under his supervision to treat the test in a perfunctory manner.

Kenneth P. Bryan

278. Mr. Bryan began employment with Met-Ed in 1967. He became a CRO at TMI-1 in 1974 and a shift foreman at TMI-1 in 1976. Between October 1978 and June 1979, he was a dual-licensed shift supervisor. Bryan Prep. St., ff. Tr. 4540 at 1.

279. Between October and December 1978, Mr. Bryan was a supervisor in training. Tr. 4573. He received a permanent assignment to "F" Shift in January 1979. Tr. 4571-72. Mr. Bryan currently is a nonlicensed, self-employed nuclear consultant. Bryan Prep. St. at 1.

280. Mr. Bryan testified as follows:

> Unit 2's technical specifications required that a successful leak rate test be performed every 72 hours. Company policy required us to perform one every shift. By obtaining a test with unidentified leakage less than 1 gpm, we extended the 72-hour time clock. If the computer printout indicated that the unidentified leakage was high or excessively low, it was my understanding that the operators would evaluate it based on plant parameters including makeup tank levels, radiation levels, and so forth. If nothing indicated why there was a change from previous leak rates, the test performer would discard that printout and initiate another. It was my understanding that we had to enter the action statement if we obtained a leak rate higher than 1 gpm that we could not invalidate. I did believe that if I had looked

at everything else and did not think that I had obtained a valid leak rate, I did not have to start the time clock."

Bryan Prep. St. at 2-3. The foregoing testimony, viewed in the light of our findings on the other members of Shift F, shows that Mr. Bryan was out of touch with the performance of the leak rate test by his shift. As we have seen, the CROs made little or no attempt to "validate" tests. They simply filed all tests under 1 gpm and discarded all tests over 1 gpm. Although they ran many tests over 1 gpm, they never entered the Action Statement.

281. Mr. Bryan did not review leak rate test results. There are no tests from September 1978 through March 28, 1979, that he performed or approved. Exh. 5-B, Attachment 5, Tables 9 and 11; Stier Report, Vol. III, Table 1. He did not recall any instance of Guthrie's bringing him a test for review. Tr. 4550. Nevertheless, he was aware that there were problems with the leak rate test. As he testified, "[l]eak rates were hard to get." Tr. 4570.

282. Mr. Bryan realized that adding hydrogen to the MUT could affect the leak rate test. Tr. 4563-64. He candidly testified that while he hoped that he had instructed his operators not to add hydrogen to the MUT during a leak rate test, he could not specifically recall issuing such an order. Tr. 4564. There are only two leak rate tests (NRR Test Nos. 121 and 152) performed by his shift during which NRR alleged that hydrogen was added to the MUT. Exh. 5-B, Attachment 5, Tables 5, 6, and 11; Stier Report, Vol. III(A), Table 1. We agree that neither of these tests supports a conclusion that "F" Shift's operators manipulated test results through hydrogen additions to the MUT. Tr. 1660 (Capra).

283. Although Mr. Bryan witnessed the effect of hydrogen addition on MUT level, he did not observe that a water addition could produce a similar, false MUT reading. Tr. 4555. NRR found three instances where "F" Shift "partially included" water additions during leak rate tests. Exh. 5-B, Attachment 5, Tables 6 and 10, NRR Test Nos. 150, 151, 153. As previously discussed (*see* § VI, ¶ 255), we believe that these tests do not represent operator efforts to manipulate leak rate test results. Tr. 1486-87 (Russell); Tr. 1847-49 (Stier).

284. Mr. Bryan permitted his shift to file a leak rate test result depicting negative unidentified leakage if the result was a small negative number. Tr. 4570. He could not remember the range of negative values he would accept or whether there was a specific rule concerning an acceptable range. Tr. 4571. He considered that the status of Unit 2's development made it possible that negative leak rate tests would result. Tr. 4570. While he agreed that negative leak rate tests might not appear logical, he was convinced that the "swings" in instrumentation in the ICS made it just as likely to obtain a negative as well as a positive leak rate. Tr. 4596. We essentially agree with Mr. Bryan on this point.

285. Mr. Bryan recalled that the Technical Change Notification (TCN) to the leak rate surveillance procedure was implemented to correct an error in the

leak rate test procedure and not to create an improper bias toward the production of favorable test results. Tr. 4597, 4605. He believed that he would not have noticed any problems in the TCN or objected to tests performed pursuant to it. Tr. 4596, 4605.

286. Mr. Bryan did not initial the sign-off sheet attached to LER 78-62/1T. Tr. 4608. Mr. Bryan believed that he did not read the LER, because someone else erroneously entered his initials alongside Mr. Bryan's name. Tr. 4609. Not surprisingly, therefore, Mr. Bryan had no recollection of that LER. Bryan Prep. St. at 5. Although, arguably, Mr. Bryan should nevertheless have read the LER and seen to it that his foreman and shift corrected their interpretation of the Tech Specs, under these circumstances we do not charge him with culpable neglect with respect to the LER.

287. We find that Mr. Bryan must be charged with culpable neglect in that he failed to keep himself adequately informed about the conduct of leak rate tests and to oversee Mr. Guthrie's direct supervision of such tests, particularly in light of Bryan's knowledge that the test was presenting problems. Tr. 4570, 4607-08.

James R. Floyd, Supervisor of Operations

288. Mr. Floyd was the Supervisor of Operations of TMI-2 during the period relevant to this proceeding. Floyd Prep. St., ff. Tr. 4894 at 2. Mr. Floyd reported to the Unit 2 Superintendent, Mr. Gary Miller, until December 1978, and Mr. Logan thereafter. Miller Prep. St., ff. Tr. 5039 at 2-5. He did not report at any time to Mr. Seelinger. Tr. 4625-26, 4769 (Seelinger); Tr. 5004-05 (Floyd).

289. We have already discussed Mr. Floyd in relation to (1) the events leading to the November 1, 1978 LER, (2) his knowledge of difficulties the operators were having with leak rate tests, and (3) his knowledge of the practice of discarding tests. We will not repeat those discussions in detail here. The findings in those discussions stand independently. The purpose of this section is to summarize and provide our overall assessment of Mr. Floyd's performance.

290. As the Supervisor of Operations, Mr. Floyd bears greater responsibility for what went wrong with leak rate tests at TMI-2 than any other single individual. He — above the operators, foremen, and shift supervisors — had overall responsibility for seeing to it that the leak rate test was conducted correctly and that the unit was operated in accordance with the Tech Spec limit on unidentified leakage. He failed in that responsibility in several respects. Furthermore, taking into account the many conflicts between Floyd's testimony and the evidence in the record and Floyd's demeanor before this Board, we find that Floyd was not fully forthcoming and candid. Indeed, Floyd was, in our judgment, the least candid witness to appear in this proceeding.

291. As discussed above (§ IV, ¶ 46), there is considerable evidence, and we find, that Floyd knew about the difficulties the operators were having with the leak rate test. Apart from the specific evidence we have cited, that conclusion is compelled by Floyd's close relationship with the CROs and the way he functioned on the job. It is inconceivable to us that a self-styled "crisis fighter" like Floyd who "lived out of the control room" (Tr. 4875) would not have been quite familiar within the difficulties we have described. We reject as incredible Floyd's claim that he had "no recollection of knowing any of these problems," that he was "basically . . . ignorant of what was going on." Tr. 4976.

292. The most striking lack of candor in Floyd's testimony relates to the misinterpretation of the Tech Specs under which seemingly valid tests reading over 1 gpm were not considered to trigger the Action Statement if one "good" test had been obtained in the preceding 72 hours. The great weight of the evidence shows that that was *Floyd's* interpretation until the Havercamp incident, and that it continued under Floyd when the "Havercamp correction" was not implemented. Mr. Seelinger, a believable witness, testified that that was the Floyd interpretation. Tr. 4745-47, 4764-65. Mr. Havercamp, also a believable witness, testified that:

> I clearly recall Mr. Floyd telling me, in effect, that RCS unidentified leakage test results must be calculated to be within acceptable limits (less than 1 gpm) only once every 72 hours in order to be in legal compliance with TS surveillance requirements. In his view, any number of RCS unidentified leakage measurement test results could be greater than 1 gpm, so long as every 72 hours acceptable leakage results were obtained. I did not attempt to determine whether this was a long-standing view or a hastily-formed justification or excuse that Mr. Floyd had argued to avoid a violation of the TS. However, I informed Mr. Floyd that in my view his interpretation was clearly incorrect.

Floyd himself, in his prefiled testimony, testified that:

> Until October of 1978, it was the general opinion that we had to get one valid leak rate of less than one gallon per minute unidentified leakage into the record every 72 hours to comply with the Unit's technical specifications. After October 20, 1978, if there was a bad leak rate and an operator could not convince himself that it was invalid, steps were to be taken to shut the Unit down. . . . I issued a memorandum in October of 1978 to explain the change in interpretation of Operations personnel.

At the hearing, however, Mr. Floyd apparently recognized that his long-standing Tech Spec interpretation was untenable. Accordingly, he engaged in some unconvincing backpedaling from his own prefiled testimony. Tr. 4903-07. The Board credits the Seelinger and Havercamp testimony on this point and rejects Floyd's attempt to obfuscate the record.

293. In addition to the foregoing, we adopt the following quoted portions of findings proposed by GPUN:

208 . . . Floyd admitted that he should have been aware of the failure by operators to record the start and stop times of leak rate tests in the CRO Log Book, as required by AP 1012, "because I was required to review the log book once a week." Floyd, ff. Tr. 4984 at 6. Floyd also admitted that he did not enforce the application of E&Ds to leak rate tests, as required by AP 1010. *Id.* at 3; *see also* Tr. 4991-93 (Floyd). Operators thus were "failing to take [actions] in violation of technical specification requirements." CLI-85-18, 22 NRC at 881. By failing to review the CRO Log and enforce the application of E&Ds to leak rate tests, Floyd through "dereliction or culpable neglect" was allowing such improper actions to occur. These very actions, if corrected, might well have highlighted the greater underlying problems with leak rate testing practices and led to their correction.

210 . . . Floyd admitted that the analysis of plant status he provided on October 18, 1978, was invalid because he attempted to determine the "legality" of continuing to operate the plant without asking for all of the relevant information. Tr. 4919-20 (Floyd); *see* ¶ 115, *supra*. In response to the Board's inquiry concerning how Floyd could correctly answer Seelinger, who had sent Bezilla with three tests for analysis, NRR Test Nos. 12C-E, Floyd responded, "All I was asked for was to look at these three pieces of paper." Tr. 4919 (Floyd). The Board believes that the Supervisor of Operations must initiate and probe as well as receive and observe. By failing to demand the further information necessary for a valid analysis, Floyd lost a critical opportunity to discover that operators were again failing to take an action — entry into the Action Station immediately upon obtaining a valid leak rate over 1 gpm — in violation of Tech Spec 3.4.6.2. We therefore find that Floyd by his "dereliction or culpable neglect" allowed one of the improper actions enumerated by the Commission in its Order and Notice of Hearing.

294. Mr. Floyd testified that he was unaware, prior to the TMI-2 accident, that adding hydrogen to the MUT might affect leak rate test results. Floyd Prep. St. at 6; Tr. 5026-27. Because of Mr. Floyd's understanding of differential MUT level transmitters, it is plausible that he would not believe that hydrogen additions would have had such an effect. *See* Faegre & Benson Report, Vol. 1 at 42-43. We find that Mr. Floyd was not aware of hydrogen additions to the MUT made during leak rate tests for the purpose of manipulation. *See* Tr. 5027-28. There is no evidence that Mr. Floyd had any knowledge of or participated in manipulation or falsification of leak rate tests by water or by any other means.[40]

---

[40] The Aamodts did not attend the hearing. As a matter of grace, not of right, the Board allowed the Aamodts to submit questions to the Board to be put to witnesses, subject to prior review by the Board and possible objections by the parties. We sustained an objection to a question proposed by the Aamodts for Mr. Floyd. Tr. 5008-09, 5034-35. The Aamodts subsequently filed a belated "Request for Relief" arguing that the objection to their question was invalid, accusing the counsel for Mr. Floyd who made the objection of "fraud," and urging us to put the question now to Mr. Floyd. Other counsel for Mr. Floyd responded to the Aamodt requests by letter dated April 3, 1987, objecting to them in various respects, but providing a response to the question in order to put the matter to rest.

The original objection was sustained on the basis of a stipulation described by counsel, a description that the Aamodts now question. This point is arguable. The literal language of the stipulation favors the Aamodts, but the purpose and likely intent of the stipulation favors counsel for Mr. Floyd. We need not resolve that issue because, in any event, the question is irrelevant to any issue in this proceeding. Furthermore, the question has now been answered. The Aamodt's personal attack on Mr. Floyd's counsel is baseless and is rejected. In view of our prior warning to the Aamodts about baseless personal attacks, and were this not the final chapter in this Board's proceeding, we might grant counsel's request to "terminate the Aamodts' disruptive participation in this proceeding." *See* Memorandum and Order of March 26, 1986, at 5 n.*.

The Board trusts that the foregoing recommended decision is responsive to the Commission's requests.

Respectfully submitted,

James L. Kelley, Chairman
ADMINISTRATIVE JUDGE

Glenn O. Bright
ADMINISTRATIVE JUDGE

James H. Carpenter
ADMINISTRATIVE JUDGE

Bethesda, Maryland

APPENDIX A

LIST OF EXHIBITS
TMI-2 LEAK RATE PROCEEDING

Exh. No.	Description	Identified at Tr. Page	Received at Tr. Page
1-A	TMI-2 Reactor Coolant Inventory Balance Testing, prepared for GPU Nuclear Corp. by Edwin H. Stier, September 5, 1985, all volumes.	388, 391 (as modified at 569)	388 (as modified at 570), 5104, 5221
1-B	Review of NRR and OI Reports on TMI-2 Reactor Coolant Inventory Balance Testing, prepared for GPU Nuclear Corp. by Edwin H. Stier, August 28, 1986.	388, 391 (as modified at 569)	388 (as modified at 570), 5104, 5221
1-C	Letter from Edwin H. Stier to Philip R. Clark, dated September 2, 1986.	388, 391 (as modified at 569)	388 (as modified at 570), 5104, 5221
2	Results of Faegre & Benson Investigation of Allegations of Harold W. Hartman, Jr., Concerning Three Mile Island Unit 2, September 17, 1980, all volumes, but excluding Vol. 1, § IV, and Vol. 2, Ch. 9.	388-89	389, 5104, 5221
3	Portion of Page 12 of Report of GPU Assessment Panel for Individuals Involved in TMI-2 Leak Rate Testing (in 1978-1979), January 6, 1986 (re Herbein).	389	389, 5104, 5221
4	TMI-2 Computer Log (October 27, 1978).	389	389, 5104, 5221
5-A	Results of NRR's Investigation and Evaluation of Ten Licensed Operators Involved in TMI-2 Preaccident Leak Rate Testing Irregularities, including attachments and supporting documents (per the Board's 6/24/86 Order at 7,	389 (as modified at 569-71	389 (as modified at 571), 5104, 5221

Exh. No.	Description	Identified at Tr. Page	Received at Tr. Page
	undifferentiated references to "management" are to be disregarded).		
5-B	Memorandum from William Russell to Harold Denton, dated September 20, 1985, with enclosed report.	389 (as modified at 569-71	389 (as modified at 571), 5104, 5221
6	Office of Investigations Report entitled: Three Mile Island-2: Investigation of Individual Operator Actions Concerning the Falsification of Leak Rate Test Data, including all attachments.	389-90	390, 5104, 5221
7	U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation TMI-1 Restart: An Evaluation of the Licensee's Management Integrity as It Affects Restart of Three Mile Island Nuclear Station Unit 1, Docket 50-289 (July 1984) (NUREG-0680, Supp. No. 5, § 4.0).	390	390, 5104, 5221
8	Memorandum of Oct. 27, 1978.	390	Withdrawn 5103, 5221
9-A thru 9-F	Photographs of TMI-2 Control Room.	377-81 (as renumbered)	381 (as renumbered at 391), 5104, 5221
9-G	Photograph of the TMI-2 make-up storage tank level indicator, pressure indicator, and temperature indicator.	1182	1183, 5104, 5221
10-A	Sample SRO license.	1025-26	1027, 5104 5221
	Sample RO license.	1026	1027, 5104 5221

Exh. No.	Description	Identified at Tr. Page	Received at Tr. Page
11-A and 11-B	J. Moore Charts, Effect of Oscillations.	1025	5104, 5221
12-A	Administrative Procedure (AP) 1036, Instrument Out-of-Service Control, Rev. 0, March 1978.	1354-55	5104, 5221
12-B	Administrative Procedure (AP) 1036, Instrument Out-of-Service Control, Rev. 1, August 1978.	1354-55	5104, 5221
13	Drawing of peak-to-peak v. slope offset calculation (included in Exh. 24).	1845 (as modified at 5103-04)	5104, 5221
14	Stier cover letter to Board with two strip charts showing hydrogen additions (included in Exh. 24).	1862 (as modified at 5103-04)	1862
15-A and 15-B	Curriculum vitae of Dr. Harrison and Mr. Cole.	2008	2008, 5104, 5221
16	Training Department Administrative Memorandum Number 5, Change 2, dated October 8, 1976 (Subject—Category IV CRO Training Program).	2219-20	2234, 5104 5221
17	Excerpts from Instrument Out-of-Service Log.	2400	2400, 5104 5221
18	RCIE Test of 2/15/79, portion of CRO Log and MUT Strip Chart.	3470	3470, 5104 5221
19	TMI-2 Control Room Layout diagram.	3500-01	3501, 5104 5221
20	D. Haverkamp Prefiled Testimony and Attachments.	4336	4337, 5104 5221
21	Bettenhausen Affidavit.	4336	4337, 5104 5221

Exh. No.	Description	Identified at Tr. Page	Received at Tr. Page
22	TMI-2 FSAR Pages 9.3-26 thru 9.3-30 and 5.2-16 thru 5.2-27.	4431	4431, 5104 5221
23	TMI-2 FSAR § 5.2.3.4, and Table 5.2-12.	4431	4431; 5104 5521
24	Stier Letter to Judge Kelley, dated September 30, 1986, with Attachments.	5103-04	5221
25	MRP Letter to Edwin Stier, dated September 30, 1986.	5104	5221
26	Letter dated Nov. 3, 1986, from R. Gallo to Rochester Gas and Electric Corp., enclosing NRC Region I Inspection Report No. 50-244/86-16, and Numerous Employees' Followup Questions for Donald R. Haverkamp.	5266-67	Rejected 5267
27	Letter dated Oct. 21, 1986, from J.P. Moore to W.A. Rockwell, Subject: MUT Level Transmitter.	Bd. Order 1/19/86	Bd. Order 1/19/86

APPENDIX B

LIST OF WITNESSES AND TESTIMONY

Witnesses	Written Testimony	Oral Testimony	Date
Adams, Charles D.	ff. Tr. 3776	3775 to 3841	10/15
Boltz, Dennis J.		2218 to 2234	9/25
Booher, Raymond R.	ff. Tr. 4175	4175 to 4232	10/28
Brummer, John A.*	ff. Tr. 5236		
Bryan, Kenneth P.	ff. Tr. 4540	4539 to 4610	10/31
Capra, Robert A.		374 to 1904	9/8, 9/9, 9/10, 9/11,
		2207 to 2209	9/12, 9/16, 9/17,
		2313 to 2439	9/18, 9/25, 9/30
Christopher, Keith		2314 to 2438	9/30
Chwastyk, Joseph J.	ff. Tr. 3407	3405 to 3600	10/10
Cole, Norman M., Jr.		374 to 2034	9/8, 9/9, 9/10, 9/11, 9/12, 9/16, 9/17, 9/18, 9/19
Coleman, Mark S.	ff. Tr. 2579	2578 to 2657	10/1
Conaway, William T., II	ff. Tr. 3097	3096 to 3141	10/7
Congdon, Joseph R.	ff. Tr. 2709	2708 to 2782	10/2, 10/3
Cooper, Martin V.	ff. Tr. 2835	2835 to 2945	10/6
Faust, Craig C.	ff. Tr. 2511	2511 to 2577	9/30, 10/1
Fels, William J.		4489 to 4535	10/30
Floyd, James R.	ff. Tr. 4894	4892 to 5036	11/4, 11/5
Frederick, Edward R.	ff. Tr. 2447	2446 to 2510	9/30
Germer, Leonard P.*	ff. Tr. 5236		
Guthrie, Carl L.	ff. Tr. 4113	4112 to 4159	10/17
Harrison, Dwight H.		374 to 2034	9/8, 9/9, 9/10, 9/11, 9/12, 9/16, 9/17, 9/18, 9/19
Hartman, Harold W., Jr.		2239 to 2309	9/25
Haverkamp, Donald R.	Exh. 20	2042 to 2210	9/24
		5237 to 5267	11/12
Hemmila, Earl D.	ff. Tr. 4039	4038 to 4111	10/17
Herbein, John G.	ff. Tr. 5268	5267 to 5320	11/12
Hitz, Gregory R.	ff. Tr. 3664	3663 to 3732	10/14
Hoyt, Kenneth R.	ff. Tr. 4233	4233 to 4299	10/28
Illjes, Theodore F.	ff. Tr. 3010	3010 to 3096	10/7

Witnesses	Written Testimony	Oral Testimony	Date
Kidwell, John M.	ff. Tr. 3285	3285 to 3399	10/9
Kirkpatrick, Donald C.**	ff. Tr. 376	374 to 1243	9/8, 9/9, 9/10, 9/11, 9/12
Kunder, George A.	ff. Tr. 4800	4799 to 4889	11/4
Logan, Joseph B.		5105 to 5220	11/6
Marshall, Walter J.	ff. Tr. 4380	4379 to 4424	10/29
McGovern, Hugh A., Jr.	ff. Tr. 3148	3147 to 3235	10/8
Mehler, Brian A.	ff. Tr. 3842	3841 to 3907	10/15
Mell, Charles F.	ff. Tr. 3239	3239 to 3282	10/9
Miller, Adam W.	ff. Tr. 3608	3607 to 3662	10/14
Miller, Gary P.	ff. Tr. 5039	5038 to 5096	11/5
Moore, James P.		374 to 1165	9/8, 9/9, 9/10, 9/11
Olson, Dennis I.	ff. Tr. 3911	3911 to 4034	10/16
Phillippe, Mark D.	ff. Tr. 4432	4431 to 4489	10/30
Rockwell, Winthrop A.		374 to 1165	9/8, 9/9, 9/10, 9/11
Russell, William T.		374 to 1904 2313 to 2438	9/8, 9/9, 9/10, 9/11, 9/12, 9/16, 9/17, 9/18, 9/30
Seelinger, James L.	ff. Tr. 4623	4614 to 4784	11/3
Scheimann, Frederick J., Jr.	ff. Tr. 2831	2783 to 2831	10/3
Stier, Edwin H.		374 to 2034	9/8, 9/9, 9/10, 9/11, 9/12, 9/16, 9/17 9/18, 9/19
Smith, Bernard G.	ff. Tr. 4331	4330 to 4379	10/29
Wermiel, Jared S.**	ff. Tr. 376	374 to 801	9/8, 9/9, 9/10
Wright, Lynn O.***	ff. Tr. 2663	2661 to 2707	10/2
Zewe, William H.	ff. Tr. 2946	2945 to 3006	10/6

Documentary Material Bound into the Transcript

Description	Page	Date
Professional Qualifications of Robert A. Capra.	ff. Tr. 651	9/9
Surveillance Data Flow Chart.	ff. Tr. 731	9/9

Description	Page	Date
Questions 5 thru 8 Submitted by Numerous Employees for D.R. Haverkamp.	ff. Tr. 2169	9/24
Personal Resume of Dennis J. Boltz.	ff. Tr. 2217	9/25
Paragraph from Page 7 of Prefiled Testimony of B.G. Smith.	Tr. 2262	9/25
List of Exhibits.	ff. Tr. 5221	11/6

*The Board did not call Brummer and Germer as witnesses. Their prefiled testimony, however, was bound into the record and reflects what the witnesses would have sworn to had they appeared. Their statements could be referred to as if the witnesses had appeared to testify. Tr. 5236 (Kelley, J.).

**Joint prefiled — Kirkpatrick and Wermiel

***Because Wright did not adopt his prefiled testimony, it was bound into the record, not as substantive evidence, but as a brief accurate summary of a longer statement placed in the record (Board Exh. 6, OI Report, Exh. 18, Wright Interview) and regarded as substantive evidence. Tr. 2662-63 (Kelley, J.).

APPENDIX C*

CORRELATION OF NRR AND STIER TEST NUMBERS FOR EACH TMI-2 LEAK RATE SURVEILLANCE TEST PERFORMED BETWEEN 9/30/78 AND 3/28/79

NRR Test No.	Stier Test No.	NRR Test No.	Stier Test No.
SEPTEMBER 1978		28	130
1	161	29	130
OCTOBER 1978		30	128
2	160	31	127
3	159	NOVEMBER 1978	
4	158	32	126
5	157	33	125
6	156	34	124
7	155	35	123
8	154	36	122
9	153	37	121
10	152	38	120
11	151	39	119
12	150	40	118
12A	149	41	117
12B	148	DECEMBER 1978	
12C	147	42	116
12D	146	43	115
12E	145	44	114
13	144	45	113
14	143	46	112
15	142	47	111
16	141	48	110
17	140	49	109
18	139	50	108
19	138	51	107
20	137	52	106
21	136	53	105
22	135	54	104
23	134	55	103
24	133	56	102
25	—	57	101
26	132	58	100
27	131	59	99

NRR Test No.	Stier Test No.	NRR Test No.	Stier Test No.
60	98	FEBRUARY 1979	
61	97	97	61
62	96	98	60
63	95	99	59
64	94	100	58
65	93	101	57
66	92	102	56
67	91	103	55
68	90	104	54
69	89	105	53
70	88	106	52
71	87	107	51
72	86	108	50
73	85	109	49
74	84	110	48
75	83	111	47
76	82	112	46
77	81	113	45
78	80	114	44
79	79	115	43
80	78	116	42
81	77	117	41
82	76	118	40
JANUARY 1979		119	39
83	75	120	38
84	74	121	37
85	73	122	36
86	72	123	35
87	71	124	34
88	70	125	33
89	69	126	32
90	68	127	31
91	67	128	30
92	66	129	29
93	65	130	28
94	64	131	27
95	63	132	26
96	62	133	25

NRR Test No.	Stier Test No.	NRR Test No.	Stier Test No.
MARCH 1979		146	12
134	24	147	11
135	23	148	10
136	22	149	9
137	21	150	8
138	20	151	7
139	19	152	6
140	18	153	5
141	17	154	4
142	16	155	3
143	15	— (No test)	2
144	14	156	1

*See Board Exh. 5-B, NRR Report, Attachment 1.

APPENDIX D

The following individuals, in addition to those who appeared and testified, were sent copies of the Board's December 31, 1985 letter offering them the opportunity to appear. They did not participate in these proceedings. After review by the Board, it was found that their appearance would be peripheral to the case in point and that therefore no further action by the Board was necessary. *See* ¶ 19 and note 6 at p. 684.

Mr. James R. Barry
Mr. Joseph R. Bashista
Mr. Robert P. Beeman
Mr. Marshall L. Beers
Mr. Nelson K. Bennett
Mr. Richard W. Bensel
Mr. Michael L. Benson
Mr. Donald A. Berry
Mr. Mark B. Bezilla
Mr. George J. Bixler
Mr. John J. Blessing
Mr. Floyd D. Bomgardner, Jr.
Mr. Stuart W. Brantley
Mr. Dennis A. Buchter
Mr. Curtis A. Conrad
Mr. Barry L. Corkle
Mr. Ember A. Curry
Mr. George L. Cvijic
Mr. Terry S. Daugherty
Mr. Michael D. Demmy
Mr. Walter R. Desh
Mr. Richard W. Dubiel
Mr. Ronald K. Fountain, Sr.
Mr. Jack K. Garrison
Mr. Timothy R. Gilbert
Ms. Juanita A. Gingrich
Mr. Thomas M. Hawkins
Mr. Danny L. Heilman
Mr. James L. Hetrick
Mr. Phillip L. Hetrick
Mr. John Hilbish
Mr. Brad E. Hoffman
Mr. Richard S. Hutchison*
Mr. Dwayne B. Jenkins
Mr. Richard E. Johnson, Jr.
Mr. Thomas M. Kauffman
Mr. Richard G. Kleinfelter
Mr. David C. Knerr
Mr. Henry M. Kohl
Mr. Peter A. LaBar
Mr. Dale J. Laudermilch
Mr. John D. Lawton, Jr.
Mr. Lawrence L. Lawyer
Mr. Randy H. Lightner
Mr. John K. Lionarons
Mr. P. Lydon*
Mr. Joseph Manoskey, Jr.
Mr. Edward T. Matincheck*
Mr. David B. Mayhue
Mr. Donald R. Miller
Mr. Thomas Morck
Mr. Steven L. Mull
Mr. David A. Neumann*
Mr. William G. Olge, Jr.
Mr. James R. Paules
Mr. George A. Pierce
Mr. Ivan D. Porter, Jr.
Mr. William E. Potts
Mr. William H. Sawyer
Mr. Charles C. Seitz
Mr. Merrill R. Shaffer
Mr. Patrick H. Shannon
Mr. Richard W. Sieglitz
Mr. Henry B. Shipman
Mr. Daniel M. Shovlin
Mr. Earl D. Showalter

Mr. Eugene H. Shue
Mr. David M. Smith
Mr. James Stair
Mr. Joseph Stupak
Mr. Frank D. Telenko
Mr. Gerald Thompson*
Mr. Garry J. Tilley
Mr. William J. Wantling
Mr. Ronald P. Warren
Mr. Douglas Weaver
Mr. David B. Wilson
Mr. James T. Wright
Mr. Richard W. Zechman

*Individuals we were unable to make contact with.

Cite as 25 NRC 830 (1987) LBP-87-16

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Administrative Judge:

Dr. Oscar H. Paris

In the Matter of

Docket No. 70-364-MLA
(ASLBP No. 815-511-01-ML)

BABCOCK AND WILCOX
(Parks Township, Pennsylvania,
Volume Reduction Facility)

May 18, 1987

This Supplemental Decision (on Remanded Issue) reverses Condition 2 ordered by LBP-86-40, 24 NRC 841, 900 (1986), which authorized the NRC Staff to issue a license amendment to Babcock & Wilcox authorizing it to operate an incinerator at its Parks Township Facility, provided certain conditions had been met. Condition 2 required an expansion of the NRC's environmental monitoring contract with the Commonwealth of Pennsylvania to include monitoring of tritium (H-3), carbon-14 (C-14), and iodine-125 (I-125). Subsequently the Commonwealth refused to sign the contract calling for the expansion of the monitoring system, and as a result the Commission remanded LBP-86-40 to the Presiding Officer for reconsideration of Condition 2. This Supplemental Decision reverses Condition 2 on the grounds that the NRC Staff will require B&W to expand its monitoring program to include routine offsite environmental monitoring.

TECHNICAL ISSUES DISCUSSED

Releases of H-3, C-14, and I-125 by the incinerator and their health effects.
Reasons for requiring offsite environmental monitoring of these radioisotopes.
The expanded environmental monitoring that the Staff will require of B&W.

APPEARANCES

Maurice Axelrad, Michael A. Bauser, and **Frank R. Lindh, Esqs.,** Newman & Holtzinger, P.C., Washington, D.C., for the Licensee, Babcock and Wilcox.

Dennis Paul Zawacki, Esq., Pittsburgh, Pennsylvania, for the Intervenors, **John P. Bologna** and **Frutie Johnson.**

Thomas Au and **John R. McKinstry, Esqs.,** for the Commonwealth of Pennsylvania.

George E. Johnson, Esq., for the Nuclear Regulatory Commission Staff.

SUPPLEMENTAL DECISION
(On Remanded Issue)

BACKGROUND

On December 23, 1986, a Decision entered in this proceeding authorized the Director of Nuclear Material Safety and Safeguards to issue Babcock and Wilcox (B&W) an amendment to NRC Materials License No. SNM-414 authorizing B&W to operate a Volume Reduction Services Facility (VRSF) at its Parks Township, Pennsylvania, facility. LBP-86-40, 24 NRC 841, 899-900. The VRSF would consist of a supercompactor and an incinerator. The Decision authorized Staff to issue the amendment to operate the compactor immediately; the amendment to authorize operation of the incinerator, however, was ordered deferred until certain conditions had been met. *Ibid.*

Condition 2 in the Decision required that the environmental sampling contract between NRC and the Commonwealth of Pennsylvania be expanded to include sampling and analysis for tritium (H-3), carbon-14 (C-14), and iodine-125 (I-125). The sampling condition was based on a statement in a letter dated July 8, 1986, from Thomas T. Martin, Director, Division of Radiation Safety and Safeguards, NRC Region I, to Mrs. Mildred Chelko, a portion of which had been read into the record during oral argument. 24 NRC at 857, 900; Tr. 475. The statement in Mr. Martin's letter gave the impression that the contract expansion had already been agreed upon by the Commonwealth. Because there was no direct testimony regarding the expansion of the NRC/Commonwealth monitoring contract, the matter was made Condition 2 of the Decision.

On March 2, 1987, a memorandum to the Commission from Richard E. Cunningham, Director, Office of Nuclear Material Safety and Safeguards, advised the Commission and the parties to this proceeding that the Commonwealth of Pennsylvania had refused to sign the contract to implement the expanded monitoring program. On March 4, 1987, B&W responded to the NRC Staff Memorandum, and on March 18, 1987, Intervenors John P. Bologna and Frutie Johnson responded.

The Commission, which had extended the period within which it could review LPB-86-40, entered an Order on March 23, 1987 (unpublished), remanding the December 1986 Decision to this Presiding Officer for reconsideration of Condition 2. The Commission's Order directed the presiding officer to consider, *inter alia*, B&W's March 4 Response.

Because the matter of expanding the environmental monitoring contract between the NRC and the Commonwealth had not been well ventilated during oral argument, the Presiding Officer wrote to the parties on March 25, 1987, providing an opportunity for them to file written argument and, if desired, written testimony with respect to Condition 2. In addition, the Staff was requested to respond to six questions raised by the Presiding Officer in the March 25 letter. On April 15, 1987, all the parties and the Staff responded in writing. Based on the record of the December 23, 1986 Decision and the subsequent filings of the parties, this Supplemental Decision reverses Condition 2 and authorizes operation of the incinerator subject to certain other conditions.

THE MONITORING ISSUE

The purpose of Condition 2 in the 1986 decision was to ensure that the expanded environmental monitoring program for H-3, C-14, and I-125 would be instigated; these isotopes will be released in the incineration process and will not be detected by the real-time radiation monitor in the incinerator's exhaust stack. B&W argues, however, that Condition 2 should be deleted because it plans to conduct a limited offsite monitoring program and in-stack continuous sampling and analysis of H-3, C-14, and I-125. B&W believes that these efforts will enable it to comply with applicable NRC regulatory requirements. B&W's Response at 1-3; B&W's March 4 Response at 5-7. B&W's affiant, A. Scott Dam, attests that B&W also is continuing to evaluate available real-time monitors that would be sensitive enough and durable enough to monitor gaseous releases of H-3, C-14, and I-125 in the incinerator stack, but none has been found. Affidavit of A. Scott Dam on Monitoring Relating to Releases from Incinerator Operation, dated April 13, 1987, at 3. In lieu of real-time monitors, B&W will continuously collect gaseous H-3, C-14, and I-125 samples and make periodic analyses of the samples. When industrial and

institutional wastes are being processed the samples will be analyzed daily; when only nuclear reactor wastes are being processed the samples will be analyzed weekly. *Ibid.* In addition, a program consisting of weekly analyses of continuous air samples from four locations for H-3 and, analyses for H-3 in weekly grab samples of precipitation from eight locations, will be conducted for a period of 13 weeks during which institutional materials constitute a substantial part of the incinerator throughput. Only H-3 will be sampled because results from the study should be applicable to C-14 and I-125. B&W will also monitor vegetation by monthly analyses of H-3 in grab samples of vegetation collected at two locations during the growing season. The purpose of the offsite monitoring program to be carried out by B&W is to confirm that dispersion estimates are accurate or conservative and that the projections of low concentration of these isotopes in the environment are correct or conservative. *Id.* at 4-5.

Intervenors argue that offsite monitoring of H-3, C-14, and I-125 will be needed to determine the doses of these isotopes to the public because I-125 is a major contributor to the thyroid dose and H-3 and C-14 are dominant contributors of doses to other organs. They argue that these isotopes will be released from both the incinerator and the compactor, and noted that the Staff assumed in the Environmental Assessment that all H-3, C-14, and I-125 would pass through the filters and into the atmosphere. Moreover, Intervenors maintain that offsite monitoring for these isotopes is needed to determine whether B&W's operations are being conducted properly. Intervenors' Response at 2-3.

The Commonwealth's Response explains the reasons it refused to sign the contract for an expanded monitoring program. It refused to sign because of the cost of the expanded monitoring program and the additional staff it would require. Commonwealth's Response at 2-4. Inasmuch as the Commonwealth's Response does not address the question of whether offsite monitoring for H-3, C-14, and I-125 is necessary or desirable, it need not be considered further here.

The NRC Staff fully addressed the six questions put to it by the Presiding Officer's March 25, 1987 letter. In the discussion to follow, the questions will be set forth and Staff's answers will be recited verbatim if short or summarized if lengthy:

Question 1

> What considerations led the Staff to suggest that the offsite monitoring contract with the Commonwealth be expanded to include sampling for H-3, C-14, and I-125?

Staff stated that it sponsored a state confirmatory environmental monitoring contracts program in order to evaluate the quality of licensees' environmental monitoring. Staff Response at 1. The Commonwealth of Pennsylvania currently

has an NRC-funded state contract for environmental confirmatory measurements, but neither the Licensee's program nor the state contract confirmatory program includes the measurement of the three isotopes, H-3, C-14, and I-125, that are at issue here. Because the Commonwealth has participated in cooperative confirmatory environmental monitoring for five nuclear power plants as well as the B&W sites, Staff had assumed that the Commonwealth would also participate in an environmental sampling program that was modified to include H-3, C-14, and I-125 around the Parks Township site. *Id.* at 2.

Question 2

> Has the Staff considered or attempted further negotiations with the Commonwealth in an attempt to reach an agreement on the expanded contract?
>
> > Yes, the staff has had further discussions with the Commonwealth of Pennsylvania. However, for the reasons set forth in its February 5, 1987 letter, the Commonwealth has not altered its position.

Ibid.

Question 3

> Does the Staff believe that an attempt to negotiate further might be fruitful? Please give the reasons for your answer.

Staff responded affirmatively, stating that once B&W's monitoring requirements are established (*see* Response to Question 5), additional participation by the Commonwealth in the voluntary state-federal program could be explored. It noted, however, that in such future negotiations the NRC's budget constraints would have to be considered. *Ibid.*

Question 4

> How essential or desirable does Staff consider offsite monitoring for H-3, C-14, and I-125 to be?
>
> > The Staff believes that offsite monitoring for H-3, C-14, and I-125 is important as a supplement to the stack effluent monitoring program to ensure that regulatory limits are not exceeded and that environmental impacts will be negligible. Because of the very low levels of releases anticipated during normal operations, the Staff does not believe environmental monitoring will detect these radionuclides if the incinerator operates as designed. Nevertheless, obtaining such negative results is one of the purposes of

environmental monitoring. The monitoring program should, however, be able to detect releases due to improper operations or from accidents.

Id. at 3.

Question 5

If Staff considers such offsite monitors to be desirable or essential, could B&W be required to install them if the Commonwealth continues to refuse to cooperate?

Staff stated that in light of the considerations noted in answer to Question 4, it has reconsidered its previous evaluation of B&W's environmental commitments. As a result, the Staff will require B&W to expand its planned environmental monitoring program for the purpose of sampling appropriate indicator media for air and ingestion exposure pathways for H-3, C-14, and I-125. In addition to B&W's existing environmental monitoring program and the commitments made by B&W in its license amendment application for the VRSF, Staff will request B&W to submit for approval prior to authorizing operation of the incinerator a revised and expanded environmental sampling program that includes the following: (1) sampling and analysis for H-3 in air and in precipitation as part of the routine sampling program;[1] (2) periodic sampling and analysis of appropriate vegetation for H-3, C-14, and I-125; and (3) an evaluation to determine appropriate sampling locations that takes into consideration the effect of the incinerator's 50-foot stack. In addition, Staff will require particulate air sampling and periodic soil sampling to assess any buildup of particulate activity in the environment. B&W will be required, by a license condition, to establish such a program whether or not the Commonwealth expands its participation in the voluntary federal-state confirmatory monitoring program. *Ibid.*

Question 6

Does Staff consider the independence of offsite monitors from Licensee control to be important? If so, is there any alternative means of achieving such independence?

Staff considers confirmatory environmental monitoring to be desirable but not essential. It requires licensees to conduct onsite effluent and offsite environmental monitoring with or without independent verification. In fulfilling its

[1] In addition, Staff stated that it may require sampling and analysis for C-14 and I-125 in air also, depending on its evaluation of the program that B&W proposes. Staff Response at 3.

responsibility to protect public health and safety and the environment, Staff ensures the adequacy of licensees' monitoring programs through its inspection program. Should NRC's inspectors find reason to suspect or question the adequacy of B&W's program, the NRC would perform additional evaluations that could include independent sampling and analyses. *Id.* at 4.

FINDINGS OF FACT

1. An expanded environmental monitoring program is necessary to ensure that offsite releases of H-3, C-14, and I-125 remain within regulatory limits and to detect releases resulting from improper operations or accidents.

2. The Staff will require B&W to revise and expand its routine environmental monitoring sampling program to include sampling and analysis of air and precipitation for H-3 (and possibly C-14 and I-125 as well), sampling of vegetation for H-3, C-14, and I-125, and sampling of air and soil for buildup of particulate activity.

3. The expanded offsite monitoring that Staff intends to require of B&W is an adequate substitute for the expanded monitoring program required by Condition 2 of the 1986 Decision.

CONCLUSIONS OF LAW

Based upon the evidentiary record and upon the findings set forth above, the Presiding Officer makes the following conclusions of law:

1. The expanded environmental monitoring program that Staff proposes to require B&W to perform will ensure the protection of the public health and safety and the environment.

2. Given the implementation of the expanded monitoring program by B&W, Condition 2 can be deleted from LPB-86-40.

ORDER

The Director of Nuclear Material Safety and Safeguards or his designee is *authorized* to issue B&W an amendment to NRC Materials License No. SNM-414 authorizing operation of the incinerator at B&W's Volume Reduction Services Facility, provided that conditions 1, 3, 4, and 5 as set forth in LBP-86-40 have been met prior to issuance. In addition, the requirements set forth in the Findings of Fact and Conclusions of Law herein are made a condition for issuance of the license, and therefore Condition 2 of LBP-86-40 is reversed.

This Supplemental Decision shall become effective immediately. Pursuant to the Commission's Orders issued July 24, 1985, and March 23, 1987, it will become final agency action thirty (30) days after date of issuance unless the Commission, on its own motion, undertakes a review of the Decision. No petition for review will be entertained by the Commission regarding this Supplemental Decision.

PRESIDING OFFICER

Dr. Oscar H. Paris
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 18th day of May 1987.

Cite as 25 NRC 838 (1987) LBP-87-17

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman
Glenn O. Bright
Dr. James H. Carpenter

In the Matter of

Docket No. 50-271-OLA
(ASLBP No. 87-547-02-LA)

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

May 26, 1987

In a proceeding involving the proposed expansion in capacity of a spent fuel pool, the Licensing Board rules on standing and contentions, grants two petitions to intervene, and establishes schedules for discovery and oral argument.

RULES OF PRACTICE: INTERVENTION

Under NRC rules, admission to a proceeding as an intervenor requires the submission of at least one valid contention within the scope of issues set forth in the notice initiating the proceeding.

RULES OF PRACTICE: CONTENTION, ADMISSIBILITY OF

A contention must have its bases set forth with reasonable specificity. In setting forth the bases for contentions, however, a petitioner need not detail the evidence that will be offered to support each contention.

RULES OF PRACTICE: CONTENTION, ADMISSIBILITY OF

In reviewing a contention and its bases for adequacy, a licensing board must not reach the merits of the contention.

OPERATING LICENSE AMENDMENT: NO SIGNIFICANT HAZARDS CONSIDERATION

The "no significant hazards consideration" determination under 10 C.F.R. § 50.91 is a procedural determination stemming from the *Sholly* amendments to § 189a of the Atomic Energy Act. The determination can only be made by the NRC Staff or Commission and cannot be challenged in an adjudicatory licensing proceeding.

LICENSING BOARD: CONSIDERATION OF GENERIC ISSUES

An allegation falling within the scope of a licensing proceeding that relates to a proposal under review may be heard notwithstanding that it may also constitute a generic issue.

POLICY STATEMENT ON SEVERE REACTOR ACCIDENTS: REVIEW OF BEYOND-DESIGN-BASIS ACCIDENTS

The Commission's Policy Statement on Severe Reactor Accidents, 50 Fed. Reg. 32,138 (Aug. 8, 1985), explicitly removes plant-specific reviews of control or mitigation of beyond-design-basis accidents from adjudicatory consideration. Only the risk of such accidents may be explored, as contemplated by the Commission's Statement of Interim Policy on "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969," 45 Fed. Reg. 40,101 (June 13, 1980).

OPERATING LICENSE AMENDMENT: SAFETY EVALUATION REPORT

In an operating license amendment proceeding, the public is entitled to be apprised in clear terms in the Staff's SER that a particular issue is being resolved in a given manner. Where a detailed description of an issue does not appear in the application documents or in the Staff's SER, a party is not barred by *res judicata* from raising the issue in a later proceeding.

NEPA: ENVIRONMENTAL ASSESSMENT

If the NRC Staff were to determine, pursuant to 10 C.F.R. § 51.22(c)(9), that an environmental assessment need not be prepared because a proposed action involves "no significant hazards consideration," that determination would become litigable under 10 C.F.R. § 51.104(b).

NEPA: ENVIRONMENTAL IMPACT STATEMENT

Although there is no *per se* requirement for an environmental impact statement in a proceeding involving the expansion in capacity of a spent fuel pool, there is also no categorical exclusion. Whether such a statement need be prepared is a litigable question.

NEPA: LONG-TERM WASTE STORAGE

The possibilities or effects of a reactor site being used as a long-term or open-ended storage facility for high-level radioactive waste may not be considered in a licensing proceeding seeking expansion of the storage capacity of a spent fuel pool. 10 C.F.R. §§ 2.758(a), 51.23, and 51.95(b).

NEPA: ENVIRONMENTAL ASSESSMENT

The adequacy of an environmental assessment may be litigated pursuant to 10 C.F.R. § 51.104(b). However, a contention questioning the potential inadequacy of such assessment may not be submitted prior to the issuance of such assessment. Instead, it may only be considered as a late-filed contention following issuance of the assessment. *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 466-67 (1982), *rev'd in part on other grounds*, CLI-83-19, 17 NRC 1041 (1983).

NEPA: ENVIRONMENTAL REPORT

The Commission encourages the litigation of environmental questions as early as possible in a proceeding. Notwithstanding the lack of any formal requirement for an applicant's environmental report in a proceeding involving expansion of the capacity of a spent fuel pool, a contention questioning the adequacy of an applicant's environmental information submitted in support of such expansion may be accepted.

LICENSING BOARD: JURISDICTION

If a licensing board in a license amendment proceeding were to reject all proposed contentions of every petitioner for intervention, the board would have to dismiss the petitioners and terminate the proceeding. Following termination, it would lose its jurisdiction to consider late-filed contentions.

NEPA: PROCEDURES

Interpretation of NRC rules to permit the timely filing of safety-based contentions at a given time but to allow environmental contentions only to be submitted later, on a late-filed basis, constitutes an improper disparity between the litigation of Atomic Energy Act and NEPA issues. *Calvert Cliffs' Coordinating Committee v. AEC*, 449 F.2d 1109, 1117 (1971).

NEPA: CONSIDERATION OF ALTERNATIVES

An agency's evaluation of alternatives is governed by two sections of NEPA — § 102(2)(C) when an impact statement is required, and § 102(2)(E) whether or not an impact statement is prepared.

PREHEARING CONFERENCE ORDER
(Rulings on Standing, Contentions, Schedules)

This proceeding involves the proposed expansion of the capacity of the spent fuel pool at the Vermont Yankee Nuclear Power Station, a boiling water reactor located in Vernon, Vermont, approximately 5 miles south of Brattleboro, Vermont. The early history of the proceeding is recounted in our Memorandum and Order (Schedules for Further Filings and for Prehearing Conference), LBP-87-7, 25 NRC 116 (1987). As there set forth, three requests for a hearing and petitions for intervention have been filed — by the New England Coalition on Nuclear Pollution (NECNP), the State of Vermont (Vermont), and James M. Shannon, Attorney General of the Commonwealth of Massachusetts (Massachusetts).

We scheduled a prehearing conference for April 21-22, 1987, in Brattleboro, Vermont, to consider the petitions before us.[1] Represented at the conference

[1] A formal Notice of Prehearing Conference was issued on March 11, 1987, and published at 52 Fed. Reg. 8393 (Mar. 17, 1987).

were the three petitioners, the Applicant[2] (Vermont Yankee Nuclear Power Corporation), and the NRC Staff. (The State of New Hampshire, which has thus far not filed any intervention petition, also sent a representative to the conference.)

Following is a description of the matters considered at the conference, and rulings stemming therefrom. For reasons set forth below, we are admitting two of the petitioners as parties to the proceeding (NECNP and Massachusetts) and are permitting the third (Vermont) to participate as an interested State (if it wishes to do so).

I. STANDING

As set forth in LBP-87-7, two of the petitioners for intervention (Vermont and Massachusetts) had successfully demonstrated their standing to participate in the proceeding, whereas the other (NECNP) needed to file additional information in order to perfect its showing of standing (namely, authorization by at least one NECNP member living near the plant for NECNP to represent his or her interests in the proceeding). NECNP timely filed such information.[3] Neither the Applicant nor the NRC Staff objected to NECNP's showing of standing.[4] We find that NECNP has adequately demonstrated its standing to participate in this proceeding.

II. CONTENTIONS

Under NRC rules, admission to a proceeding as an intervenor requires the submission of at least one valid contention, within the scope of issues set forth in the notice initiating the proceeding. 10 C.F.R. § 2.714(b); *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-316, 3 NRC 167, 170 (1976). Such a contention must have its "bases . . . set forth with reasonable specificity" (10 C.F.R. § 2.714(b)). In setting forth the bases for contentions, however, a petitioner need not detail the evidence that will be offered to support each contention. *Mississippi Power & Light*

---

[2] Vermont Yankee Nuclear Power Corp. is seeking an amendment to its operating license in this proceeding. Although it refers to itself as a licensee (presumably by virtue of its possession of an operating license), no modification of its license is being sought by any party or petitioner, except the foregoing amendment. In the posture of this proceeding, therefore, Vermont Yankee is more appropriately deemed an applicant for new authority rather than a licensee. We will thus refer to it as "Applicant."

[3] "New England Coalition on Nuclear Pollution's Response to Board Order of February 27, 1987: Statement of Contentions and Standing," dated March 30, 1987 (hereinafter "NECNP Contentions").

[4] Tr. 9 (Applicant); "NRC Staff Response to Contentions of the State of Vermont, Commonwealth of Massachusetts and New England Coalition on Nuclear Pollution," dated April 13, 1987 (hereinafter "Staff Response"), at 16.

Co. (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-130, 6 AEC 423, 426 (1973). Furthermore, in reviewing a contention and its bases for adequacy, a Board must not reach the merits of a contention. *Houston Lighting and Power Co.* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-590, 11 NRC 542, 548 (1980); *Grand Gulf*, ALAB-130, *supra*. We need only determine "whether (1) the requisite specificity exists; (2) there has been an adequate delineation of the basis for the contention; and (3) the issue sought to be raised is cognizable in an individual licensing proceeding" (*Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), ALAB-182, 7 AEC 210, 216-17 (1974)). If those criteria are satisfied, the contention is admissible "irrespective of whether resort to extrinsic evidence might establish the contention to be insubstantial" (*id.* at 217).

All three petitioners submitted proposed contentions on a timely basis. NECNP submitted six such contentions,[5] Vermont submitted four,[6] and Massachusetts two.[7] The Applicant and Staff responded to the contentions,[8] each claiming that no contention of any petitioner was valid. NECNP filed a reply to the responses of the Applicant and Staff.[9]

Certain of the proposed contentions overlap in their coverage. As a result, at the conference we discussed the various contentions by subject matter, using the NECNP contentions as a point of departure (since they to a great degree envelope the other parties' contentions).[10]

A. Safety-Based Contentions

There are several categories of safety-based contentions (i.e., contentions based on requirements of the Atomic Energy Act and implementing regulations) submitted by one or more of the petitioners. All three of them have submitted "severe-accident" contentions — claiming in effect that the facility is not adequately designed to handle the consequences of certain greater-than-design-

---

[5] "NECNP Contentions," *supra* note 3. Although numbered as NECNP Contentions 1-5, we regard Contention 5 as including two contentions and are treating it as such.

[6] "Introductory Statement and Contentions of the State of Vermont," dated March 30, 1987 (hereinafter "Vermont Contentions"). We view ¶ III of this document to include two contentions (III.A and III.B) and ¶¶ IV and V to include one each.

[7] "Contentions of the Commonwealth of Massachusetts," dated March 30, 1987 (hereinafter "Massachusetts Contentions").

[8] Licensee's Response to the Contention[s] of the State of Vermont, the Commonwealth of Massachusetts, and New England Coalition on Nuclear Pollution, separate documents each dated April 9, 1987 (hereinafter "Applicant's Response to . . ."); Staff Response, *supra* note 4.

[9] "New England Coalition on Nuclear Pollution's Response to Objections to Contentions," dated April 16, 1987 (hereinafter "NECNP Response").

[10] Vermont and Massachusetts did not object to this approach (Tr. 13). We separately discussed the Vermont contentions (¶¶ III.A and III.B) which were different from any of NECNP's contentions.

basis accidents.[11] NECNP has submitted two contentions questioning the adequacy of the cooling system for the expanded-capacity spent fuel pool.[12] Vermont additionally has submitted two contentions the terms of which are directed at the potential "no significant hazards consideration" determination which NRC may be called upon to address.[13]

1. At the outset, we turn to Vermont's contentions directed at the "no significant hazards consideration" determination. As we understand it, Vermont has in mind the determination that the Commission may make under 10 C.F.R. § 50.91.

That determination is a procedural one stemming from the so-called *Sholly* amendments to § 189a of the Atomic Energy Act, 42 U.S.C. § 2239(a). The determination is one that can only be made by the NRC Staff or the Commission. When such a finding has been made, the NRC may make effective a proposed license amendment prior to any hearing on the request. The determination itself, however, cannot be challenged in a licensing proceeding of this type:

> No petition or other request for review of or hearing on the staff's significant hazards consideration determination will be entertained by the Commission. The staff's determination is final, subject only to the Commission's discretion, on its own initiative, to review the determination.

10 C.F.R. § 50.58(b)(6) (1987); *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-86-12, 24 NRC 1, 4 (1986), *rev'd in part on other grounds, San Luis Obispo Mothers for Peace v. NRC*, 799 F.2d 1268 (9th Cir. 1986).

For this reason, we agree with the Applicant and NRC Staff that, to the extent Vermont's Contentions III.A and III.B seek to affect the Staff's "no significant hazards consideration" determination under § 50.91, they are beyond our jurisdiction and must be rejected on that ground.[14]

2. The "severe accident" contentions of NECNP, Vermont, and Massachusetts all claim essentially that the consequences of severe accidents will be exacerbated by the expansion in capacity of the spent fuel pool. In none of these contentions (NECNP Contentions 1 and 2, Vermont Contentions, ¶ V, and Massachusetts Contention I) is it alleged that the planned expansion fails to meet the governing safety requirements of 10 C.F.R. Part 50 or applicable regulatory guidelines.

---

[11] NECNP Contentions 1 and 2; Vermont Contentions, ¶ V; Massachusetts Contention I (except to the extent that it asserts "risk" questions).

[12] NECNP Contentions 3 and 4.

[13] Vermont Contentions, ¶¶ III.A and III.B.

[14] To the extent these contentions may raise environmental questions, *see* pp. 860-61, *infra*.

a. In its Contentions 1 and 2, NECNP claims that the exacerbated consequences pose an "undue risk to public health and safety," are contrary to the Commission's Policy Statement on Severe Accidents, and that the expansion should therefore be disapproved. It bases its exacerbated-consequences claims on a combination of circumstances: (1) the greater likelihood of failure in the event of an accident of a GE Mark I BWR containment (as is used at Vermont Yankee) as contrasted with other designs; (2) the location of the pool in the reactor building, which is not designed to take severe accident loads; (3) the failure of the pool or its cooling systems to be designed to accommodate such severe accident loads; (4) the possibility of hydrogen leakage to the reactor building in such an accident, resulting in hydrogen deflagration and detonation; and (5) an increase in potential consequences of such an accident by the 40% increase in the amount of fuel stored, particularly because of the increased inventory of cesium and strontium.

In evaluating the litigability of these claims, we note first that the concept of "risk" to which NECNP refers falls under the purview of both the Atomic Energy Act and the National Environmental Policy Act (NEPA). By incorporating by reference these same claims into its Contention 5, NECNP has raised the NEPA aspects of risk, and we will discuss those aspects in connection with the EIS portion of Contention 5 (*see* pp. 853-55, *infra*). As NECNP states, Contention 1 clearly raises Atomic Energy Act claims based on the concept of "undue risk" appearing in 10 C.F.R. Part 50, Appendix A, and by NRC's use of those terms to describe the Atomic Energy Act's statutory standard of "adequate protection to the health and safety of the public." 42 U.S.C. § 2232(a).[15] Moreover, as we shall see, the regulatory standards for accepting risk-based contentions differ significantly depending on the statutory foundation for the contention.

As for the opposition to Contention 1, we must first reject the Applicant's claim that the contention challenges only those aspects of the facility's design that were reviewed earlier and hence (according to the Applicant) are not subject to challenge in this proceeding. The contention raises questions as to the ability of the facility to withstand additional fission product and heat loads allegedly imposed by the sought amendment. As such, it falls within the ambit of this proceeding. For the same reason, we reject the Applicant's claim that the increased consequences relate only to the "no significant hazards consideration" determination over which we have no jurisdiction. As NECNP points out, while the contention may be relevant to the "no significant hazards consideration" determination, it is clearly also relevant to the "undue risk to public health and safety" questions that the amendment may create and we may consider.[16]

---

[15] NECNP Response, *supra* note 9, at 1-2.

[16] *Id.* at 3-4. Moreover, as set forth *infra* p. 861, under certain circumstances we may have authority to review a "no significant hazards consideration" finding by the Staff.

We also reject the Staff's claim that certain elements of NECNP's hypothesized accident raise generic issues that have no particular applicability to Vermont Yankee or to the proposed amendment. NECNP is setting forth a proposed accident scenario which includes enhanced consequences allegedly resulting from the increased storage capacity of the spent fuel pool. That this allegation falls within the scope of this proceeding is obvious; whether it has merit may not be considered by us at this stage of the proceeding.[17]

We find, however, that we must reject this contention for a different reason. The accident scenario that is sought to be considered is clearly a "beyond design basis accident."[18] There is no allegation (in this contention) that the proposed license amendment fails to meet one or more safety standards (regulation or other criteria). The Commission's Policy Statement on Severe Reactor Accidents, 50 Fed. Reg. 32,138, 32,144 (Aug. 8, 1985), explicitly removes plant-specific reviews of control or mitigation of severe accidents from the review of operating license applications. The same policy "also applies to any hearing proceedings that might arise for an operating reactor" — such as the instant proceeding. As set forth by the Commission for these proceedings:

> Individual licensing proceedings are not appropriate forums for a broad examination of the Commission's regulatory policies relating to evaluation, control and mitigation of accidents more severe than the design basis (Class 9). . . . The Commission believes that considerations which go . . . to the possible need for safety measures to control or mitigate severe accidents in addition to those required for conformance with the Commission's safety regulations or conformance with the Clarification of TMI Action Plan Requirements, should not be addressed in case-related safety hearings.

50 Fed. Reg. at 32,144-45 (footnote omitted).

Litigation of NECNP Contention 1 as a safety-based contention seeking denial of the proposed amendment as a means of controlling or mitigating the alleged enhanced consequences of a beyond-design-basis accident clearly is proscribed by the Policy Statement. (As a risk contention under NEPA, however, we reach a different conclusion.[19]) NECNP Contention 2, which seeks to examine whether the proposed amendment is consistent with the Policy Statement itself, may be a subject that the NRC Staff may examine under the Policy Statement. The

---

[17] To the extent that the Staff is implying that a generic issue cannot be considered in this proceeding, that claim also must be rejected. *Virginia Electric and Power Co.* (North Anna Power Station, Units 1 and 2), ALAB-491, 8 NRC 245, 248 (1978); *Gulf States Utilities Co.* (River Bend Station, Units 1 and 2), ALAB-444, 6 NRC 760 (1977); *cf. Consumers Power Co.* (Midland Plant, Units 1 and 2), LBP-82-63, 16 NRC 571, 584-85 (1982); *id.*, LBP-82-118, 16 NRC 2034, 2037-39 (1982).

[18] As additional support for this contention, NECNP has pointed to the Brookhaven National Laboratory Draft Report on "Beyond Design-Basis Accidents in Spent Fuel Pools." NECNP Response, *supra* note 9, at 3 n.1.

[19] The Policy Statement permits us to examine the *risk* of the type of accident sought to be litigated by NECNP Contentions 1 and 2 as well as by Massachusetts Contention I. In accepting the EIS portion of NECNP Contention 5 (*infra* pp. 853-55), we are examining such risk.

portions of the Policy Statement cited by NECNP define activities that the Staff may undertake.[20] But consideration by a licensing board in an adjudicatory proceeding is barred by the hearing provisions quoted above. For that reason, we must reject both NECNP Contentions 1 and 2.

b. In its Contention I, Massachusetts also seeks to litigate the alleged increase in consequences of a severe accident not dissimilar to the accident posed by NECNP. To the extent this contention seeks mitigative or control measures for severe accidents, it must be rejected for reasons comparable to those underlying our ruling on NECNP Contentions 1 and 2. (To the extent the contention raises risk issues, see our discussion of NECNP Contention 5, *infra* pp. 854-56.)

c. For its part, Vermont Contentions, ¶ V, likewise seeks to litigate the enhanced consequences of a "severe" accident. But it fails to define, in other than the most general terms, which accidents it has in mind. The two accident sequences that it portrays are so general that a party could not properly respond. Accordingly, for lack of a particularized basis (as well as the proscriptions of the Policy Statement), we reject Vermont Contentions, ¶ V.

3. NECNP's Contentions 3 and 4 raise questions concerning the effect of the amendment on the facility's system for maintaining the temperature of the spent fuel pool water within certain specified limits. Contention 3 claims that the system as proposed "violates the single failure criterion." Contention 4 claims that the system would "reduc[e] the safety margin and increas[e] the probability of a radioactive release from the pool." The pool cooling system, upon which both of these contentions focus, consists of the dedicated spent fuel pool cooling pumps augmented or superseded in specified instances by one train of the reactor's residual heat removal (RHR) system.

a. Citing the relevant portions of the Applicant's expansion application, together with the Applicant's responses to certain Staff questions, NECNP in Contention 3 maintains that the Applicant has not established that its proposed method of spent fuel pool cooling ensures that both the fuel pool cooling system and the RHR system are single-failure proof.[21] The Applicant and Staff each would have us reject this contention as lacking a nexus to the present application and, accordingly, not within the ambit of issues properly before us.

The Applicant describes the augmented cooling system as "a question of original plant design."[22] The Applicant and Staff both claim that, under existing technical specifications, the reactor may utilize the RHR system to augment the fuel pool cooling system for all periods during which the Applicant seeks to use it. They assert that no further modification of the technical specifications is

---

[20] NECNP Contentions at 5-6.
[21] *Id.* at 6-7.
[22] Applicant Response to NECNP at 3.

required for the current application. Absent any required change, they perceive the use of the RHR system as not within the scope of the presently sought amendment.[23] In response, NECNP asserts that, at the very least, the RHR system will have to be used to a greater extent than previously and that the Applicant had previously sought authority to use the RHR system for pool cooling only for standby or backup purposes.[24]

Based on the material before us, we have found no review of or authorization for use of the RHR system for cooling of the spent fuel pool at the time of the original operating license authorization.[25] As far as we can ascertain, use of the RHR system to augment the spent fuel pool cooling system was first considered in conjunction with a 1977 application to increase the storage capacity of the spent fuel pool.[26] NECNP was, of course, a party to the 1977 license amendment proceeding. The question, therefore, is whether it should be barred at this time from raising an issue which, according to the Applicant, NECNP could have raised in the 1977 proceeding.

The record of the 1977 proceeding appears to support NECNP's position that, during that proceeding, the RHR system was considered only for backup purposes or in situations where a greater-than-usual amount of fuel was offloaded from the reactor — for example, a full-core offload. Thus, the 1977 expansion application states, with regard to the adequacy of the spent fuel pool cooling system to handle the heat load resulting from additional fuel assemblies:

> The heat load resulting from the presence of additional spent fuel assemblies is within the capacity of the existing cooling system.
>
> * * *
>
> In the event of the loss of primary spent fuel pool forced circulation cooling, the residual heat removal system can be cross connected to the spent fuel pool to provide the necessary cooling flow.[27]

Moreover, the Staff's analysis of spent fuel pool cooling in connection with the 1977 expansion discussed the use of the RHR system only in conjunction with "larger than normal batches of spent fuel" — more particularly, situations where a full-core offload is necessary.[28]

According to the present application, the RHR cooling system would have to be used much more frequently than for full-core offload situations. In fact, the

---

[23] *Id.* at 3-4; Staff Response at 18-19.
[24] Tr. 54.
[25] *See* Staff's SER, dated June 1, 1971, at 58 (§ 9.2).
[26] The Applicant concedes as much (Tr. 62, 63).
[27] Application letter from Vermont Yankee to NRC Staff, dated November 5, 1976, Enclosure 2 at 3, 6. We have found no other submission by the Applicant providing any further details concerning proposed usage of the RHR system for cooling the spent fuel pool.
[28] Staff SER, dated June 10, 1977, at 3-4; SER, Supp. 1, dated June 20, 1977, at 1-2.

Applicant seemed to indicate that the RHR system not only would be used but in fact is being used for every fuel offload.[29] There apparently are no technical specifications that define limits for the use of the RHR system for spent fuel pool cooling during periods when the reactor is in a cold shutdown mode. But did NECNP (which was a party to the 1977 proceeding involving the first capacity expansion of the spent fuel pool) have a fair opportunity to challenge the use of the RHR system for use other than for full-core offload or other later-than-normal offload situations?

NECNP claims it did not have such an opportunity,[30] and we are inclined to agree. Indeed, the public is entitled to be apprised in clear terms in the Staff's SER that a particular issue is being resolved in a given manner. *See River Bend Station*, ALAB-444, *supra*, 6 NRC at 774-75. The 1977 SER discussed the use of the RHR system only for extra-normal fuel offloads, such as full-core offloads which are likely to occur only three or four times during the life of a reactor. As indicated by NECNP, the current application presents a question that is different in degree (if not in kind) from the 1977 issue.[31] Notwithstanding the current status of the technical specifications, NECNP has not previously had a fair chance to challenge the proposed routine (yearly) use of the RHR system for cooling the spent fuel pool.[32]

During the prehearing conference, the Applicant also argued that the single-failure criterion does not apply to the spent fuel pool cooling system.[33] It reasoned that Criterion 61, "Fuel storage and handling and radioactivity control," which governs spent fuel pools, does not refer to the single-failure criterion, whereas other criteria — e.g., Criterion 38, referring to "Containment heat removal" — specifically incorporate the single-failure criterion where applicable.[34]

NECNP did not cite any particular design criterion as being applicable but referred instead to the introductory portion of the General Design Criteria which states that the definition of systems subject to the single-failure criterion is still under development.[35] NECNP also claims that where no particular rule governs a subject, the applicable standard for judging the admissibility of contentions is whether "the matter poses a significant safety problem." *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-86-21, 23 NRC 849, 852 (1986). As for the Staff, it asserts that Criterion 44, "Cooling

---

[29] Tr. 59, 61.
[30] Tr. 78.
[31] Tr. 55.
[32] We are not raising any question as to whether the Staff in 1977 should have authorized use of the RH system for other than full-core offload situations. We are only determining whether a party such as NECNP should be barred by *res judicata* principles from raising the issue at this time.
[33] Tr. 64, 67.
[34] Tr. 58.
[35] Tr. 57-58.

water," is applicable to spent fuel pools but, at the present time, is applied by the Staff only to "active" components; it has under study whether to apply the single-failure criterion to "passive" components.[36] In addition the Applicant acknowledged that the current Standard Review Plan (which is not a regulation) applies the single-failure criterion to spent fuel pools.[37]

Given the differences in opinion as to whether the single-failure criterion is or should be applicable, either through regulatory requirement or Staff guidance, we will not at this time rule out NECNP Contention 3 on legal grounds. Because NECNP did not have a fair chance to raise the issue at an earlier date, we will also not bar it on that basis. We accordingly will admit NECNP Contention 3, in the form set forth as Contention 1 in Attachment A to this Order.

We note that the contention raises questions as to the applicability of the single-failure criterion both to the spent fuel pool cooling system and to the RHR system. The Applicant ackrowledges that the criterion is applicable to the RHR system when the system is being used as part of the ECCS system but not during periods when the reactor is in cold shutdown (during which the RHR system could and would be used for spent fuel pool cooling).[38] NECNP claims, however, that the RHR system may be needed for decay heat removal even when the reactor is in cold shutdown; and under those circumstances, were one train of the RHR system being used for spent fuel pool cooling, the required redundancy would not be achieved.[39] A recently issued licensing board opinion (in another proceeding) acknowledged a paucity of information concerning accidents that may be initiated during periods of reactor shutdown. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), LBP-87-12, 25 NRC 324, 333-34, 338 (1987). We would expect that the need for a redundant RHR system for decay heat removal purposes during periods of cold shutdown would be explored as part of this contention.

In addition, the Applicant noted that the RHR system could be used for spent fuel pool cooling for limited periods of time during which the reactor is in full operation.[40] We read the contention as broad enough to encompass the applicability of the single-failure criterion during such periods.

Finally, the contention as submitted questioned RHR system usage as proposed to keep pool water at a bulk temperature of 150°F. That temperature was used in the 1977 evaluation of the pool, and it was carried over into the current application. The Staff's current Standard Review Plan, however, which was

---

[36] Tr. 68. The Applicant disagrees with the Staff as to the applicability of Criterion 44 to spent fuel pools (*id.*). The Applicant and Staff agree that Criteria 60, 62, 63, and 64 (as well as 61) govern spent fuel pools (Tr. 69) but none except 61 are relevant to NECNP's proposed contention.

[37] Tr. 69. The Staff is using the current Standard Review Plan to review the instant application (Tr. 74).

[38] Tr. 59-60, 61.

[39] NECNP Response at 6-7; Tr. 77.

[40] Applicant's Response to NECNP at 3-4 n.1; Tr. 72-73, 79-81, 83-86.

adopted in 1981, provides that pool water temperature be kept to 140°F, except in the event of "abnormal heat load." SRP (NUREG-0800), Rev. July 1981, § 9.1.3, ¶ III.1.d and h. In litigating this contention, we propose to consider the applicable temperature to be 140°F, unless the Applicant can demonstrate why some other temperature should be controlling.

b. As for NECNP Contention 4, the other cooling-system contention, it relies on the same basis as Contention 3 but claims, instead, that the system as proposed lessens the margin of safety currently available. Margins of safety, however, are not prescribed by regulation or guidelines. They are primarily relevant to the "no significant hazards consideration" finding which, as we have stated earlier, is not within our jurisdiction to review. If a system meets applicable public health and safety criteria or guidelines, it perforce will have an adequate safety margin for licensing purposes. (That question, of course, is part of Contention 3, which we have accepted.) Accordingly, for jurisdictional reasons, we reject NECNP Contention 4.

We note, however, that if the Staff were to determine under 10 C.F.R. § 51.22(c)(9) that an EA need not be prepared for the proposed amendment because of the lack of significant hazards consideration (*see infra* note 41), a reduction in safety margin might be relevant and would be litigable under 10 C.F.R. § 51.104(b). A proposed contention such as NECNP Contention 4 might then become litigable, and we would consider doing so subject to appropriate standards. *See* ¶ II.B.6 of the Order, *infra* p. 861.

B. Environmental Contentions

Each of the three petitioners has submitted at least one environmental contention. In general, they focus upon NRC's failure to have prepared an Environmental Impact Statement (EIS) and/or an Environmental Assessment (EA). NRC concededly has not at this time prepared either an EIS or an EA — indeed, the Staff reports that an EA is being prepared but will not be issued until July 1, 1987, at the earliest (Tr. 91-92).[41]

1. The broadest of the environmental contentions is NECNP Contention 5, which asserts generally that the NRC has not complied with the provisions of the National Environmental Policy Act (NEPA) or of its own rules in 10 C.F.R. Part 51 (which implement NRC's compliance with the requirements of NEPA). As bases, NECNP cites (a) the failure of NRC to prepare an EIS reflecting the environmental impact of the proposal and discussing alternatives, and (b) the failure of NRC to prepare, as a minimum, an EA. (As noted earlier, at note 5, we regard NECNP Contention 5 as constituting two separate contentions.)

---

[41] The Staff also indicated, however, that this application may not require an EA, since it may be categorically excluded by 10 C.F.R. § 51.22(c)(9). *See* Tr. 110. We will discuss the ramifications of this position, *infra* p. 861.

In this connection, NECNP describes the areas of specific concern to it as the increased health risks (as set forth in its health-and-safety contentions) and the consideration of alternatives — particularly dry-cask storage and independent pool storage, both of which allegedly provide safety advantages over the proposed expansion in capacity of the spent fuel pool.

Vermont also seeks an EIS. Its sole basis is the alleged lack of availability of long-term waste disposal facilities and the resulting open-ended storage at the Vermont Yankee site (Vermont Contentions, ¶ IV). For its part, Massachusetts Contention II complains of a failure to consider alternatives such as a dry spent fuel storage facility (i.e., dry-cask storage) or an in-ground spent fuel pool — essentially the same alternatives that NECNP seeks to have examined. As a basis, Massachusetts cites the possibility of a severe accident, as defined in its contention on that subject, and asserts that an EA has not been prepared by the Staff. Although Massachusetts does not specifically seek an EIS, the accident it hypothesizes as a basis for an EA (set forth in Massachusetts Contention I) is essentially the same as that hypothesized by NECNP as grounds for issuance of an EIS. Moreover, Massachusetts has indicated that it is seeking an EA only if an EIS is not to be prepared (Tr. 126). Therefore, we will discuss the similar accident claims of Massachusetts and NECNP in our discussion of the EIS portion of NECNP Contention 5.

2. The Applicant and Staff each find all of these proposed contentions unacceptable. They first observe that there is no *per se* requirement that an EIS be prepared in a case such as this (*citing* 10 C.F.R. § 51.20) and that the NRC determines whether to do so on a case-by-case basis (*citing Diablo Canyon*, CLI-86-12, *supra*, 24 NRC at 12). The Staff has not yet made such a determination in this case. The Applicant and Staff go on to assert that, in order to challenge a determination not to prepare an EIS, a petitioner must allege some specific deficiency in the environmental evaluation, not just a generalized disagreement with the Staff's conclusion (*citing Diablo Canyon*, CLI-86-12, *supra*), and that NECNP and Vermont have advanced only generalized conclusory statements as their bases for why an EIS should be prepared. As for Vermont, the Applicant adds that the basis advanced is outside the scope of matters that we are authorized to consider, pursuant to 10 C.F.R. § 51.23.

With respect to the EA contentions of NECNP and Massachusetts, the Applicant takes the position that, since the EA has not yet been issued, a petitioner cannot advance a contention that purports to challenge an EA. It views the EA allegations as an effort to have us direct the Staff with respect to a matter committed to the Staff's jurisdiction and hence beyond our authority. Moreover, with regard to NECNP's EA contention, the Applicant regards it as the equivalent of a "bookmark article" in a Town Meeting Warrant, a practice it deems to be not an accepted practice in NRC proceedings (*citing Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 466-67 (1982),

rev'd in part on other grounds, CLI-83-19, 17 NRC 1041 (1983)). In response to our inquiry, the Applicant also expressed reservations whether a petitioner may formulate environmental contentions based on the Applicant's submissions, since there is no regulatory requirement in a case such as this for an applicant to submit any such information (Tr. 93, 108).

The Staff takes a somewhat different approach to NECNP's and Massachusetts' EA contentions. It states that, at this stage of the proceeding, these contentions should be directed to perceived deficiencies in the Applicant's environmental report and not to the Staff's yet-to-be-issued document (*citing Catawba*, CLI-83-19, *supra*, 17 NRC at 1049). It adds that any challenge to the Staff's EA advanced after issuance of the EA would have to be considered as late filed, under the criteria in 10 C.F.R. § 2.714(a) (*citing Catawba*, CLI-83-19, *supra*, 17 NRC at 1045, 1048). In response to our inquiry, however, the Staff recognized that an environmental report need not be filed in a case such as this (Tr. 92-93) and also, for that reason, questioned whether a petitioner could formulate an environmental contention based on information submitted by the Applicant (Tr. 114).

3. Turning first to the proposed contentions seeking preparation by NRC of an EIS, governing rules appear to permit litigation of an issue of this type (10 C.F.R. § 51.104(a) or (b)). Similar contentions have been accepted in a number of spent fuel pool expansion cases, although (insofar as we can determine) there is no such case where an EIS has been found to be required. *See, e.g., Portland General Electric Co.* (Trojan Nuclear Plant), ALAB-531, 9 NRC 263, 264-68 (1979); *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), LBP-77-51, 6 NRC 265, 267-74 (1977), *modified on other grounds*, ALAB-455, 7 NRC 41 (1978).

However, there is no categorical exclusion to considering contentions seeking an EIS in spent fuel pool expansion cases (*see* 10 C.F.R § 51.22(c)). Indeed, the Commission has stressed that this determination is open for case-by-case consideration. *Diablo Canyon*, CLI-86-12, *supra*, 24 NRC at 12. Moreover, to raise a contention of this type, a petitioner must allege some specific deficiency in the Staff's environmental review (where that has been performed) or a specific demonstration of sufficient impacts to warrant preparation of an EIS (*id.*). Thus, if a petitioner advances adequate reasons in a particular case why there may be sufficient environmental impact resulting from a proposed action to warrant an EIS, the contention may be accepted, irrespective of the validity of those reasons.

The reasons advanced by Vermont cannot serve as a basis for a valid contention. They seek to examine the possibilities or effects of the Vermont Yankee site being used as a long-term or open-ended storage facility. However, we are precluded by regulation from entertaining or considering a contention embody-

ing those concerns in a proceeding such as this. *See* 10 C.F.R. §§ 2.758(a), 51.23, and 51.95(b). For that reason, we reject Vermont's Contention IV.

On the other hand, NECNP's major reason for seeking an EIS is to discuss a particular accident scenario: the same accident scenario the safety aspects of which it sought to examine in its Contention 1.[42] (Massachusetts seeks to explore the environmental impacts of a similar accident in its Contention I.) In support of this scenario, NECNP relies on several studies or draft studies — in particular, NUREG-1150, draft dated February 1987; Brookhaven Report A-3825R, draft dated October 1986; NUREG/CR-4624; and NUREG-1250, draft dated February 1987.

At the outset, we must reject the Applicant's claim that NECNP has presented "nothing more than generalized statements to the effect that the proposed rerack is a 'major federal action significantly affecting the quality of the human environment' and would increase the risk to the public health and safety."[43] The scenario described above (which is incorporated by NECNP through reference to its safety contentions) is considerably more than that and is sufficient to constitute a basis set forth with reasonable specificity.[44] Assuming the basis is not objectionable for some other reason, it is sufficient to undergird an acceptable contention.

The Staff also claims that this contention has not been set forth with adequate basis and specificity. We reject that claim for the same reason as we rejected the Applicant's claim. However, by reference to its arguments on Vermont's severe accident contention (which we are designating as Vermont Contention V), the Staff also raises the question whether a contention of this type is consistent with the Commission's Policy Statement on Severe Accidents.

We earlier held that the Policy Statement precluded us from examining measures to control or mitigate the proffered accident, which is an accident more severe than the design-basis accident for this facility. The Staff would also read the Policy Statement as barring the examination of this accident under NEPA, citing the Appeal Board's statement in *Limerick*, ALAB-819, *supra*, 22 NRC at 696 n.10, that consideration of such accidents need not be undertaken under NEPA, as "NEPA could not logically require more than the safety provisions of the Atomic Energy Act."

We do not read the litigation bar of the Policy Statement to extend as broadly as the Staff suggests. We construe it to apply only to the consideration of control or mitigative measures to counter the effects of such an accident.[45] It does not

---

[42] NECNP Contentions at 2-3, 8-9. *See* p. 845, *supra*, for a further description of this accident scenario.

[43] Licensee's Response to Contentions of NECNP at 5.

[44] *See, e.g., Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), ALAB-819, 22 NRC 681, 693-95 (1985).

[45] The Appeal Board's statement in *Limerick*, ALAB-819, quoted above, related to a contention that sought to explore certain "design alternatives to *mitigate* severe accidents." 22 NRC at 692 (emphasis supplied).

extend to the NEPA-mandated consideration of the *risks* of such an accident. In the explicit language of the Policy Statement:

> The Commission has announced a policy regarding Class 9 environmental reviews and hearings in its Statement of Interim Policy on "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969" (45 FR 40101, June 13, 1980) and *expects to continue* this policy. The environmental issues deal essentially with the *estimation and description of the risk* of severe accidents.

50 Fed. Reg. 32,138, 32,144-45 (Aug. 8, 1985) (emphasis supplied). The Commission stressed that only "considerations which go *beyond that* to the possible need for safety measures to control or mitigate severe accidents in addition to those required for conformance with the Commission's safety regulations . . . should not be addressed in case-related safety hearings." *Id.* at 32,145 (emphasis supplied).

This language clearly leaves open, to a limited degree, the examination of the risks of a beyond-design-basis accident. NECNP clearly wishes to explore such risks[46] (even though its contention probably goes further than that). We will admit the EIS portion of its proposed Contention 5 to the extent it asserts that the particular accident scenario set forth (*see supra* p. 845) represents an impact serious enough to warrant an EIS to discuss its risk. The discussion of risk would be undertaken as provided by the Commission's Interim Policy Statement on "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969," 45 Fed. Reg. 40,101 (June 13, 1980). The contention is set forth as Contention 2 in Attachment A to this Order. (Because of the similarity of the accident scenario posed by Massachusetts Contention I, we will consider Massachusetts to be a joint sponsor of this contention.)

4.a. In seeking to introduce their EA contentions (both of which by their terms seek a Staff analysis of two specified alternatives), NECNP and Massachusetts find themselves in a procedural quagmire (at least under the analyses presented to us by the Applicant and Staff). On the one hand, the petitioners are advised that it is premature for them at this time to raise challenges to an EA that has not yet been issued. Such a challenge is deemed to fall within the scope of nonspecific contentions condemned by the Appeal Board in *Catawba*, ALAB-687, *supra*. Any such challenge must await the issuance of the EA and would then be considered (if at all) under the late-filing criteria of 10 C.F.R. § 2.714(a).

On the other hand, the petitioners are told that they cannot challenge the adequacy of the Applicant's treatment of alternatives, since NRC imposes no regulatory requirement on an applicant in a case such as this to submit an analysis

---

[46] Tr. 43-44.

of alternatives. The only obligation to consider alternatives (if there be any) is said to lie with the Staff.

We must further note that, if we were to reject all contentions at this time, as the Applicant and Staff urge, we would have to dismiss the petitioners and terminate the proceeding. We would lose our jurisdiction to consider late-filed contentions.[47] Thus, the statement that petitioners could challenge the EA by virtue of a late-filed contention means that, to do so, they would have to petition the Commission (or at least the Appeal Board, if it still retained jurisdiction) to institute a new proceeding or reopen the record — both tasks much more difficult even than filing a late-filed contention. Although we are accepting other contentions at this time, we must consider the EA contentions as if we had not done so, since the Applicant and Staff oppose all contentions and could exercise their appeal rights if we accepted any of them.

Under this analysis, both procedurally and environmentally speaking, the petitioners find themselves caught between a rock and a hard place. They are told that they cannot challenge the adequacy of the Applicant's environmental information, because there is no regulatory requirement that an applicant submit any such information. But they also cannot challenge the as-yet-unissued EA, because it is premature to do so. Further, they also cannot challenge the EA when it is issued (or the Staff's determination that an EA is not required) because (if the Applicant and Staff were to succeed in all their arguments) the proceeding would be terminated and we would no longer have jurisdiction to consider late-filed contentions. The very act of the Staff's delaying issuance of an EA (or a determination that an EA is not necessary) — whether or not justified — could operate to deprive a petitioner of a hearing on environmental issues, irrespective of the potential merit of a petitioner's position on such issues.

The Applicant (supported by the Staff) urges this result as a necessary consequence of the various *Catawba* rulings. We do not agree. Such a reading of those rulings, in our view, constitutes the type of "crabbed interpretation of NEPA" and its implementing regulations that we thought had long ago been laid to rest. *See Calvert Cliffs' Coordinating Committee v. AEC*, 449 F.2d 1109, 1117 (1971).[48]

Fortunately, the *Catawba* rulings need not be read so proscriptively. In the first place, the *Catawba* rulings were in the context of an operating license proceeding with multiple contentions already at issue. The only question was the showing needed to accept a late-filed contention, not the situation where a late-filed contention would be ruled out jurisdictionally. In that context, the

---

[47] *See* Tr. 121.

[48] Under the Applicant's reading, the disparate treatment in cases of this type of Atomic Energy Act issues (for which an application must be filed) and NEPA issues (where no information need be filed) — and the differing procedural consequences stemming therefrom — represents a situation as egregious as the procedural disparities condemned by the *Calvert Cliffs'* court. *See* 449 F.2d at 1118-19, 1127-28.

Appeal Board ruled that a valid contention could not be submitted challenging a Staff document not yet issued, and the Commission appears to support that ruling. CLI-83-19, *supra*, 17 NRC at 1049.

Beyond that, the Appeal Board in *Catawba* had permitted a less-than-usual showing to support a late-filed contention following issuance of one of the Staff review documents. The Commission reversed that narrow aspect of the Appeal Board's ruling, holding that the usual standards for considering late-filed contentions, as spelled out in 10 C.F.R. § 2.714(a), would have to be followed. In so holding, the Commission stressed that

> application of the five factors in 10 CFR 2.714(a)(1) only increases the showing required for the admission of a late contention, *and does not act to automatically or unreasonably cut off hearing rights.*

Id., 17 NRC at 1047 (emphasis supplied).

The Commission also rejected the claim that use of the five factors would allow applicants and the NRC Staff "to manipulate the availability of licensing-related documents to deprive intervenors of their rights to a hearing." It explained:

> The situation under consideration here results from the Commission's generic establishment of schedules and, thus, is not susceptible to manipulation by the parties to a proceeding. If undue delay should occur, it can be as easily dealt with in a balancing test as by a *per se* rule.

Id.

Finally, with respect to environmental issues, the Commission recognized that the adequacy of NRC's environmental review is an appropriate issue for litigation. Although the adequacy of such review could not be determined before the issuance of the Staff documents, the Commission emphasized that environmental concerns reflected in an applicant's environmental report should be raised as early as possible and should not await issuance of the Staff documents. *Id.* at 1049. It concluded:

> intervenors are expected to raise issues as early as possible. To the extent that this leads to contentions that are superseded by the subsequent issuance of licensing-related documents, those changes can be dealt with by either modifying or disposing of the superseded contentions.

Id. at 1050.

b. The EA contentions of NECNP and Massachusetts each seek the consideration of two specified alternatives — dry-cask storage and independent pool storage. The Applicant, in its application documents, rejected each of these alternatives as not being available in the time frame within which it allegedly

needed additional fuel storage capacity, specifically because no such facilities had "previously been fully licensed" by NRC.[49] The Applicant indicates that, "in general" the unlicensed options had "not been demonstrated on other than a theoretical or prototype basis, adding to the uncertainty concerning the schedule for design and construction."[50] The Applicant's application documents do not discuss the environmental aspects of either of the two suggested alternatives (or, for that matter, any other alternative).

An agency's evaluation of alternatives is governed by two sections of NEPA, §§ 102(2)(C) and 102(2)(E), 42 U.S.C. §§ 4332(2)(C) and 4332(2)(E). The former section is applicable only when an EIS is required; the latter applies whether or not an EIS is prepared. These sections are implemented within NRC by 10 C.F.R. §§ 51.45(b)(3), 51.53, 51.71, and 51.91(a) (for the discussion of alternatives in an EIS, as required by § 102(2)(C) of NEPA), and 10 C.F.R. § 51.30(a)(1)(ii) and (iii) (for the discussion of alternatives in an EA, as required by § 102(2)(E) of NEPA).

In addition, although an applicant need not submit an environmental report for a spent fuel pool capacity expansion application (*see* 10 C.F.R. §§ 51.45, 51.50, 51.53, 51.54, 51.60, 51.61, 51.62, and 51.68), the Staff may require an applicant for a license amendment to submit "such information . . . as may be useful in aiding the Commission in complying with section 102(2) of NEPA" (10 C.F.R. § 51.41). By letter to licensees dated April 14, 1978, which transmitted NRC guidance on spent fuel pool modifications (entitled "Review and Acceptance of Spent Fuel Storage and Handling Applications"), the NRC outlined the type of information (including environmental information) needed by the Staff to review spent fuel pool modification applications, together with acceptance criteria to be used by the Staff in authorizing such modifications.[51] Environmental information is outlined on pp. II-1 and V-1 through V-4. The Applicant here has referenced at least some portions of this guidance document in submitting its application.[52]

Notwithstanding its approval and use by the Staff, and the reliance upon it by this Applicant, the NRC guidance document does not constitute a formal regulatory requirement. Neither, however, does information provided by the Applicant in response to such guidance constitute an entirely gratuitous submission. For it is clear that the Staff envisages using such information in its review of appli-

---

[49] Letter from Applicant to NRC, dated April 25, 1986, at 3, and attached Replacement Report at 5-6.
[50] *Id.*, Letter at 3; Replacement Report at 6.
[51] The April 14, 1978 letter was supplemented by a letter dated January 18, 1979, but the supplement did not deal with environmental information.
[52] Application letter, *supra* note 49, at 6, 7; Replacement Report at 1.

cations such as this, and might well request it if not voluntarily supplied by the Applicant.[53]

Given this situation, it is not surprising that NECNP and Massachusetts focused their EA contentions on the failure of the Staff to analyze alternatives, rather than on an alleged failure of the Applicant to analyze alternatives adequately. The Applicant need not submit an environmental report, although it may be asked by the Staff to provide environmental information.[54] The Staff has the sole regulatory burden of reviewing and analyzing alternatives in a case such as this, and its analysis clearly is a proper subject for litigation. Only because of the Staff's delay in issuing an EA would contentions worded as are NECNP's and Massachusetts' EA contentions become questionable.

In its *Catawba* ruling, the Commission emphasized that a major foundation of its holding was to commence the consideration of particular issues as soon as possible, using the Applicant's information as grounds for contentions. Thereafter, when the Staff's review was completed, contentions could be modified or disposed of, as appropriate (subject to proper standards). Notwithstanding the lack of any formal requirement in a case such as this for an applicant to submit an environmental report, it would appear to be consistent with *Catawba* to accord the Staff's April 14, 1978 guidance with some regulatory significance and to entertain contentions on the sufficiency of an applicant's environmental submissions under those guidelines (or, as applicable, the lack of any such submission). Such contentions have been accepted in cases such as this. *See, e.g., Diablo Canyon*, LBP-86-21, *supra*, 23 NRC at 869 (Mothers for Peace Contention 1). And, as the Commission observed, such contentions can later be modified, as appropriate, but at an early date can serve to permit the commencement of proceedings.

NECNP's and Massachusetts' EA contentions do not, by their terms, focus on the Applicant's analysis of alternatives. But they clearly are aimed at the substance of the Applicant's analysis, since they criticize the lack of any environmental evaluation of alternatives and claim that the alternatives provide safety advantages. NECNP even sets forth facts undercutting the Applicant's claim of lack of availability of one of the alternatives (dry-cask storage).[55] And, at the prehearing conference, it became apparent that the time frame in which the availability of alternatives should properly be analyzed may be far lengthier than is reflected in the application documents.[56]

---

[53] *See* April 14, 1978 Staff Letter to Licensees: "Providing the information needed to evaluate the matters covered by this document would likely avoid the necessity for NRC questions . . . ."

[54] Beyond the information encompassed by the April 14, 1978 guidance letter, the Staff has thus far not sought any information on alternatives in this case (Tr. 95).

[55] NECNP Contentions at 10.

[56] Tr. 9-12.

Given the clear intent of these contentions, we perceive the wording used by NECNP and Massachusetts as imprecise, attributable to the absence of an environmental report requirement coupled with the overlay of the *Catawba* procedural requirements for contentions. The substance of NECNP's and Massachusetts' claims is that the analysis of alternatives thus far is deficient. Contentions of this sort have been accepted with far less specificity and basis than are provided by NECNP and Massachusetts. *See Grand Gulf*, ALAB-130, *supra*, 6 AEC at 425-26. Moreover, as the Appeal Board has observed, "[i]t is neither Congressional nor Commission policy to exclude parties because the niceties of pleading were imperfectly observed. Sounder practice is to decide issues on their merits, not to avoid them on technicalities." *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), ALAB-549, 9 NRC 644, 649 (1979).

For the foregoing reasons, we are accepting the EA contentions of NECNP and Massachusetts in substance but are rewriting them to constitute a challenge to the adequacy of the Applicant's submission. Given their similarity, we are also combining NECNP's and Massachusetts' contentions and are limiting the approved contention to the two alternatives specifically mentioned therein. This contention is set forth as Contention 3 in Attachment A to this Order.

5. In ¶ III.B of its contentions, Vermont asserts an impact of the proposed amendment on its ability to handle low-level waste, as to which it assumes certain responsibilities in 1993. Although as worded the contention appears to be directed at the "no significant hazards consideration" determination under 10 C.F.R. § 50.91 (and hence beyond our jurisdiction, except to the extent it might be considered under 10 C.F.R. § 51.104(b)),[57] we inquired what basis Vermont had for its concerns. It could not particularize how Vermont's obligations would be changed, although it sought to examine the environmental impact that might result (Tr. 139-44, 147). The Staff volunteered that removal of the old racks themselves would perhaps increase the amount of low-level waste (Tr. 146) but added that such removal would occur long before 1993 (Tr. 152, 153).

That being so, we find no basis for this contention and additionally reject it on that ground.

6. We earlier pointed out that we lack jurisdiction to entertain claims concerning the "no significant hazards consideration" determination that the Staff may make pursuant to 10 C.F.R. § 50.91. We also noted that the Staff indicated (Tr. 110) that it may determine that it need not prepare an EA on that same basis — i.e., that an EA is categorically excluded for an action that involves no significant hazards consideration. 10 C.F.R. § 51.22(c)(9).

If the Staff should determine that an EA is categorically excluded for that reason, however, such a determination would be subject to litigation pursuant to

[57] *See supra* p. 844.

10 C.F.R. § 51.104(b). If the Staff were to make such a determination, we would be prepared to consider, albeit on a late-filed basis, contentions that challenge such a determination.

In that connection, we note that Vermont Contentions, ¶¶ III.A and III.B, would not qualify on other grounds — III.A as inconsistent with 10 C.F.R. § 51.23, III.B for lack of basis. But NECNP Contentions 1 and 4, to the extent they may be read as challenges to a "no significant hazards consideration" finding, might well be litigable on the basis of a challenge to a determination under 10 C.F.R. § 51.22(c)(9), if they were not litigable on some other basis. Absent any Staff action, we express no opinion at this time on this question.

III. STIPULATION BETWEEN PARTIES

As part of the resolution of issues in the 1977 fuel pool expansion application, the parties entered a stipulation of certain facts. LBP-77-54, Appendix A (slip op.) (Aug. 30, 1977).[58] The Applicant, NRC Staff, NECNP, and the State of Vermont were, *inter alia*, parties to that stipulation. Reflecting Vermont's reference to this stipulation as part of the material supporting its contentions, we asked parties and petitioners to address the effects of the stipulation (if any) at the prehearing conference. Memorandum dated April 14, 1987 (unpublished).

Based on the views of all of the parties and petitioners (Tr. 154-68), we conclude that the stipulation does not bar the Applicant (either on an estoppel or a "clean hands doctrine" basis) from seeking the current expansion. We also conclude that the stipulation does not by its terms impose any additional obligation on the Applicant to explore alternatives. We note, however, that the stipulation does suggest a need to explore alternatives, but that current regulatory guidelines also reflect that need. Our admission of NECNP Contention 5 (both portions) and Massachusetts Contention II reflects those guidelines.

IV. SCHEDULES

Under the hybrid hearing procedures that are to govern this proceeding, a period of discovery follows the admission of contentions. Except in exceptional circumstances, such period shall not exceed 90 days. 10 C.F.R. § 2.1111. With respect to the three *admitted* contentions, we are providing approximately 60 days' discovery, with additional discovery provided for new contentions (if any) or with respect to the effect of yet-to-be-issued Staff documents on existing contentions. Following discovery, parties are to submit to us "all the facts, data,

[58] Although the body of LBP-77-54 was published at 6 NRC 436 (1977), Appendix A was not published (*id.* at 449).

and arguments that are known to the party at such time" and on which the party proposes to rely with respect to a contention. We are to consider such material at an oral argument prior to determining whether any issues shall go to hearing. 10 C.F.R. §§ 2.1113 and 2.1115.

We hereby establish the following schedule:

1.	Formal discovery commences:	Within 5 days of service of this Order (approximately June 1, 1987)
2.	Formal discovery closes (i.e., answers to interrogatories received, second round questions asked and answered, document production completed, etc.)	August 3, 1987 (or within 45 days of our acceptance of new contentions based on Staff review documents, or within 45 days of the issuance of such documents, whichever is later)
3.	Filing date for new contentions based on Staff review documents	Within 14 days of service of the particular review document
4.	Filing date for oral argument material (tentative)	September 8, 1987
5.	Oral argument (tentative)	Late September or early October 1987.

Although we are not at this time consolidating any of the parties, we recognize the multiple sponsorship of several of the admitted contentions. We expect the parties to coordinate their discovery efforts so that duplicative requests are not filed.

V. ORDER

For the foregoing reasons, it is, this 26th day of May 1987, ORDERED

1. NECNP Contentions 3 and 5 (both portions), and Massachusetts Contentions I (to the extent it raises risk questions) and II are hereby *accepted*, rewritten as described in the Attachment to this Order;

2. NECNP Contentions 1, 2, and 4, Massachusetts Contention I (except to the extent it raises risk questions), and all of Vermont's contentions are hereby *rejected*.

3. The requests for a hearing and petitions for intervention of NECNP and Massachusetts are hereby *granted*. NECNP and Massachusetts are *admitted* as parties to this proceeding, pursuant to 10 C.F.R. § 2.714. Massachusetts is also *admitted* as an interested State, pursuant to 10 C.F.R. § 2.715(c). Vermont's request pursuant to 10 C.F.R. § 2.714 is *denied*. If Vermont wishes to participate as an interested State, it should so advise us and we will permit it to do so.

4. A Notice of Hearing, in the form set forth in Attachment B (not published) to this Order, will be published in the *Federal Register*.

5. Petitions for reconsideration will be considered on the same terms as if 10 C.F.R. § 2.751a were applicable to this proceeding.

6. This Order is subject to review by the Atomic Safety and Licensing Appeal Board under the terms of 10 C.F.R. § 2.714a. A notice of appeal with accompanying supporting brief must be filed within ten (10) days after service of this Order. Please note that any appeals must satisfy the criteria set forth in 10 C.F.R. § 2.714a(b) or (c), as applicable.

THE ATOMIC SAFETY AND
LICENSING BOARD

Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE

Glenn O. Bright
ADMINISTRATIVE JUDGE

Dr. James H. Carpenter
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 26th day of May 1987.

ATTACHMENT A

CONTENTIONS

Contention 1
(Derivation: NECNP Contention 3)

The spent fuel pool expansion amendment should be denied because, through the necessity to use one train of the reactor's residual heat removal system (RHR) in addition to the spent fuel cooling system in order to maintain the pool water within the regulatory limits of 140°F, the single-failure criterion as set forth in the General Design Criteria, and particularly Criterion 44, will be violated. The Applicant has not established that its proposed method of spent fuel pool cooling ensures that both the fuel pool cooling system and the reactor cooling system are single-failure proof.

Contention 2
(Derivation: NECNP Contention 5, Massachusetts Contention I)

The proposed amendment would create a situation in which consequences and risks of a hypothesized accident (hydrogen detonation in the reactor building) would be greater than those previously evaluated in connection with the Vermont Yankee reactor. This risk is sufficient to constitute the proposed amendment as a "major federal action significantly affecting the quality of the human environment" and requiring preparation and issuance of an Environmental Impact Statement prior to approval of the amendment.

Contention 3
(Derivation: NECNP Contention 5, Massachusetts Contention II)

The Applicant has failed to submit an adequate analysis of alternatives to the proposed action, as required by §§ 102(2)(C) and 102(2)(E) of the National Environmental Policy Act, 42 U.S.C. §§ 4332(2)(C) and 4332(2)(E), and implementing NRC regulations or guidelines. Specifically, the Applicant has failed to analyze adequately the alternatives of (1) dry-cask storage and (2) independent pool storage. Both of these alternatives are available options and provide obvious safety advantages over the instant proposal.

[Attachment B has been omitted from this publication but can be found in the NRC Public Document Room, 1717 H Street, NW, Washington, DC 20555.]

Administrative Law Judge

ADMINISTRATIVE LAW JUDGE

Cite as 25 NRC 865 (1987) ALJ-87-4

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ADMINISTRATIVE LAW JUDGE

Ivan W. Smith

In the Matter of

Docket No. 30-16055-SP
(ASLBP No. 87-545-01-SP)
(BML No. 34-19089-01)
(EA 86-155)

ADVANCED MEDICAL SYSTEMS, INC.
(One Factory Row
Geneva, Ohio 44041)

May 4, 1987

MEMORANDUM AND ORDER CONCERNING NRC STAFF'S MOTION FOR STAY OF PROCEEDING

I. BACKGROUND

Advanced Medical Systems, Inc. (AMS), of Geneva, Ohio, is authorized by an NRC byproduct material license to possess and use cobalt-60 and cesium-137 in the manufacture, installation, and servicing of radiography and teletherapy devices. On October 10, 1986, the Director of the Office of Inspection and Enforcement issued an immediately effective order suspending AMS' authority under the license to install, service, maintain, or dismantle the devices.

AMS demanded a hearing. Before the proceeding progressed very far, the NRC Staff administratively relaxed the terms of the order. Licensee is now authorized to resume the suspended activities, but under new conditions.[1] Counsel for the parties have reported during several informal prehearing conferences that, despite the relaxation of the suspension order, there are legal and factual issues remaining to be heard. Those issues have never been sufficiently defined

[1] Letter from Regional Administrator James G. Keppler to Advanced Medical Systems, Inc., February 2, 1987.

because, at the informal request of the Department of Justice, and with the consent of AMS, prehearing conferences were postponed. Formal discovery has not yet been authorized, although the Staff had begun voluntarily providing information to AMS.

On March 9 the Department formally requested NRC Deputy General Counsel James P. Murray to seek a stay of this proceeding.[2] On March 19 the Staff filed the instant motion appending the Department's request and adding the Staff's own arguments for a stay.[3] AMS opposes a stay.

The Department's request explains that its Criminal Division received a case referral from the NRC's Office of Investigations in August 1986, but that the Department then deferred action pending the NRC's investigation because the allegations presented immediate public health and safety concerns. Noting that the NRC has since issued the suspension order and has permitted resumption of operations under conditions that have apparently resolved those health and safety concerns, the Department now wishes to proceed on the earlier allegations and on more recent allegations. The Department notes further that this proceeding has advanced to the point where AMS will have the right to make discovery demands of materials developed by NRC's Staff offices to the detriment of the criminal investigation. For example, the Department represents that there is a "grave risk" that witness statements and other information may be unnecessarily and prematurely disclosed to criminal targets through administrative discovery in this proceeding. The problem arises because discovery under the Federal Rules of Civil Procedure, and by analogy the NRC discovery rules, is much more liberal than the Federal Rule of Criminal Procedure 16. *See, e.g.*, 4A Moore's Federal Practice § 34.04 (2d ed. 1984).

The NRC Staff has accepted the Department's representations and moves that this proceeding be stayed until the completion of the ongoing criminal investigation of AMS and any prosecution by the Department of Justice. The Staff recognizes that an open-ended stay may raise due-process questions, but suggests that the stay need not be extended beyond a reasonable time because resumption of the hearing is within the discretion of the NRC. The Staff believes that since AMS may now perform its normal business under the conditions of the relaxed suspension order, a stay would not be unduly burdensome on AMS. Staff Motion at 7-8.

AMS opposes the motion for a stay on two principal grounds: (1) the motion is without adequate evidentiary support, and (2) a long stay could prejudice AMS by delaying the discovery essential to its defense. Significantly, AMS does

---

[2] Letter from William F. Weld, Assistant Attorney General, Criminal Division, By Victoria Toensing, Deputy Assistant Attorney General, U.S. Department of Justice, to James P. Murray, Associate General Counsel, Nuclear Regulatory Commission, March 9, 1987.

[3] There is privity of interest between the NRC Staff and the Department. For the purpose of the motion, I sometimes regard them jointly as the "Government."

not assert a financial burden in operating under the unwanted conditions of the relaxed suspension order. In fact, AMS disdains an economic defense on the grounds that it is irrelevant to the due-process issue of delayed discovery. AMS Brief at 5-6, 10-11.

II. DISCUSSION

A. Evidentiary Basis for Stay

AMS challenges even the authenticity of the March 9 letter from the Department of Justice, which according to AMS was "supposedly issued by a William F. Weld who is apparently an Assistant General Counsel in the Criminal Division . . . ." AMS Brief at 2.

There is no reasonable doubt that there really is a William F. Weld, who is an Assistant Attorney General of the Department of Justice, and that his Deputy, Victoria Toensing, signed the March 9 letter to Mr. Murray requesting the stay. Nor is there reasonable doubt that there actually is a criminal investigation into the activities of the Licensee here and that the statements to that effect contained in the letter and the motion are generally accurate. Nevertheless, the matter is a very significant concern to the Licensee. AMS is entitled to be assured that the motion for a stay has a solid evidentiary footing.

In *Commonwealth Edison Co.* (Byron Nuclear Power Station, Units 1 and 2), ALAB-735, 18 NRC 19 (1983), the Appeal Board refused to accept the generalized representation of counsel that premature disclosure of matters under investigation by the Office of Investigations could seriously compromise those investigations. *Id.* at 23-24. Affidavits of officials having first-hand knowledge of the impact of such disclosure were deemed essential to Staff efforts to prevent disclosure. *Id.*

Accordingly, in the order below, the Staff is granted an opportunity to provide affidavits in support of its motion consistent with the Appeal Board's discussion in *Byron*. *Id.* In the meantime, however, to spare AMS further procedural delay in this proceeding, I assume the authenticity of the March 9, 1987 letter from the Department of Justice. I also assume that the criminal investigation alluded to in the letter and in the Staff's motion are based essentially on the same factual allegations at issue in the NRC civil proceeding at hand.

B. Authority to Stay NRC Proceeding

AMS does not dispute the authority of the NRC to stay the proceeding; its argument is directed to the unfairness of any such stay. The NRC Staff, *citing Landis v. North American Co.*, 299 U.S. 248, 254-55 (1936), correctly asserts

that it is well established that courts may stay a civil proceeding if the harm from staying the civil proceeding is outweighed by the difficulty imposed on the criminal proceeding if both are permitted to go forward simultaneously. Motion at 6.

The NRC Staff also forthrightly acknowledges that, as the party seeking the stay, it "must make a clear case of hardship or inequity in being required to go forward if there is even a fair possibility that the stay for which he prays will work damage to someone else." Motion at 6, *citing Landis v. North American, supra*, 299 U.S. at 254-55. The Staff also concedes that the NRC is not required to suspend its administrative proceeding because of a criminal investigation into the same matter. Motion at 5, *citing General Public Utilities Nuclear Corp.* (Three Mile Island Nuclear Station, Unit 2), CLI-83-24, 18 NRC 315, 318 (1983).

In the *General Public Utilities* decision, the Commission declined to quash administrative investigative subpoenas inquiring into the TMI-2 leak rate matter. The Commission, relying upon *SEC v. Dresser Industries, Inc.*, 628 F.2d 1368 (D.C. Cir. 1980) (*en banc*), *cert. denied*, 449 U.S. 993 (1980), explained that the NRC, as did the Securities and Exchange Commission in the *Dresser* case, had a mandate to make investigations promptly for the protection of the public, which mandate should not be blocked because of a Grand Jury inquiry into the same matter. In *United States v. Kordel*, 397 U.S. 1 (1970), also cited in the *General Public Utilities* decision, the Court held that a governmental agency such as the FDA need not invariably choose either to forego recommending a criminal prosecution once it seeks civil relief, or to defer its civil proceedings pending the ultimate outcome of the criminal trial. *Id.* at 9, 10.

While the Commission, in *General Public Utilities*, declined to suspend its civil proceeding solely on the basis of the Grand Jury's inquiry, it went on to consider whether the parallel investigations would "demonstrably prejudice substantial rights of the investigated parties." *Supra*, 18 NRC at 323-24. Again drawing upon *SEC v. Dresser* for its rationale, the Commission acknowledged that the constitutional privilege against self-incrimination might require a stay of the civil proceeding. Nevertheless, the Commission decided that, as in *Dresser*, a weak case for staying the administrative proceeding was made, and, as noted, declined to stay the NRC investigation.

The decisions of the Commission in *General Public Utilities* and the courts in *SEC v. Dresser* and *United States v. Kordel*, relied upon by the Staff, provide incomplete guidance in this proceeding. Those decisions establish only that it is within my discretion to stay the civil proceeding before me if substantial rights are threatened, and that, where the public interest requires going forward, a civil proceeding need not be stayed pending the completion of the parallel criminal matter. Factually the instant proceeding is quite different from the cited cases. In the *General Public Utilities* case and those cited there, the targets of the parallel

investigations sought the stay. In this case the Government seeks the stay. Unlike the situations in the cited cases, in this proceeding there is no immediate public interest in a stay. As all parties agree, the immediate public health and safety aspects of the proceeding have been satisfied by the conditions of the Regional Administrator's action relaxing the suspension order.

C. Legal Standards for Balancing the Government Need for a Stay Against the Licensee's Need for an Undelayed Proceeding

In a recent case cited by the NRC Staff (at 6), *United States v. Eight Thousand Eight Hundred and Fifty Dollars ($8,850)*, 461 U.S. 555 (1983), the Supreme Court described the test to be applied in determining whether a delay in bringing the government's administrative proceeding prejudiced the defendant's rights to a speedy trial. The similarities in the proceeding here against AMS and the case in *$8,850* provide useful guidance. In *$8,850* the Customs Service (under the Bank Secrecy Act of 1970), before any hearing, seized the money at issue from the defendant upon her entry into the United States. In this proceeding, the NRC Staff, by imposing the immediately effective suspension order against AMS, seized its relief before any hearing, notwithstanding the partial relaxation of that order later. In *$8,850*, the government delayed some 18 months in bringing its civil forfeiture action against the defendant. In this case, the stay sought by the Government could amount to a similar delay in AMS' hearing. In *$8,850*, as in this proceeding, the Government sought to justify the delay in going forward with the administrative proceeding by arguing that the parallel criminal proceeding justified the delay because of concern for improper opportunities for the defendant to discover administratively the details of the pending criminal case. *Id.* at 567.

The Court in *$8,850* recalled that, in *Barker v. Wingo*, 407 U.S. 514 (1972), it had established a balancing test composed of weighing four factors for determining when the government has abridged the right to a speedy trial. The "Barker test" factors were: length of the delay, the reason for the delay, the defendant's assertion of his right to a trial, and prejudice to the defendant. *$8,850*, *supra*, 461 U.S. at 564.

1. Length of Delay

In *$8,850* the Court considered being deprived of such a sum of money over 18 months was a significant burden. But the Court acknowledged that when a delay becomes presumptively improper depends upon the facts of a particular case. In this case, as noted above, AMS does not assert a financial burden. In considering the length of a possible delay sought by the Government in this

proceeding, I am guided most by the amount of injury any such delay might impose upon the Licensee in defending the charges against it.

2. *Reason For Delay*

The Government in the instant proceeding has advanced a traditional and appropriate reason for seeking a delay, as discussed above. An argument could be advanced that a total stay of the proceeding is unwarranted, as compared to, for example, going forward under a protective order, or limiting discovery to noncriminal aspects of the proceeding. But as I understand the facts now available to me, a distinction between the noncriminal and the civil aspects of the matter cannot now be easily made. As to a protective order, no party has suggested that approach. For the short term of the stay imposed below, the problems of devising and administering a protective order outweigh any benefits to be realized.

It does not appear that the Government has failed to move expeditiously on both the civil and criminal tracks. The period between the time that the Department first reported that it wanted a postponement to consider the consequences of civil discovery in the NRC proceeding, until its March 9 formal request for a stay, and then until the Staff's March 19 motion for the stay was only a few weeks. Presumably the request for a stay was not lightly made. The time in seeking it would reflect the fact that the idea was carefully considered beforehand.

3. *Licensee's Assertion of Its Right to a Prompt Hearing*

The Court in *$8,850* found that the defendant there did not avail herself of her remedies to ensure an early judicial hearing on her rights. No such finding can be made in this proceeding. AMS has moved the proceeding along as expeditiously as possible. While counsel for AMS did not oppose the requests for continuances, the delays were not long. Counsel's acquiescence in those delays was no more than normal professional courtesy. In any event, AMS is now demanding a prompt hearing.

4. *Prejudice to the Licensee*

The final "Barker test" factor is whether AMS will be prejudiced by any significant delay in the NRC proceeding. AMS asserts that it has a discovery plan it wishes to pursue and that if denied its opportunity for discovery, its defense will be irreparably harmed "as memories of key witnesses will inevitably fade." The Court in *$8,850* looked to whether the delay in the civil proceeding

hampered the defendant there in presenting its defense, for example, through the loss of a witness or other evidence. Finding that the defendant had not alleged that the delay affected her ability to defend against the government's civil action, the decision was rendered against her. *Id.*, 461 U.S. at 569.

In contrast, the Commission in *General Public Utilities* expressed its concern that "the recollection of individuals may be fading with the passage of time, and delaying the NRC's investigation any longer could seriously prejudice the NRC's ability to resolve this matter." *Supra*, 18 NRC at 325. *See also SEC v. Dresser, supra*, 628 F.2d at 1377.

AMS' concern about its ability to prepare its defense after a long delay is well founded. Memories do fade. Witnesses become unavailable and documents are lost. The Staff's case seems to depend relatively little on technical documents and other objective, enduring evidentiary records. This proceeding seems to depend more upon human motivation, memories, and perceptions than most conducted by the NRC. This is precisely the type of evidence I have found to be the most perishable in NRC proceedings. *Metropolitan Edison Co.* (Three Mile Island Nuclear Station, Unit 1), Partial Initial Decision (Reopened Proceeding), LBP-82-56, 16 NRC 281 (1982), and Partial Initial Decision on the Remanded Issue of the Dieckamp Mailgram, LBP-85-30, 22 NRC 332 (1985). A long delay in the civil aspects of the proceeding will have the dangerous potential of fatally impairing Licensee's ability to mount a defense. If such be the case, the NRC Staff may also be impaired in its ability to impose the relief it deems needed in the public interest.

I have not accepted the Staff's statement that "AMS is fully aware of the Staff's evidentiary case." Motion at 9. That statement is contradicted by the very grounds asserted for the motion, i.e., civil discovery will disclose more information about the Staff's case to the detriment of the Government's criminal investigation. Nor do I understand the Staff's next assertion: "A delay in the hearing will not affect the evidence which AMS seeks to challenge." *Id.* True, while the delay may not affect the nature of the evidence the Staff may present for AMS to challenge, a long delay would affect AMS' ability to challenge that evidence.

III. CONCLUSION

There is no basis to believe that the Licensee in this proceeding has any scheme or plan to use the NRC discovery process to frustrate the Government's criminal investigation. In many of the cases touching on the tension between a criminal target's broad discovery rights in a related civil proceeding, and the very limited rights to discover in a criminal proceeding, there has been a solid basis to fear that the target would abuse the civil process to discover for the criminal

proceeding. For example in the frequently cited case of *Campbell v. Eastland*, 307 F.2d 478 (5th Cir. 1962), the court viewed with suspicion the discovery efforts of a taxpayer who, knowing he was the target of a criminal proceeding, initiated a civil suit for a refund of the taxes in issue. The court inferred the filing of the civil suit and the motion for discovery were tactical maneuvers and a "dodge" to gain advance information over the criminal proceeding. *Id.* at 483, 487, 490; *distinguishing Frazier v. Phinney*, 24 F.R.D. 406 (S.D. Tex. 1959), and *Commissioner v. Licavoli*, 252 F.2d 268 (6th Cir. 1958) (taxpayers were targets of criminal proceedings and involuntary defendants in tax deficiency suits).

In this proceeding, AMS is an involuntary party to a proceeding brought by the NRC and is entitled to all due-process rights consistent with the public interest in the criminal investigation.

As noted, the Department requested an open-ended stay until the conclusion of any criminal prosecution. The Staff supported that request although it suggested that some earlier, unspecified resumption might be appropriate. Neither discusses anything short of a total stay, e.g., the possibility of a protective order, answering interrogatories under seal, or other forms of limited discovery. This is not surprising because the NRC Staff already has what it needs by way of relief and possibly by way of information. But the Government's position shows an insensitivity to the due-process rights of the Licensee. Having failed to request anything short of an absolute stay for as long as the Department wishes, it falls upon me to fashion a more reasonable solution,[4] which may or may not serve the Government's convenience.

IV. ORDER

This proceeding is stayed until August 15, 1987. The stay, however, is subject to the Staff's filing supporting affidavits for the stay as discussed above on or before June 1, 1987.

The Staff may file a motion for a continuation of the stay, but any such motion shall be supported by affidavits, shall report the expected time needed to complete the criminal investigation, and any other information bearing on the reasonableness of the length of any continuation. In the event a motion to continue the stay is filed, arguments may be presented on whether relief short of an absolute stay will serve the Government's needs. For example, the feasibility of an order limiting information to AMS' counsel, responses to discovery kept under seal until the conclusion of the criminal investigation, or

[4] *Dellinger v. Mitchell*, 442 F.2d 782, 787 (D.C. Cir. 1971); *McSurely v. McClellan*, 426 F.2d 664, 672 (D.C. Cir. 1970).

permitting discovery only on specifically defined subject-matter areas may be relevant to any such motion.

In the meantime, as a condition of granting this stay, the NRC Staff shall carefully preserve all evidence that would otherwise be available to AMS in discovery and make a particular effort to identify and preserve evidence that might be exculpatory to AMS.

IT IS SO ORDERED.

Ivan W. Smith
ADMINISTRATIVE LAW JUDGE

Bethesda, Maryland
May 4, 1987

*U.S. GOVERNMENT PRINTING OFFICE: 1987 - 202-286:60009