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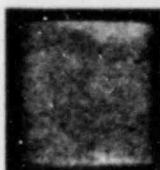
NUCLEAR REGULATORY COMMISSION ISSUANCES

April 1982



U.S. NUCLEAR REGULATORY COMMISSION

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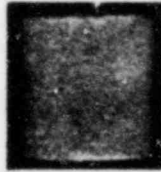




This report includes the issuances received during the specified period from the Commission (CLI), the Atomic Safety and Licensing Appeal Boards (ALAB), the Atomic Safety and Licensing Boards (LBP), the Administrative Law Judge (ALJ), the Directors' Decisions (DD), and the Denials of Petitions For Rulemaking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

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



U. S. NUCLEAR REGULATORY COMMISSION

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



COMMISSIONERS

Nunzio J. Palladino, Chairman
Victor Gilinsky
John F. Ahearn
Thomas M. Roberts

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

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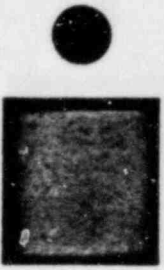
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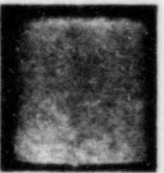
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Commission Issuances



Cite as 15 NRC 673 (1982)

CLI-82-7

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Victor Gillinsky
John F. Ahearne
Thomas M. Roberts

in the Matter of

Docket Nos. 50-275 OL
50-323 OL
(SECURITY)

**PACIFIC GAS AND ELECTRIC
COMPANY**
(Diablo Canyon Nuclear
Power Plant, Units 1 and 2)

April 22, 1982

The Commission denies two petitions for review of an Appeal Board decision (ALAB-653 (Restricted), 14 NRC 629 (1981)), in this operating license proceeding concerning the physical security plan for this facility. The Commission also decides it will not, contrary to earlier indication (CLI-81-22, 14 NRC 598, 600 (1981)), undertake review of the Appeal Board's interpretation of the word "several" as used in 10 CFR 73.1(a)(1)(i) describing a design basis threat; the Commission states its belief that the design basis threat should nonetheless be reevaluated, and announces that it will handle such reevaluation generically.

ORDER

On September 9, 1981 the Atomic Safety and Licensing Appeal Board held in ALAB-653 (RESTRICTED) that the physical security plan for the Diablo Canyon Nuclear Power Plant conformed to the applicable provisions of the Atomic Energy Act of 1954, as amended, and the Commission's regulations. Governor Edmund Brown and San Luis Obispo Mothers For Peace filed petitions for review with the Commission, setting forth numerous allegations of Appeal Board error. The Commission, upon examining the pleadings and the Appeal Board opinion, has denied the petitions for review.

However, one issue, the Appeal Board's interpretation of the word "several" as used in the design basis threat of 10 CFR 73.1(a)(1)(i), merits further comment. In its earlier decision reviewing the Appeal Board's decision authorizing issuance of a fuel loading and low power testing license for Diablo Canyon, the Commission stated that it "does not necessarily agree with the Board's conclusion regarding the definition of the word 'several' found in 10 CFR 73.1(a)(1)(i). The Commission will provide guidance on this matter at a later date." *In the Matter of Pacific Gas and Electric Company* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-22, 14 NRC 598, 600 (1981). After further examining this matter, the Commission has decided that this issue does not warrant Commission review within the context of this proceeding.

Nonetheless, in its Statement of Considerations accompanying the adoption of Section 73.1(a)(1), the Commission stated that "the kind and degree of threat and the vulnerabilities to such threats will continue to be reviewed by the Commission. Should such reviews show changes that would dictate different levels of protection the Commission would consider changes to meet the changed conditions." 42 *Fed. Reg.* 10836 (February 24, 1977). Five years have elapsed since the adoption of Section 73.1(a)(1)(i), and the Commission believes that the design basis threat should be reevaluated. The Commission will handle this reevaluation generically.

The separate views of Commissioner Gilinsky and additional views of Commissioners Ahearne and Roberts are attached.

It is so ORDERED.

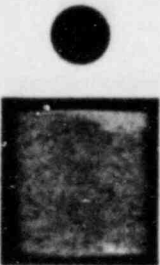
For the Commission

SAMUEL J. CHILK
Secretary of the Commission

Dated at Washington, D.C.
this 22nd day of April, 1982.

SEPARATE VIEWS OF COMMISSIONER GILINSKY

I would affirm the Appeal Board's conclusion that the Diablo Canyon physical security plan is adequate. However, I would reverse the Appeal Board's interpretation of the term "several". When the Commission, on which I sat, adopted the rule requiring facilities to be capable of defending against "several" armed attackers, it did not intend to limit the threat to



some fixed number, as the staff and Board apparently think, but instead intended the word to mean what it plainly means: "more than two but fewer than many".

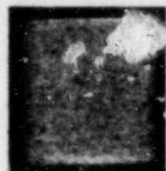
The Commission deliberately chose not to require that a system be capable of defending only against a specific number of attackers precisely because the Commission intended that the security system be relatively insensitive to minor changes in the number of attackers. This is a terribly important point which has been entirely overlooked in this proceeding, and of which the Appeal Board seems unaware. This extra margin of security would be lost if the Commission were to endorse the Board's interpretation. Fortunately, it appears that a majority of the Commission does not support such an interpretation.

I would ask the staff to explain its reasons for selecting the number of armed responders required at licensed sites and its present views on the number of armed responders which should be required.

ADDITIONAL VIEWS OF COMMISSIONERS AHEARNE AND ROBERTS

Commissioner Gilinsky's opinion may be read as indicating the Commission denied review because it was convinced beyond doubt that (1) the Appeal Board correctly characterized the Commission's intent in using the term "several" and (2) its interpretation is the correct approach.

A more accurate statement of our basis for declining review is that the Appeal Board decision is reasonable, there is no real question about adequacy of the physical security plan in this case, and the questions we believe should be addressed are more appropriately discussed in a generic context. The Commission has agreed to do so.



Atomic Safety and Licensing Appeal Boards Issuances

ATOMIC SAFETY AND LICENSING APPEAL PANEL

Alan S. Rosenthal, Chairman
Dr. John H. Buck, Vice Chairman
Dr. Lawrence R. Quarles
Dr. W. Reed Johnson
Thomas S. Moore
Christine N. Kohl
Stephen F. Eilperin
Gary J. Edles
Reginald L. Gotchy



APPEAL BOARDS

Cite as 15 NRC 677 (1982)

ALAB-672

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Christine N. Kohl

In the Matter of

Docket Nos. 50-498 OL
50-499 OL

**HOUSTON LIGHTING & POWER
COMPANY, et al.**
(South Texas Project, Units 1
and 2)

April 21, 1982

The Appeal Board issues a memorandum explicating the reasons for its unpublished order (April 15, 1982) requiring that another member of the Licensing Board panel be designated to replace a technical member of the Licensing Board in this operating license proceeding.

RULES OF PRACTICE: DISQUALIFICATION

A party leveling a charge as serious as that of bias against a licensing board or its members has a manifest obligation to be most particular in establishing the foundation for the charge. *Duquesne Light Co.* (Beaver Valley Power Station, Units 1 and 2), ALAB-172, 7 AEC 42, 43 (1974).

RULES OF PRACTICE: MOTIONS (DISQUALIFICATION)

An express and ironclad requirement of 10 CFR 2.704(c) is that recusal motions "be supported by affidavits setting forth the alleged grounds for disqualification." *Beaver Valley, supra*, 7 AEC at 43 fn. 2; *Dairyland Power Cooperative* (LaCrosse Boiling Water Reactor), ALAB-497, 8 NRC 312, 313-14 (1978). The movant must refrain from sweeping and unsubstantiated assertions.

RULES OF PRACTICE: DISQUALIFICATION

An administrative trier of fact is subject to disqualification for the appearance of bias or prejudgment of the factual issues as well as for actual bias or prejudgment. *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-101, 6 AEC 60, 64-65 (1973).

RULES OF PRACTICE: DISQUALIFICATION

A motion seeking the recusal of a member of the Commission or of an appeal board from further participation in an adjudicatory proceeding is to be determined by that individual rather than by the full Commission or board. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-80-6, 11 NRC 411 (1980) (Commissioner); *id.*, CLI-80-9, 11 NRC 436, 437 (1980) (Appeal Board member).

APPEARANCES

Mr. Lanny Sinkin, Austin, Texas, for the intervenor, Citizens Concerned About Nuclear Power.

Messrs. Jack R. Newman, **Maurice Axelrad** and **Alvin H. Gutterman**, Washington, D.C., and **Finis E. Cowan** and **Thomas B. Hudson, Jr.**, Houston, Texas, for the applicants, Houston Lighting & Power Company, *et al.*

Mr. Jay M. Gutierrez for the Nuclear Regulatory Commission staff.

MEMORANDUM

On March 9, 1982, intervenor Citizens Concerned About Nuclear Power (CCANP) filed a motion under 10 CFR 2.704(c) calling upon Administrative Judge Ernest E. Hill to recuse himself from further service on the Licensing Board for this operating license proceeding now in progress. Subsequently, as required by Section 2.704(c), two affidavits were submitted in support of the motion. Broadly speaking, the motion and affidavits asserted that, during the course of the proceeding to date, on several occasions and in different ways Judge Hill had manifested a lack of impartiality — indeed, an open hostility toward CCANP, a self-avowed “anti-nuclear organization”

Both the applicants and the NRC staff filed oppositions to the motion. Thereafter, on April 13, the other two members of the Licensing Board

issued an unpublished memorandum and order. Observing that Judge Hill had declined to recuse himself for reasons set forth in an accompanying separate statement, the quorum memorandum and order (at p. 4) addressed the question "whether the accusations [in the motion] have merit and, if so, are legally disqualifying". The two members of the Board answered this question in the negative and, accordingly, denied the motion.

As mandated by 10 CFR 2.704(c), the Licensing Board simultaneously referred the motion to us. Because another hearing session was to begin one week later, an early disposition of the matter was imperative. We therefore embarked immediately upon an examination of the documents before us. That examination produced the following result, announced in a brief unpublished order issued on April 15:

Essentially for the reasons stated by the Licensing Board quorum, we do not believe that of themselves the motion and supporting affidavits provide sufficient cause for Judge Hill's recusal or disqualification. At the same time, however, several of the comments contained in his separate statement give rise to a serious doubt respecting Judge Hill's present ability to judge CCANP and its assertions in this proceeding dispassionately. The appearance of total objectivity being as important as the reality, we are thus compelled to the conclusion that another member of the Licensing Board Panel should be now designated to replace Judge Hill [footnote omitted].

The order indicated that a full opinion would issue at a later date.¹

A. No useful purpose would be served by detailing the basis of our agreement with the Licensing Board quorum that the CCANP motion and supporting affidavits were insufficient to justify Judge Hill's recusal or disqualification.² On that score, we simply emphasize that, apart from all other considerations, the recitals in CCANP's papers relating to purported on-the-record manifestations of bias on Judge Hill's part are not accompanied by transcript references.³ In addition, many of the broadly stated claims suffered from a lack of specificity.

Long ago, we were confronted with a disqualification motion that likewise "contained very little more than broad and vague assertions" of

¹ Despite our efforts to avoid any delay in the hearing as a result of our decision, we understand that a new member of the Licensing Board has not yet been designated and that the hearing has been postponed indefinitely.

² Whether Judge Hill's colleagues should themselves have ruled upon the recusal motion is, however, another matter. See pp. 683-685 *infra*.

³ CCANP's papers also contained numerous allusions to Judge Hill's demeanor, as well as to certain alleged "off the record manifestations" of bias. While those allusions may not have been susceptible of supporting record references, in no event could they carry the same weight as claims subject to verification.

bias, "which assertions were not accompanied by record references". Although that motion was voluntarily withdrawn after its referral to us by the Licensing Board, we nonetheless felt constrained to call attention to its deficiencies. In this regard, we stressed that a "party leveling a charge as serious as that of bias against a licensing board or its members has a manifest obligation to be most particular in establishing the foundation for the charge * * *". *Duquesne Light Co.* (Beaver Valley Power Station, Units 1 and 2), ALAB-172, 7 AEC 42, 43 (1974).

That admonition bears repetition. NRC adjudicators are entitled to be free of irresponsible attacks upon their probity and objectivity. The express and ironclad requirement of Section 2.704(c) that recusal motions "be supported by affidavits setting forth the alleged grounds for disqualification" serves that end.⁴ But so too does an insistence that the movant refrain from sweeping and unsubstantiated assertions of the stripe that freight both the motion and the affidavits here.⁵

B. We now turn to the underpinnings of our conclusion that Judge Hill's separate statement gave "rise to a serious doubt respecting [his] present ability to judge CCANP and its assertions in this proceeding dispassionately". See p. 679, *supra*. As scarcely requires extended discussion, if a basis for such a doubt existed, his replacement as a member of this Licensing Board was obligatory without regard to his disclaimer of bias against CCANP.⁶ We need not go beyond what was said on the point in *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-101, 6 AEC 60, 64-65 (1973) (footnote omitted):

The federal courts have made it equally clear that the appearance of either bias or the prejudgment of factual — as opposed to legal — issues in controversy will disqualify an adjudicator from participating in a proceeding. Thus, in two separate cases, the Chairman of the Federal Trade Commission was disqualified from participating in proceedings where he had previously made speeches which took a position on factual matters directly in controversy. *Cinderella Career and Finishing Schools, Inc. v. Federal Trade Commission*, 425 F.2d 583 (D.C. Cir. 1970); *Texaco, Inc. v. Federal Trade Commission*, [336 F.2d 754 (D.C. Cir. 1964), vacated and remanded on other grounds, 381 U.S. 739

⁴ *Beaver Valley, supra*, 7 AEC at 43 fn. 2; *Dairyland Power Cooperative* (LaCrosse Boiling Water Reactor), ALAB-497, 8 NRC 312, 313-14 (1978).

⁵ See, for example, the bald representation at p. 2 of the March 23, 1982 affidavit of CCANP's representative, Lanny Alan Sinkin, that Judge Hill had "repeatedly demonstrated an antagonistic and hostile attitude toward CCANP'S participation in this proceeding".

⁶ It is of no consequence that the basis for our doubts about Judge Hill's objectivity is found not in CCANP's motion and affidavits, but rather in the statement prompted by such motion. Once such evidence of bias manifests itself, we can scarcely deny its existence.

(1965)]. In both cases, the court expounded its test for disqualification as being whether

a disinterested observer may conclude that [the agency] has in some measure adjudged the facts as well as the law of a particular case in advance of hearing it.

In emphasizing that the appearance of bias or prejudgment is as valid a basis for disqualification as is actual bias or prejudgment, a court noted: " * * * an administrative hearing * * * must be attended, not only with every element of fairness but with the very appearance of complete fairness. Only thus can the tribunal conducting a quasi-adjudicatory proceeding meet the basic requirement of due process." *Amos Treat & Co. v. S.E.C.*, 306 F.2d 260, 267 (D.C. Cir. 1962).

Under this rule, actual bias or prejudgment need not be shown. Indeed, the rule "may sometimes bar trial by [those] who have no actual bias and who would do their very best to weigh the scales of justice equally between contending parties." *In re Murchison* [349 U.S. 133, 136 (1955)]. As one judge cogently remarked,

We must presume that a fair hearing was denied if a disinterested observer would have reason to believe that the Commissioner had "in some measure adjudged the facts * * * of a particular case in advance of hearing it" [*Texaco, supra*, 336 F.2d at 764 (Washington, J., concurring) (footnotes omitted)].

In sum, therefore, an administrative trier of fact is subject to disqualification * * * if he has a "personal bias" against a participant; * * * or if he has engaged in conduct which gives the appearance of personal bias or prejudgment of factual issues.

We appraised the separate statement with these settled principles in mind. In other words, the question at hand was whether a disinterested observer could have reasonably inferred from Judge Hill's statement that he now has a personal animus against this intervenor which could affect his ability to pass judgment objectively upon its cause.

At the outset of the statement, Judge Hill laid bare the depth of his resentment respecting the motion and its content: he considered it to be a "personal and unwarranted attack on [his] professional and moral integrity".⁷ Whether or not that characterization was justified, it might well not have occasioned difficulty had Judge Hill thereafter confined himself to a dispassionate response to the claims on which the motion rested. But he did not do so. Rather, he launched a series of direct attacks

⁷ See p. 686, *infra*. (Judge Hill's statement is attached as an appendix to this opinion.)

of his own upon "the representatives for CCANP",⁸ cast for the most part in extremely pejorative terms.

More specifically, those representatives were accused of: "actively subvert[ing] the stated objectives of this expedited proceeding by being unduly contentious with matters having little, if any, bearing on the admitted contentions"; providing "a constant flow of additional and largely unsupported allegations against various principals in [the] case"; conducting "needlessly long and unproductive cross examination of various witnesses"; and "on several occasions" having "been unwilling to heed the advice or admonishment of this Board to cease such delaying and obstructing actions".⁹ In addition to these "delaying and harassing actions", according to the statement, the CCANP representatives had "blatantly used this proceeding as a forum to present CCANP's political views on subjects not at issue * * *".¹⁰ And, finally, the statement recorded Judge Hill's view that the charge of bias had been placed against him because of his several efforts to have the Board Chairman "limit the subverting actions of the representatives of CCANP"; as he saw it, "those representatives have chosen to misinterpret my objections to this misuse of the proceeding as a bias against CCANP".¹¹

These statements speak for themselves. It suffices to say that they reflect a lack of sensitivity for the role that a judge must necessarily play in any adjudication. A judge must put aside his personal feelings and exercise restraint in responding to charges of bias, even where they may be particularly inflammatory.¹² The use of intemperate language, particularly in a written (rather than oral) statement like Judge Hill's, is at odds with the notion of judicial restraint and fairness, and the most sincere disclaimer of bias cannot salve the damage already inflicted.

Moreover, apart from their import and tone, Judge Hill's observations were totally gratuitous. None of them had the slightest discernible relevance to the only matter before Judge Hill for consideration: whether, as claimed by CCANP, he had displayed a personal animosity against that organization, its representatives or the cause it espoused. It is also noteworthy that, aside from a single reference to the trial transcript,¹³ the statement did not document any of the indictments of CCANP, its actions or

⁸ P. 686, *infra*.

⁹ *Ibid.*

¹⁰ *Ibid.*

¹¹ F. 687, *infra*.

¹² This is not to suggest that CCANP's motion and affidavits were such as to provoke a response in kind.

¹³ Tr. 9981-83 (January 22, 1982), where the Board Chairman criticized certain aspects of the cross-examination conducted by then CCANP counsel. From all that appears there, this was the first occasion on which the Board admonished a CCANP representative.

its motives. Thus, even if they had some bearing on the issue raised by the CCANP motion, it would not be readily possible to substantiate those indictments.¹⁴

The disqualification of a Licensing Board member — particularly on grounds of the appearance of bias against one of the litigants — is not a step lightly to be taken. In the totality of the foregoing circumstances, however, we were left with no other choice. By electing to address the CCANP motion in the manner in which he did — rather than simply confronting its assertions on their merits — Judge Hill affirmatively created the impression that he harbors a deep-seated personal hostility towards CCANP and its representatives, which could be expected to affect materially his future determinations on matters of concern to that intervenor. Once again, whether that impression accords with reality is quite beside the point. The fact that there is a legitimate basis for it is enough.

C. There remains a procedural question which was raised and determined by the Licensing Board quorum. Although not crucial to the result that we reach, the question may recur and is of sufficient general importance to warrant our attention here.

As the Board quorum acknowledged (at p. 3), the Commission has squarely held that a motion seeking the recusal of a member of the Commission or of an appeal board from further participation in an adjudicatory proceeding is to be determined by that individual rather than by the full Commission or board. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-80-6, 11 NRC 411 (1980) (Commissioner); *id.*, CLI-80-9, 11 NRC 436, 437 (1980) (Appeal Board member).¹⁵ Nonetheless, as we have seen, the Board quorum elected not to follow the guidance of those precedents in this instance. Rather, once Judge Hill determined not to recuse himself, the Board quorum then passed upon the motion itself.

As we read its opinion (at pp. 3-4), three considerations prompted that course. First, the Board quorum read 10 CFR 2.704(c) as obliging it to decide the motion once Judge Hill had declined to step aside voluntarily. Second, the quorum (without further elaboration) opined that the Commission's rulings in *Diablo Canyon* may have been "a reflection of the particular circumstances of the single proceeding which generated those decisions". Third, the quorum noted our at least implicit prior endorsement

¹⁴ In this connection, whether in recognition of its immateriality or for some other reason, the Board quorum did not mention, let alone endorse, Judge Hill's commentary.

¹⁵ In the latter case, following the issuance by the Appeal Board member of a statement explaining the reasons why he declined to recuse himself, the Commission reviewed the statement and determined that "a case has not been established for disqualification". CLI-80-11, 11 NRC 511, 512 (1980).

of this procedure in *Nuclear Engineering Co.* (Sheffield, Illinois, Low-Level Radioactive Waste Disposal Site), ALAB-494, 8 NRC 299, 301 (1978).

We acknowledge that, as *Sheffield* illustrates, prior to *Diablo Canyon* licensing boards generally followed the practice adopted below, without our objection. But we do not agree with the Board quorum that either the *Diablo Canyon* rulings may have been dictated by special circumstances obtaining in that case,¹⁶ or the terms of Section 2.704(c) preclude the application of those rulings to motions seeking the recusal of a licensing board member. Further, there appears to us to be substantial practical cause for not placing two members of a licensing board in the awkward position of having to decide whether the third member should be involuntarily removed.

1. The relevant provisions of Section 2.704(c) are these:

If a party deems the presiding officer or a designated member of an atomic safety and licensing board to be disqualified, he may move that the presiding officer or the board member disqualify himself. * * * If the presiding officer does not grant the motion or the board member does not disqualify himself, the motion shall be referred to * * * the Atomic Safety and Licensing Appeal Board * * *

Because the Rules of Practice employ generally the term "presiding officer" to refer to the entire Licensing Board (in circumstances where a board rather than a single administrative law judge is conducting the proceeding), the Board quorum reasoned that it was obliged to determine the motion once Judge Hill decided not recuse himself. See 10 CFR 2.721.

Leaving aside that the Commission apparently does not so construe Section 2.704(c) (see fn. 16, *supra*), we think that reasoning to be flawed. Most importantly, it overlooks the use of "or" rather than "and" in the second sentence quoted; *i.e.*, the contemplation is that there may be either a denial of the motion by the "presiding officer" or a refusal of the board member to disqualify himself — but not both. And the first sentence makes clear the foundation for the disjunctive reference to action by presiding officers and individual board members. It specifically authorizes the filing of a motion directed either to the presiding officer or, in the case of a licensing board, to a member thereof. Obviously, the initial determination of a motion to disqualify an *entire* board (*i.e.*, presiding officer) must

¹⁶ On that score, we find nothing in the Commission's opinions to suggest that it perceived the existence of such circumstances. To the contrary, the Commission referred the motion to disqualify the Appeal Board member to him for initial consideration (subject to later Commission review) "[c]onsistent with [the] principle" that the Commission thought was established by Section 2.704(c). CLI-80-9, *supra*, 11 NRC at 437.

be made by the board collegially. This is not so, however, in the instance of a motion that seeks the recusal of a particular board member.¹⁷

2. In *Diablo Canyon*, CLI-80-6, *supra*, the Commission noted that its determination that "disqualification decisions should reside exclusively with the challenged Commissioner" without further peer review was consistent with "the generally accepted practice of the federal courts and administrative agencies". 11 NRC at 411-12.¹⁸ This is scarcely surprising. For one thing, the truth or falsity of the assertions underlying the recusal motion often will be within the special knowledge of the individual to whom those assertions relate.¹⁹ Beyond that, the effective discharge of the functions of any collegial body depends to a large extent upon the existence of harmonious working relationships among its members. It requires little imagination to forecast the likely consequences in that regard were a licensing board quorum to overrule the third member on such a highly sensitive matter as the latter's objectivity.²⁰ Needless to say, appellate review by a higher tribunal does not present a similar danger.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the Appeal Board

¹⁷ The legislative history of Section 2.704(c) does not conflict with the plain terms of the Section. See 40 *Fed. Reg.* 51995-96 (November 7, 1975).

¹⁸ See, e.g., in this connection, 28 U.S.C. 455; *Laird v. Tatum*, 409 U.S. 824 (1972) (Rehnquist, J.); *Jewel Ridge Coal Corp. v. Local 6167, United Mine Workers*, 325 U.S. 897 (1945) (Jackson, J.); 17 CFR 200.60 (SEC); 49 CFR 1000.736-5 (ICC); *Standard Oil of California*, 29 AdL2d 339 (FTC, 1971).

¹⁹ To be sure, that will not invariably be the case. In this instance, for example, one of the claims in Mr. Sinkin's March 23, 1982 affidavit (see fn. 5, *supra*) was that certain allegedly erroneous rulings of the Licensing Board had been brought about by Judge Hill's "domination" of the Board. In its opinion (at pp. 6-7), the Board quorum denied the accuracy of that claim. Even had the quorum left it to Judge Hill to pass on the motion, however, it would have remained free to file a separate statement of its own (as opposed to a ruling on the motion) on that matter, as well as any other matters raised by the motion, as to which it might possess greater information.

To the extent that a recusal motion may present issues of law, the involved board member is entitled, of course, to solicit the advice of his colleagues or of the legal counsel available to the Licensing Board Panel.

²⁰ Indeed, because of this precise consideration, a determination by a board quorum *not* to disqualify the third member might be viewed with suspicion, even if unjustifiably so in the particular circumstances at hand.

APPENDIX

Separate Statement of Judge Ernest E. Hill, appended to the April 13, 1982 memorandum and order of the Licensing Board quorum.

I fully subscribe to the reasons set forth in the opinion of Judge Lamb and Judge Bechhoefer for denying the CCANP motion. I wish to provide further comment on what I consider to be a personal and unwarranted attack on my professional and moral integrity.

In September 1978, the Nuclear Regulatory Commission established this Licensing Board to rule on intervention petitions. The same Board was later authorized to conduct hearings on the application by Houston Lighting and Power Co. *et al.* to operate the South Texas Project. 44 Fed. Reg. 21090 (April 9, 1979). On September 22, 1980, the Commission further directed this Board to conduct expedited hearings on issues arising from the Show Cause Order of April 30, 1980. CLI-80-32, 12 NRC 281. The then-constituted Board, which earlier had adopted two contentions of CEU and CCANP relating to potential construction and QA deficiencies, then formulated six additional issues, based on CLI-80-32, to be considered in this expedited hearing. The sum total of these contentions and issues constituted a rather narrow spectrum of issues to be heard in an expedited manner, leaving the remainder of the OL proceeding to be heard at a later date.

On March 11, 1981 the hearing board was reconstituted in order to replace Dr. Emmeth A. Luebke with Ernest E. Hill. 46 Fed. Reg. 17319 (March 18, 1981). Previously adopted contentions and issues remained unchanged and the case went to evidentiary hearing on May 12, 1982.

From the outset, the representatives for CCANP have in many instances actively subverted the stated objectives of this expedited proceeding by being unduly contentious with matters having little, if any, bearing on the admitted contentions. In addition to the contentions admitted for adjudication by this Board, they have provided a constant flow of additional and largely unsupported allegations against various principals in this case. In many instances, the CCANP representatives have conducted needlessly long and unproductive cross examination of various witnesses and on several occasions have been unwilling to heed the advice or admonishment of this Board to cease such delaying and obstructing actions. (See, *e.g.*, Tr. 9981-9983 (January 22, 1982).)

In addition to these delaying and harassing actions, the representatives for CCANP have blatantly used this proceeding as a forum to present CCANP's political views on subjects not at issue, at least in this expedited phase of the case. In particular, they have attempted to inject the internal political issues of the cities of Austin and San Antonio into this proceeding.

In my opinion, the representations of this Board member to the Chairman on several occasions to limit the subverting actions of the representatives of CCANP have led to this charge of bias. Indeed, those representatives have chosen to misinterpret my objections to this misuse of the proceeding as a bias against CCANP.

The other claim of bias made against me, based on my career field and place of employment, is most unfortunate. I have spent over twenty-five years in the field of nuclear safety. I feel that I have made at least some modest contribution to the safe design, construction, and operation of nuclear systems. I particularly resent the implication that the choice and pursuit of this career field in some way raises doubts about my professional moral integrity.

The Atomic Safety and Licensing Board Panel (ASLBP) has, since its inception, relied heavily on the services of nuclear scientists and engineers chosen from the Atomic Energy Commission and later the Department of Energy National Laboratories. There have been more than ten nuclear scientists or engineers chosen from the National Laboratories to serve on the ASLBP. Of these, five have been selected from the Los Alamos National Laboratory or the Lawrence Livermore National Laboratory, both operated by the University of California. I am proud to be one of those selected from these laboratories and feel strongly that such a background does not, in any way, constitute bias against any party to this case.

The charge that the Lawrence Livermore National Laboratory is "part of the nuclear industry" is one that would be objected to by the Department of Energy, the University of California, the Lawrence Livermore National Laboratory and, indeed, by the "nuclear industry" itself.

CCANP and its representatives can be assured of three conclusions from this unfortunate affair: First, I have not in the past nor have I now any bias against CCANP or its representatives; second, I will not disqualify myself from this case; and third, I will continue my efforts to effectively complete this proceeding in an orderly and timely manner, as directed by the Commission.

Based on the legal considerations discussed in the Board's opinion, together with the additional comments provided in this separate statement, I decline to grant CCANP's request that I recuse myself from further participation in this proceeding.

Ernest E. Hill, Member
ADMINISTRATIVE JUDGE

Cite as 15 NRC 688 (1982)

ALAB-673

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Stephen F. Ellperin, Chairman
Dr. W. Reed Johnson
Dr. Reginald L. Gotchy

In the Matter of

Docket Nos. 50-361 OL
50-362 OL

**SOUTHERN CALIFORNIA EDISON
COMPANY, et al.**
**(San Onofre Nuclear Generating
Station, Units 2 and 3)**

April 26, 1982

The Appeal Board denies intervenors' motion for a stay pending appeal of the Licensing Board's partial initial decision (LBP-82-3, 15 NRC 61 (1982)) which authorized the issuance of a low-power operating license for Unit 2 of this facility.

RULES OF PRACTICE: STAY PENDING APPEAL

The determination whether to grant a stay pending appeal is governed by 10 CFR 2.788(e) which codifies the criteria established in *Virginia Petroleum Jobbers Ass'n v. Federal Power Commission*, 259 F.2d 921, 925 (D.C. Cir. 1958). See also *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-437, 6 NRC 630 (1977); *Northern Indiana Public Service Co.* (Bailly Generating Station, Nuclear 1), ALAB-192, 7 AEC 420 (1974).

**COMMISSION PROCEEDINGS: RES JUDICATA/COLLATERAL
ESTOPPEL**

The doctrines of res judicata and collateral estoppel are generally applicable to NRC proceedings. *Alabama Power Co.* (Joseph M. Farley

Nuclear Plant, Units 1 and 2), ALAB-182, 7 AEC 210, 212-16, *remanded on other grounds*, CLI-74-12, 7 AEC 203 (1974); *Houston Lighting & Power Co.* (South Texas Project Units 1 and 2), LBP-79-27, 10 NRC 563, 566 (1979), *aff'd* ALAB-575, 11 NRC 14 (1980). See also *Toledo Edison Co.* (Davis-Besse Nuclear Power Station, Units 1, 2 and 3), ALAB-378, 5 NRC 557, 563 (1977).

COMMISSION PROCEEDINGS: RES JUDICATA/COLLATERAL ESTOPPEL

The judicial doctrines of res judicata, collateral estoppel and privity provide the appropriate bases for determining when concededly different persons or groups should be treated as already having had their day in court. The "privity" concept requires legal accountability between groups or virtual representation of one group by the other. See generally *Southwest Airlines Co., v. Texas International Airlines*, 546 F.2d 84, 95 (5th Cir.), *cert. denied*, 434 U.S. 832 (1977). See also *United States v. Trochee-Carson*, 649 F.2d 1286, 1303 (9th Cir. 1981); *United States v. ITT Rayonier, Inc.*, 627 F.2d 996, 1003 (9th Cir. 1980); *Pollard v. Cockrell*, 578 F.2d 1002, 1008-09 (5th Cir. 1978); *Expert Electric, Inc. v. Levine*, 554 F.2d 1227, 1233 (2d Cir.), *cert. denied*, 434 U.S. 903 (1977).

OPERATING LICENSE HEARINGS: ISSUES FOR CONSIDERATION

The Commission may place limitations upon the issues that may be litigated at the operating license stage by either (1) entirely eliminating certain issues from operating license consideration on the ground that they are suited for examination only at the earlier construction permit stage, (see 47 *Fed. Reg.* 12940 (March 26, 1982)) or, short of that, (2) providing by rule that any issues which were or could have been raised by a party to the construction permit proceeding will not be entertained at the operating license stage except upon a showing of "changed circumstances" or "newly discovered evidence." Commission practice presently applies conventional res judicata and collateral estoppel principles in determining the litigability of such issues at the operating license stage.

RULES OF PRACTICE: ERROR IN EXCLUSION OF EVIDENCE

In general, error may not be predicated upon a ruling which excludes evidence unless a substantial right is affected, and the substance of the evidence is made known by way of an offer of proof or is otherwise

apparent. Fed. R. Evid. 103. See generally *United States v. Vitale*, 596 F.2d 688, 689 (5th Cir. 1979), *cert. denied*, 444 U.S. 868 (1980); *United States v. Callahan*, 551 F.2d 733, 738 (6th Cir. 1977); *Hochstadt v. Worcester Foundation for Experimental Biology*, 545 F.2d 222, 226 n.4 (1st Cir. 1976). See also 1 *Weinstein's Evidence* ¶ 103[3], at 103-27 (1981); 21 *Wright & Graham, Federal Practice & Procedure* §5040 (1977), at 209.

OPERATING LICENSE: SUSPENSION (REOPENED HEARING)

In deciding whether to allow continued operation of a plant during the pendency of a reopened hearing, the standard to be applied is whether the continued operation of the plant over the period required to complete the additional proceedings will be consistent with the requirement that there be reasonable assurance that the public health and safety not be endangered. See 10 CFR 2.104(c)(3); 10 CFR 50.57(a)(3). If not, the facility cannot be allowed to continue to operate. *Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 2)*, ALAB-486, 8 NRC 9, 46 (1978).

APPEARANCES

Messrs. David R. Pigott, Edward B. Rogin, Samuel B. Casey and John A. Mendez, San Francisco, California, **Charles R. Kocher** and **James A. Beoletto**, Rosemead, California, for the applicants.

Mr. Richard J. Wharton, San Diego, California, for the intervenors, *Carstens, et al.*

Mr. Lawrence J. Chandler for the Nuclear Regulatory Commission staff.

DECISION

Intervenors *Carstens et al.*, seek a stay pending their appeal of the Licensing Board's January 11, 1982 partial initial decision which authorized the issuance of a low-power operating license for the San Onofre Nuclear Generating Station, Unit 2 (San Onofre). See LBP-82-3, 15 NRC 61 (1982). The stay motion focuses on the ability of crucial power plant safety systems to withstand the most severe earthquake that might affect the plant during its operating lifetime, what NRC regulations term the

"safe shutdown earthquake." 10 CFR Part 100, Appendix A, §III(c); *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-644, 13 NRC 903, 913 (1981).¹

Intervenors argue that the Licensing Board erroneously foreclosed them from presenting evidence that the Cristianitos fault, located about one-half mile from San Onofre was "capable" — *i.e.*, susceptible of generating earthquake activity, and hence posed a threat to the plant.² Intervenors also argue that the Licensing Board erred by treating as segmented the principal geologic feature in the proceeding (the Offshore Zone of Deformation, or OZD), with the asserted result that the Board underestimated the magnitude and peak ground acceleration (PGA) of the earthquake the plant must be designed to resist.³ Intervenors allude to a number of other claimed factual errors that they allege wrongly diminish the designed-against safe shutdown earthquake.

In passing upon intervenors' stay request we apply 10 CFR 2.788(e), which codifies the criteria long ago established by the Court of Appeals for the District of Columbia Circuit in *Virginia Petroleum Jobbers Ass'n v. Federal Power Commission*, 259 F.2d 921, 925 (1958). See also *Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-437, 6 NRC 630 (1977); *Northern Indiana Public Service Co.* (Bailly Generating Station, Nuclear 1), ALAB-192, 7 AEC 420 (1974). The rule calls upon us to consider:

- (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.

¹ Unit 1 was licensed to operate in 1967. Its seismic design is currently being upgraded, generally to that found acceptable by the Licensing Board here. See *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Unit 1), DD-81-19, 14 NRC 1041, 1043 (1981).

² 10 CFR Part 100, Appendix A, §III(g) defines a capable fault as a fault that has exhibited one or more of the following characteristics:

- (1) Movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years.
- (2) Macro-seismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with the fault.
- (3) A structural relationship to a capable fault according to characteristics (1) or (2) of this paragraph such that movement on one could be reasonably expected to be accompanied by movement on the other.

³ The acceleration associated with an earthquake is expressed in terms of a percentage of "g" (one g represents the gravitational acceleration of a free falling body). "Magnitude" refers to the size of an earthquake measured instrumentally.

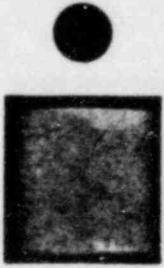
As we discuss more fully below, intervenors have failed to make a strong showing that the Licensing Board erred in its conclusion as to the adequacy of San Onofre's earthquake design. On the other hand, we entertain serious doubt that the Board was correct (at least on the theory it propounded) in foreclosing intervenors from fully pursuing the earthquake potential of the Cristianitos fault. This apparent legal error, however, is not of major consequence. There is substantial evidence already in the record to the effect that the Cristianitos fault is not capable, and intervenors were able to put on virtually their entire case with regard to the issue. The practical effect of the Board's ruling was to foreclose intervenors from cross-examining two witnesses on a subject that had not been pursued by intervenors to any purpose with other witnesses. This does not strike us as prejudicial error, especially in the absence of an offer of proof as to what of consequence could have been achieved. In view of this and the substantial body of evidence relied upon by the Licensing Board in support of its conclusion as to the appropriateness of San Onofre's earthquake design, we think the Board's apparently mistaken foreclosure ruling was harmless, and that there is no serious threat of irreparable injury in allowing the power plant to start up during the pendency of this appeal. Absent a serious safety concern, the public interest also favors this result.⁴ We therefore deny the stay motion.

I. Background

We draw upon the Licensing Board's partial initial decision to set forth the background (15 NRC at 68-69, 67-68):

Nuclear power plants must be designed to protect the public from the dangers of radioactive releases that might otherwise be caused by an earthquake The linchpin for the regulatory scheme is the "safe shutdown earthquake," or "SSE." The purpose of the SSE determination is "to estimate the magnitude of the strongest earthquake that might affect the site of a nuclear power plant during its operating lifetime." The SSE is defined as "that earthquake which produces the maximum vibratory ground motion for which [critical plant safety systems] are designed to remain functional." [10 CFR Part 100] App. A, §III(c).

⁴ It is also apparent that the applicant will be harmed to some extent if a stay issues and the plant is forced to remain down. Applicant will incur added costs for alternative fuel, construction financing, and keeping the plant in a standby condition. See Affidavit of Robert Dietch in Opposition to Intervenor's Application for a Stay of Low Power License (filed February 8, 1982) at 4-6. Thus the third factor — harm to other parties — also points to denial of stay.



Large earthquakes only occur on pre-existing active faults. Therefore a particular active fault capable of producing an earthquake, which would in turn generate the strongest ground motion at the site — sometimes called the “controlling geologic feature” — must be selected. Taking into account historic earthquake data, the distinctive geology of the area, prevailing stresses in the earth’s crust, and other factors, seismologists make expert judgments about [the] maximum magnitude earthquake — *i.e.*, the “safe shutdown earthquake” — that could occur on that feature.

....

[T]he San Onofre facilities are located on an 800 acre site within the United States Marine Corps Base, Camp Pendleton, California. The site fronts on the Pacific Ocean and is about five miles down the coast southeast from San Clemente, California.

Levels of seismic activity vary significantly in different parts of Southern California. The areas of highest seismicity are on and near the San Andreas and San Jacinto fault systems, the present boundary between the Pacific and North American plates. Seismic activity generally decreases westward away from the plate boundary. The nearest approach of these plate boundary fault systems to San Onofre is about forty-five miles. The coastal region around San Onofre has experienced relatively moderate seismic activity during the past two centuries for which historic records of earthquakes exist.

There are a number of offshore faults in the coastal waters off Southern California, some of which are active. Of greatest concern to San Onofre is an offshore structure beginning with the Newport-Inglewood Zone of Deformation near Long Beach, passing the facility about eight kilometers offshore as the South Coast Offshore Zone of Deformation, and extending south to the San Diego area as the Rose Canyon Fault Zone. This entire structure, extending from near the Santa Monica Mountains to San Diego, is known as the Offshore Zone of Deformation or “OZD.” As will be seen, one of the disputed issues in this proceeding is whether the OZD is a single, throughgoing fault, or whether it is comprised of separate segments of faults or “zone of deformation.”

About one-half mile from the facility the Cristianitos fault is clearly expressed in the sea cliffs. The Cristianitos is the closest significant geologic feature to San Onofre. It proceeds inland from the sea cliffs for about 25-30 miles and appears to die out about one mile offshore. The Cristianitos has long been considered to be inactive [footnotes omitted].

San Onofre is built to withstand safely a magnitude 7.0 earthquake occurring at the point on the OZD nearest the plant (eight kilometers) — an earthquake that could generate a peak ground acceleration to shake the plant site with two-thirds the force of gravity (0.67g). The Licensing Board examined the propriety of that design basis earthquake looking to the historic record, the characteristics of the OZD, and the various earthquake methodologies that had been developed separately by the licensee and the NRC staff for this case. Having held 25 days of evidentiary hearings — most devoted to seismic issues — the Board found, among other things, that San Onofre was conservatively designed. The Board noted that in the opinion of the NRC staff seismologist, Dr. Leon Reiter, San Onofre is probably the most conservatively designed of some 30 nuclear power plants he has reviewed. *Id.* at 75, 141-42, 184-85.

II. The Cristianitos Fault

A. The Foreclosure Ruling

The Cristianitos fault did not control the seismic design of San Onofre because it had long been an inactive (not capable) fault. *Id.* at 68-69.⁵ The Board did recognize, however, that “[i]f the Cristianitos were shown to be a capable fault, it would certainly be significant, and perhaps crucial to the safety of the San Onofre facility.” *Id.* at 77-78.⁶

Intervenors’ principal argument on this stay motion is that they were illegally precluded from fully litigating their case that the Cristianitos fault is capable. The Licensing Board foreclosed that issue because the intervenors failed to make a sufficient showing of changed circumstances since 1973 when the construction permit was issued. *Id.* at 78. The crux of the Board’s ruling was its belief that where an issue, such as the capability of the Cristianitos fault, was known at the construction permit stage and underwent intensive staff scrutiny *anyone* who could have litigated the issue (even if as here, no one had) was foreclosed at the operating license stage absent newly discovered evidence.

⁵ The finding of inactivity was supported by a detailed analysis set out in the NRC staff’s Safety Evaluation Report, and in testimony of applicant and staff witnesses which included an updated analysis since the time the construction permit was issued in 1973. See, e.g., Staff Exh. 1, “Safety Evaluation Report,” NUREG-0712 (February 1981), at 2-33 through 2-52 [SER]; Testimony of Dr. Shawn Biehler on Contention 1 at 5-9; Testimony of Dr. David G. Moore on Contention 2 at 11-17; Testimony of Dr. Roy J. Shlemon on Contention 2 at 5-9; Supplemental Testimony of Anthony Thomas Cardone, fol. Tr. 5563, at 4; Supplemental Testimony of Dr. Reiter, fol. Tr. 5566, at 2 and Tr. 5574.

⁶ But it is also possible that the Cristianitos fault, even if capable, could not generate peak ground acceleration beyond that already accounted for.

The Licensing Board recognized that its foreclosure ruling went beyond the common law principles of res judicata and collateral estoppel, doctrines which we have held are generally applicable to NRC proceedings. *Alabama Power Co.* (Joseph M. Farley Nuclear Plant, Units 1 and 2), ALAB-182, 7 AEC 210, 212-16 remanded on other grounds, CLI-74-12, 7 AEC 203 (1974); *Houston Lighting & Power Co.* (South Texas Project Units 1 and 2), LBP-79-27, 10 NRC 563, 566 (1979), *aff'd*, ALAB-575, 11 NRC 14 (1980). See also *Toledo Edison Co.* (Davis Besse Nuclear Power Station, Units 1, 2 and 3), ALAB-378, 5 NRC 557, 563 (1977).⁷ Neither of those doctrines would have barred intervenors from litigating the capability of the Cristianitos fault — whether or not based on newly discovered evidence or changed circumstances — because intervenors in this proceeding were neither parties to nor in privity with the parties who participated in the construction permit proceeding.⁸ As the Board succinctly put its position (Tr. 5192):⁹

If, for example, the Sierra Club litigates something in 1973, there is no reason in our view why the Union of Concerned Scientists should be able to litigate the same thing eight years later.

At least from our preliminary review of the matter, it seems to us that the Board's novel foreclosure ruling may be in error. It is at odds with generally recognized judicial principles and is premised upon the belief that organizations or persons who share a general point of view adequately represent one another in Commission licensing proceedings.

We doubt that so expansive a reading of the concept of adequate representation is sustainable. The standard for determining whether persons or organizations are so closely related in interest as to adequately represent one another — and thus to foreclose further litigation — is already provided for in the "privity" concept, which requires legal account-

⁷ The Supreme Court has described the doctrines of res judicata and collateral estoppel, as follows:

Under the doctrine of res judicata, a judgment on the merits in a prior suit bars a second suit involving the same parties or their privies based on the same cause of action. Under the doctrine of collateral estoppel, on the other hand, the second action is upon a different cause of action and the judgment in the prior suit precludes relitigation of issues actually litigated and necessary to the outcome of the first action.

Parklane Hosiery Co., Inc. v. Shore, 439 U.S. 322, 326 n.5 (1979).

⁸ See n.7, *supra*. See also *Dreyfus v. First Nat'l Bank of Chicago*, 424 U.S. 1171, 1175 (7th Cir.), *cert. denied*, 400 U.S. 832 (1970). We need not reach the question whether the doctrines would be inapplicable as well because the capability of the Cristianitos fault was not a contested issue in the construction permit proceeding.

⁹ The passage quoted in text is a somewhat stronger case for foreclosure than that which was actually before the Licensing Board because, as noted above, the capability of the Cristianitos fault was not a contested issue at the construction permit hearing.

ability between the two groups or virtual representation of one group by the other. Even in its broadest readings the privity concept has not encompassed the situation of a generally shared viewpoint.¹⁰ In a related context the Supreme Court has noted that "the burden of making [the] showing [that representation may not be adequate] *should be treated as minimal.*" *Trbovich v. United Mine Workers of America*, 404 U.S. 528, 538 n.10 (1972) (emphasis added). Similarly, the District of Columbia Circuit has found existing representation inadequate because the parties' interests "may not coincide". *Natural Resources Defense Council v. Costle*, 561 F.2d 904, 912 n.41 (1977) (emphasis added). In short, we think the judicial doctrines of res judicata, collateral estoppel, and privity provide the appropriate bases for determining when concededly different persons or groups should be treated as already having had their day in court. We see no public policy reason why our administrative proceedings warrant a looser standard.

This is not to say that the Commission is legally precluded from placing additional limitations upon the issues that may be litigated at the operating license stage. For one thing, as reflected by recent amendments to its regulations, the Commission may entirely eliminate certain issues from operating license consideration on the ground that they are suited for examination only at the earlier construction permit stage.¹¹ Short of that, the Commission has considerable discretion to provide *by rule* that any issues which were or could have been raised by a party to the construction permit proceeding will not be entertained at the operating license stage except upon a showing of "changed circumstances" or "newly discovered evidence". Our point is simply that, at least insofar as safety issues are concerned, to date the Commission has seen fit to pursue neither of these courses. The fact that the Commission has chosen to act *by rule* when excluding certain NEPA issues indicates that safety issues not addressed by rule are not now excluded, nor do they carry a newly discovered evidence burden for their litigation. As matters now stand, Commission practice (as established in *Farley* and other cases, *supra*, p. 695) still requires that the litigability of such issues at the operating license stage be determined with reference to conventional res judicata and collateral estop-

¹⁰ For a discussion of the privity standard, see generally *Southwest Airlines Co. v. Texas International Airlines*, 546 F.2d 84, 95 (5th Cir.), *cert. denied*, 434 U.S. 832 (1977). See also *United States v. Trochee-Carson*, 649 F.2d 1286, 1303 (9th Cir. 1981); *United States v. ITT Rayonier, Inc.*, 627 F.2d 996, 1003 (9th Cir. 1980); *Pollard v. Cockrell*, 578 F.2d 1002, 1008-09 (5th Cir. 1978); *Expert Electric, Inc. v. Levine*, 554 F.2d 1227, 1233 (2d Cir.), *cert. denied*, 434 U.S. 903 (1977).

¹¹ See 47 *Fed. Reg.* 12940 (March 26, 1982), which precludes litigation of the National Environmental Policy Act issues of need for power, alternative sites, and alternative energy sources unless otherwise ordered by the Commission.

pel principles, which necessitate for their application an identity, or privity, of parties. This being so, we doubt that the Board below was free to bar the present intervenors from raising the matter of the capability of the Cristianitos fault on the ground that the matter could have been (albeit was not) raised by a party to the construction permit proceeding.¹²

B. Non-Prejudicial Error

1. While the Licensing Board's foreclosure ruling may well be erroneous it had little, if any, impact on the proceeding. Intervenors' counsel advised us at oral argument that the record available for appellate review is deficient only in the absence of cross-examination of staff witnesses Dr. Reiter and Mr. Cardone. Whatever direct testimony intervenors had to present on the capability of the Cristianitos fault is fully set out in the record though formally stricken in major part, and intervenors had adequate opportunity to cross-examine the applicant's witnesses. See Appeal Tr. 14-15, 19-22, 93-97 [App. Tr.].

We have reviewed the record material (including that which was formally stricken) and do not find the gap in cross-examination prejudicial. Intervenors did in fact cross-examine Mr. Cardone and Dr. Reiter as to post-1973 evidence dealing with the potential capability of the Cristianitos fault. See generally Tr. 5744-56, 6684, 6718-38. What they were precluded from pursuing by virtue of the Licensing Board's foreclosure ruling was pre-1973 information bearing on the fault's capability. But as to that, intervenors had had virtually no questions to ask when cross-examining Dr. Biehler, the applicant's consultant, whose testimony covered the Cristianitos fault in its full historical range.¹³ And intervenors do not quarrel with the scope of their cross-examination of Dr. Biehler. See p. 692, *supra*. Nor did intervenors make an offer of proof as to what would have been elicited through cross-examination of Mr. Cardone and Dr. Reiter as to pre-1973 matters. In these circumstances, the Board's foreclosure ruling cannot be said to have prejudiced intervenors' case.¹⁴

¹² To require a rule change before issues are excluded would also assure that the Commission is called upon to address the specific considerations for dispensing with the opportunity to litigate particular issues before foreclosing a person who was not a party to the previous proceeding. We think this may be preferable to the course chosen by the Licensing Board, which stretches the concept of adequate representation into an unbending exclusionary rule.

¹³ Our review of the transcript reveals only an isolated series of questions relating to the focal mechanism of a 1967 earthquake. Tr. 3992-93. See n.18, *infra*.

¹⁴ The rule in the federal courts, to which we can look for guidance, is that error may not be predicated upon a ruling which excludes evidence unless a substantial right is affected, and the substance of the evidence is made known by way of an offer of proof or is otherwise apparent. Fed. R. Evid. 103. See generally *United States v. Vitale*, 596 F.2d 688, 689 (5th Cir. 1979), *cert. denied*, 444 U.S. 868 (1980); *United States v. Callahan*, 551 F.2d 733, 738

(CONTINUED)

Moreover, there may well be an alternative reason why intervenors could properly be precluded from challenging the capability of the Cristianitos fault with evidence antedating the construction permit. The issue was simply not within the scope of the contentions set for hearing.¹⁵ Whether or not a person can be foreclosed from litigating an issue that could have been raised in a proceeding to which he was not a party, he certainly can be foreclosed when the issue is not properly raised as a contention in the proceeding to which he is a party.

2. Having reviewed the record materials (as set forth below), we also believe that intervenors have failed to make a strong showing that the Cristianitos fault may be capable. Our view on the merits of that question (and on the seismic issues discussed *infra*), decidedly influences our view on the issues of irreparable injury and the other stay elements. Our statement in *Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 2)*, ALAB-486, 8 NRC 9, 46 (1978) when deciding whether to allow continued operation of that plant during pendency of a reopened hearing, is fully applicable here:


The standard which perforce governs this determination is an obvious one: will the continued operation of the plant over the period required to complete the additional proceedings be consistent with the requirement that there be reasonable assurance that the public health and safety not be endangered. See 10 CFR 2.104(c)(3); 10 CFR 50.57(a)(3). If not, the facility of course cannot be allowed to continue to operate at this time.

As applied to the case at hand, that standard obviously does not call upon intervenors to show that an earthquake beyond the seismic design of the plant is likely during the pendency of this appeal. It would be enough if apparent inadequacies in the plant's seismic design were sufficient to raise the question whether plant operation would present an undue risk to the public in the event of an earthquake.¹⁶ See *Pacific Gas and Electric Co.*

(6th Cir. 1977); *Hochstadt v. Worcester Foundation for Experimental Biology*, 545 F.2d 222, 226 n.4 (1st Cir. 1976); See also 1 *Weinstein's Evidence* ¶103[3], at 103-27 (1981); 21 *Wright & Graham, Federal Practice & Procedure* §5040 (1977), at 209. Given the line of questioning taken with Dr. Biehler we cannot say that it is apparent what kind of testimony intervenors thought they would have elicited from cross-examination of staff witnesses as to pre-1973 Cristianitos fault matters.

¹⁵ The four seismic contentions dealt with the Offshore Zone of Deformation, the Cristianitos Zone of Deformation (a feature not synonymous with the Cristianitos fault) and the propriety of San Onofre's seismic design in light of *post* construction permit data and techniques. Prior to the hearing the Licensing Board rejected intervenors' proposed contention regarding the Cristianitos fault for lack of specificity. Revised Prehearing Conference Order (May 28, 1981), at 6.

¹⁶ The facts of this case are not so close as to compel us to define how much risk is undue.



(Diablo Canyon Nuclear Power Plant, Unit 1), CLI-81-30, 14 NRC 950 (1981). Absent a greater doubt than we now have in that regard, there is not a significant threat of irreparable injury if San Onofre is allowed to start up during the pendency of this appeal. We turn to the evidence bearing on the question of the capability of the Cristianitos fault.

3. Prior to the 1973 issuance of a construction permit for San Onofre, the applicant had undertaken a comprehensive geologic investigation of the site region including detailed examinations of excavations along the Cristianitos fault, geologic mapping, and field examinations. The Cristianitos fault was seen to be a north trending, west dipping normal fault located along the eastern margin of the Capistrano Embayment. The west side of the fault was formed in association with the development and opening of the embayment during Late Miocene and Early Pliocene time (i.e., between about four and ten million years ago). Unbroken terrace deposits at least 125,000 years old overlay the Cristianitos fault and showed that the fault had been inactive for at least that time. SER at 2-34, 2-49; Testimony of Dr. Perry L. Ehlig on Contention 4 at 28; Testimony of Dr. Moore on Contention 2 at 16-17, 44; Testimony of Dr. Shlemon on Contention 2 at 8-9.

After issuance of the construction permit and at the staff's request, the applicant undertook a series of further investigations. These included a detailed investigation of two small earthquakes of magnitude 3.3 and 3.8 which occurred on January 3, 1975 near San Juan, Capistrano.¹⁷ The earthquakes were of concern to the staff: had the Cristianitos fault generated them it would constitute significant evidence that at least a portion of the fault was capable. The applicant's investigations included a geomorphic study, an evaluation of microseismic events, a study of focal mechanisms, the construction of a subsurface contour map, an updating of historic seismicity, and geophysical surveys. SER at 2-38.¹⁸ Through calibration blasts Dr. Biehler developed a model to locate more accurately the epicenters of the small earthquakes and to fix limits on their hypocentral depths.¹⁹ The difference in faulting style and spatial separation from the Cristianitos fault led him to conclude that the events could not be asso-

¹⁷ The strong motion instruments at San Onofre, approximately 20 kilometers (km) away from the earthquakes, were not triggered, indicating that ground motion had attenuated to less than 0.01g. So too a field survey along the Cristianitos fault did not locate any ground surface rupture. Testimony of Dr. Biehler on Contention 1 at 5.

¹⁸ A geomorphic study deals with surface features; focal mechanisms describe the manner in which the ground moves during an earthquake. See generally Tr. 3652-53.

¹⁹ The epicenter is the point on the ground surface directly above the source of the earthquake (the hypocenter) from which seismic waves first emanate.

ciated with that fault. Testimony of Dr. Biehler on Contention 1 at 7-8.²⁰ These and other investigations²¹ confirmed the applicant's and staff's opinion that evidence gathered since the construction permit issued did not disturb the earlier conclusion that the Cristianitos fault was not capable. See generally SER at 2-34 through 2-35, 2-49 through 2-50; Testimony of Dr. Moore on Contention 2 at 15-17.

Intervenors presented two witnesses on the capability of the Cristianitos fault. The principal witness, Mr. Richard S. Simons, attempted to show that a number of low magnitude earthquakes could be geographically associated with the Cristianitos fault, thus indicating its activity or capability.²² He plotted the location of instrumentally determined earthquake epicenters in an area surrounding San Onofre,²³ drew a circle about each epicenter the radius of which was equivalent to the error in the position of that epicenter, then drew a line representing the position of the Cristianitos fault. Twenty of the circles intersected the Cristianitos line. This, Mr. Simons asserted, was evidence that the Cristianitos fault should be considered capable.

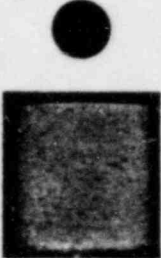
This evidence is not convincing. Mr. Simons' plot of earthquake epicenters reveals a generally random distribution of epicenters throughout the

²⁰ The motion of the two small earthquakes was strike-slip with a significant thrust component, while one would expect dip-slip movement from the Cristianitos fault. (In a strike-slip fault, the ground on one side of the fault moves horizontally and parallel to that on the other side; in a dip-slip fault, the movement is perpendicular to the strike of the fault. See generally 13 NRC at 917-18, *Glossary of Geology* (2d ed. 1972)). Moreover, the two earthquakes were oriented along the trend of Trabuco Canyon, a significant geomorphological feature, and oblique to the trend of the Cristianitos fault. Beyond differences in faulting style — simply as a matter of geographically locating the earthquake — it was unlikely that either earthquake lay on the Cristianitos fault plane even assuming the shallowest possible dip for the Cristianitos fault. Testimony of Dr. Biehler on Contention 1 at 7-8.

²¹ A number of other investigations were conducted after the construction permit issued to resolve questions bearing upon the capability of the Cristianitos fault. For example, at the staff's request the licensee undertook trenching to expose the base of Holocene alluvium (i.e., recent (in the last 10,000 years) stream deposits). The alluvium showed no evidence of fault displacement, nor did the overlying terrace deposits show any evidence of shearing. See Testimony of Dr. Shlemon on Contention 2 at 8-9; SER at 2-34 through 2-39.

²² Because the Licensing Board apparently considered Mr. Simons' testimony dealing with pre-1973 earthquakes to be intertwined with later developments, it applied its foreclosure ruling to the entirety of his testimony. His testimony was also excluded for lack of probative value. 15 NRC at 76.

²³ These data were obtained from a catalog published by the Seismology Laboratory at the California Institute of Technology for the period 1932 through 1980. Written Testimony of Richard S. Simons, attached as Exh. 1 to Intervenors (sic) Carstens *et. al.* Application for Stay of Low Power License (filed January 27, 1982) [Stay Motion], at 2. That catalog includes an estimate of the error to be associated with the position of each epicenter in terms of distance. The area considered by Mr. Simons was roughly a square, 55 kilometers to a side, containing 127 epicenters.



region.²⁴ Seemingly any line drawn on that plot comparable in length to the Cristianitos fault (approximately 40 kilometers) would be intersected by a number of earthquake epicenter error circles. Following Mr. Simons' reasoning, any such line would define a capable fault. Had Mr. Simons in fact demonstrated that the line representing the Cristianitos fault was intersected more frequently than other randomly drawn lines of comparable length his methodology might provide some basis for associating the Cristianitos fault with earthquake activity.²⁵ But Mr. Simons did not show this, our scrutiny of his plot does not indicate that carrying out this procedure would support his thesis, and more thoroughgoing investigations undertaken by the applicant and staff showed the Cristianitos fault to be inactive. See pp. 699-700, *supra*. We conclude that the Licensing Board did not err in not crediting Mr. Simons' testimony.

Intervenors' other witness on the activity of the Cristianitos fault, Mr. Mark R. Legg, relied upon Mr. Slomons's analysis for predicating the fault's activity. See Tr. 5204-05. What we have said of Mr. Simons' testimony therefore, is fully applicable here as well.²⁶ Additionally, Mr. Legg sought to show that inactivity of the Cristianitos fault should not be inferred from the fact that the regional stress field has changed from the

²⁴ On cross-examination, Mr. Simons acknowledged that the arrangement of earthquake epicenters in the vicinity of San Onofre was generally random. Tr. 4820-21. Indeed, if anything, there is a clustering of epicenters in the northeast quadrant of Mr. Simons' Figure 1 and away from the location of the Cristianitos fault and San Onofre.

Randomness is inherent in the notion of a "halo of seismicity," a concept Mr. Simons recognized as applicable to California and which characterizes the random disposition of small epicenters not associated with known faults. Tr. 4842. Seismicity this low yields peak ground accelerations so small that the design of the plant, 0.67g, can easily cope with them. For example, the 1975 earthquakes 20 kilometers distant from San Onofre produced a peak ground acceleration at San Onofre of less than 0.01g.

Also appearing in the record is a mapping of earthquake epicenters of magnitude 3 and above for the entire Southern California area. Testimony of Dr. Stewart W. Smith on Contention 4 at 5 and Figs. SWS-A, -B, and -C. These figures also demonstrate the generally uniform distribution of small earthquake epicenters throughout the region, as well as concentrated clusters of events associated with faulting. The San Onofre and Cristianitos regions stand out as areas of low seismic activity.

²⁵ As noted *supra* p. 699, applicant did conduct further investigations regarding the issue, especially into the 1975 small magnitude earthquakes. These investigations included calibration blasts recorded by 11 seismographs to develop a local crustal velocity model for the purpose of fixing limits on the earthquakes' hypocentral depths, and a comparative analysis of their focal mechanisms with that of Cristianitos. Mr. Simons' far less sophisticated error-based analysis did not distinguish between the Cristianitos fault and any other randomly located comparable plot.

²⁶ The Licensing Board struck approximately one paragraph of Mr. Legg's prepared testimony in accordance with its ruling that intervenors were foreclosed from litigating pre-1973 information regarding the Cristianitos fault. Tr. 5237-41. The excluded testimony was, in essence, a summary of Mr. Simons' testimony. Its formal rejection was therefore not prejudicial.

time the Cristianitos fault was formed.²⁷ The point is a tangential one, and in any event Mr. Legg conceded on cross-examination that he had no evidence in the history of geology that a listric normal fault (such as the Cristianitos is thought to be) had later undergone left lateral oblique thrust, the type of movement his view posited. Tr. 5246-47. See also Tr. 6392-94.²⁸

Lastly, intervenors point to the uncertainty associated with Dr. Biehler's location of the 1975 earthquakes and argue from that, that their location on the Cristianitos fault cannot be excluded. Dr. Biehler had testified on cross-examination that if one assumed the shallowest possible vertical projection for the Cristianitos fault, and used the maximum standard deviation on hypocentral depth, one of the two events comes very close to the projected line at a depth consistent with the deepest portion of the vertical error bar. Tr. 3965. However, Dr. Biehler also testified that the focal mechanisms of the 1975 earthquakes are inconsistent with that of the Cristianitos fault, and his position was endorsed by the NRC staff seismologist, Dr. Reiter. Tr. 5745-46. Moreover, Dr. Biehler was of the opinion that the hypocentral location of the 1975 events was two to three kilometers above the position of the Cristianitos fault. Tr. 3969-70. Dr. Reiter concurred that it would require an arbitrarily great shallowness of the Cristianitos fault, in disregard of its focal mechanism of a steeply vertical dip-slip fault, to associate the 1975 earthquakes with it. Tr. 5746.

From our review of the record thus far, we think the great weight of the evidence supports the view that the Cristianitos fault is not an active fault. Intervenors have not made a strong showing that they are likely to prevail on that issue by the end of our appellate review. Moreover, the factual controversy is not so close that there is a significant risk of irreparable injury in allowing San Onofre to operate during the pendency of the appeal.

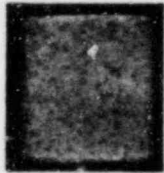

III. The Offshore Zone of Deformation

A. Background

Intervenors other major argument for a stay is that the Licensing Board erred in treating as segmented the Offshore Zone of Deformation, (OZD),

²⁷ The Cristianitos is a dip-slip fault, oriented west-southwest. In mid-Pliocene times (five to six million years ago) the tectonic setting of the region changes from east-west extension to the present stress field which is north-south crustal shortening or compression. Tr. 5204-05; Testimony of Dr. Moore on Contention 2 at 16. Applicant's witness Dr. Ehlig was of the opinion that the present tectonic regime would remain unchanged for at least the next 100,000 years. Tr. 994.

²⁸ A listric normal fault is a fault in which the hanging wall moves downward, usually concluding with a concave-upward surface of fracture. *Glossary of Geology* (2d ed. 1972).



which is the geologic feature that controls the design basis earthquake for San Onofre. This segmentation, we are told, was contrary to an understanding among the parties to assume that the OZD was a continuous throughgoing feature, and had the effect of underestimating the maximum magnitude earthquake for which San Onofre should be designed.

We think that intervenors have misread both the understanding of the parties and the Licensing Board's decision. All understood that the geologic characteristics of the OZD and their relevance to earthquake magnitude were contested matters for the Board to decide, so long as the controversy stayed within the confines of the description of the OZD posited by the NRC staff and its geological consultant, the United States Geological Survey (USGS). As explained below, nothing in the Board's decision contravened the staff and USGS position that, for purposes of conservative nuclear design, the three segments of the OZD should be considered related in some fashion and capable of an earthquake the magnitude of which could be commensurate with the length of the zone.²⁹

B. The Parties' Understanding

At the construction permit hearing the parties stipulated as an issue:

[w]hether, assuming the geologic model set forth in the Regulatory Staff's Safety Evaluation, 0.67g is a reasonably conservative design basis earthquake for San Onofre Nuclear Generating Station Units Nos. 2 and 3.

Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-73-36, 6 AEC 929, 931 (1973). With regard to the OZD, the Staff's model indicated

[t]he existence of a zone of deformation about five miles offshore from the [San Onofre] site which extends from the Newport-Inglewood fault zone to the north and cannot be disassociated from the Rose Canyon fault zone to the south. The present evidence indicates an extensive, linear zone of deformation, at least 240 kilometers (km) long extending from the Santa Monica Mountains to at least Baja, California. We and our consultants [USGS] consider this zone of deformation to be potentially active and capable of an earthquake whose magnitude could be commensurate with the length of the zone.

Safety Evaluation of the San Onofre Nuclear Generating Station, Units No. 2 & 3 (October 1972), at 15-16. The safety evaluation went on to

²⁹ The three segments of the OZD are, from north to south, the Newport-Inglewood Zone of Deformation (NIZD), the South Coast Offshore Zone of Deformation (SCOZD), and the Rose Canyon Fault Zone (RCFZ).

recommend that the design basis earthquake for the plant be based upon an acceleration of 0.67g from the maximum earthquake likely to affect the site. *Id.* at 16.

While the applicant was of the view that the USGS model for the OZD was unduly conservative and at odds with its geologic characteristics, it nevertheless "agreed to accept the Staff's more conservative view as the basis for their design." 6 AEC at 943.³⁰ That agreement carried through to the operating license hearing. Though reiterating that "the Applicants have never accepted as a matter of substance the throughgoing nature of the offshore zone of deformation", counsel for the utility nevertheless represented that "[w]e are not attempting to relitigate that particular question at this time and it does not appear in any of the issues." Tr. 1046.

The parties also agreed that USGS witness Mr. James F. Devine had correctly outlined the meaning to be attached to the model of the OZD. App. Tr. 24. That the zone of deformation should be considered potentially active and capable of an earthquake the magnitude of which could be commensurate with the length of the zone was not to be taken as indicating that the offshore zone of deformation was a fault zone, or

³⁰ In fuller explanation the Licensing Board there stated (6 AEC at 943):

It has become apparent to the Board, both from the record existing at the start and from the testimony during the hearing, that an honest difference of opinion exists between the experts on the two sides as to the proper geological model to use, i.e., whether there is a long continuous zone of deformation near the site which must be considered as the potential location of a major earthquake, or whether the nearby zone constitutes only a smaller, isolated fault and one need consider only a small earthquake commensurate with that shorter fault and larger earthquakes on more distant faults. The Applicants ultimately (prior to the hearing) agreed to accept the Staff's more conservative view as the basis for their design. Accordingly, they agreed to the stipulation cited in Paragraph 51, *supra*, which specifies that the adequacy of the design basis earthquake will be litigated in the framework of "the geological model set forth in the Regulatory Staff's Safety Evaluation." This model, of course, is the one set forth by the USGS in the quoted sections of report [sic] in Paragraph 59, *supra*. The Board has reviewed the information in the record and the Staff's evaluation of that information and finds that the Staff's model is the appropriate one for use in evaluating the effect of these facilities on the health and safety of the public. We note the Applicants' reluctance to concede that the Staff's model is a true representation of the situation. This was indicated by their effort to introduce prepared testimony attempting to counter the Staff's model and specifically stated in the Applicants' reply to the Staff's proposed findings. As we stated above, the interpretation of the geological data is susceptible to differences of opinion and future discoveries may well prove the Applicants' interpretation to be correct. Indeed, there may even be a small preponderance of evidence presently in their favor. The importance of the matter from a safety point of view and the lack of overwhelming evidence that the Applicants' interpretation is correct, however, require this Board to adopt the more conservative position, i.e., that the Staff's model is the one to be used in evaluating the propriety of an 0.67g design basis earthquake.

capable of rupturing at the same time in a single event. Rather, as Mr. Devine explained (Tr. 5333):³¹

[w]e specifically avoided the term "fault zone." We called it a zone of deformation because there are indeed segments which are not faulted, but instead deformed, folded, for example.

And so when attempting to describe them, the earthquake potential one should assign to such a feature, we argued that the three discrete zones should not represent individual fault zones and earthquake magnitudes dependent on each of those individual segments, but instead should consider them all in one segment, for the purpose of estimating earthquake size.

Q That is not the same, however, as saying for example that you are suggesting a single fault capable of rupturing at the same time in a single event, is it?

A As I recall, none of us had the opinion or the position that the entire length could rupture at once, but only that there was indeed some relationship, probably at depth, of these three segments, such that it all should be considered one zone.

In sum, the parties were free to put on evidence about the geologic characteristics of the three OZD segments and the effect of those characteristics on the maximum magnitude earthquake for San Onofre's design, so long as account was taken of the fact that there was indeed some relationship among the three segments.³² Intervenors do not contend that the staff or applicant did otherwise. App. Tr. 25. What the understanding barred was the position that each particular segment of the OZD should have an assigned maximum magnitude earthquake derived from the as-

³¹ In tracing the history of the USGS position as it developed at the construction permit review, Mr. Devine noted (Tr. 5332-33):

The Applicant maintained that there were three discrete components, and put forth an argument that there was not sufficient evidence to cause them to be linked and considered as one fault, and on the other side of the scale, we were not able to demonstrate that they were indeed one fault.

However, in our review at that time, we insisted that for purposes of nuclear design, and for margins of safety and levels of conservatism as we understood them, we felt it appropriate that for that purpose they be considered to be one zone of deformation

³² Contention 4 in the proceeding specifically put the geologic characteristics of the OZD in issue. It reads:

Whether based on the geologic and seismic characteristics of the OZD, including its length, assignment of $M_s 7$ as the maximum magnitude earthquake for the OZD renders the seismic design basis for [San Onofre] inadequate to protect the public health and safety.

M_s stands for "surface wave magnitude". It is a measure of magnitude used to describe earthquakes of about magnitude six and above. See 15 NRC at 101-102. See also 13 NRC at 930-31.

sumption that an earthquake rupture could not proceed from one segment to another.

C. Licensing Board Consideration of the OZD

Intervenors are not likely to persuade us on the merits that the Licensing Board decision was inconsistent with that model. First, intervenors' argument is inherently implausible because its underlying premise is that the Licensing Board took a fact-finding path inconsistent with the evidence presented by *all* the parties.³³ Second, intervenors' argument is refuted by the Licensing Board decision itself. The Board summarized its findings as follows:

The intervenors persistently attempted to show that the OZD was controlled by a major, throughgoing fault capable of rupture along its full length. But apart from Dr. Slemmons testimony (Tr. 6317) that he believed the OZD could be interpreted as a single continuous fault, there was virtually no evidence to support this theory. In our hearings the OZD was repeatedly characterized by other witnesses as a segmented zone. The SER and the witnesses for the Applicants, the USGS and the Staff all characterized the OZD as a discontinuous zone divided into three segments, the NIZD, SCOZD and RCFZ. Witness Allen testified that the zone does not contain a single, continuous well defined fault zone (Tr. 4732). The evidentiary record supports the description of the OZD as some 240 km long, composed of a series of discontinuous, short, en eschelon [sic] fault segments, drag-fold anticlines and synclines, which progressively changes its style of faulting from north to south. Of major significance for us was the uncontested evidence of the San Joaquin Structural High which interrupts or terminates the NIZD at its southern end, a fact which emphasizes the unlikelihood of a throughgoing rupture of the OZD.

51. The Board's findings on the OZD rest heavily upon the exhibits and testimony presented by the Staff and the Applicants. The Intervenors' primary witnesses had not made independent studies of the San Gnofre area and that fact was testified to by Dr. Brune (Tr. 4207-4208) and Mr. Legg (Tr. 5156). Nor do the Proposed Findings of Fact of the Intervenors challenge the findings we have presented other than in their attempt to mischaracterize the OZD as a structure controlled by a single, continuous fault capable of rupture along its full length.

³³ We again take note of the fact that intervenors do not contend that the staff's and applicant's evidence was inconsistent with the OZD model. See p. 705, *supra*.

15 NRC at 109. Nothing in the Licensing Board's findings strikes us as inconsistent with the understood OZD model. As Mr. Devine emphasized, the OZD is not a single throughgoing *fault* but rather a zone of deformation. Nor was the USGS of the opinion that the entire length could rupture at once. See p. 705, *supra*.

IV. Other Challenges to the Adequacy of the Seismic Design Basis

A. The Maximum Magnitude Earthquake

Intervenors argue that the Licensing Board erroneously accepted the views of staff witness Dr. David Slemmons, who calculated the "mean" rather than "the properly conservative mean plus one standard deviation (84%)" earthquake that might be expected on the OZD. Stay Motion at 7. Intervenors argue that the properly conservative magnitude range is from $M_s 7.3-7.9$, and that the $M_s 7$ figure accepted by the Board³⁴ means that half the earthquakes that occur on the OZD will exceed the magnitude premised for San Onofre's design.

1. Intervenors' argument is refuted by other testimony in the proceeding and stems from what appears to be an improper use of Dr. Slemmons' testimony. As a matter of recorded history the largest earthquake anywhere on the OZD is the 1933 Long Beach earthquake of $M_s 6.2$ ³⁵ Nowhere along the OZD is there good evidence of the amount of surface displacement that has resulted from a single major past earthquake. Testimony of Dr. Heath on Contention 4 at 22. Dr. Smith concluded that earthquakes larger than $M_s 6.5-7.0$ could not have occurred very often over the last million years without producing more impressive geologic deformation than has been seen in the region of the OZD. Testimony of Dr. Smith on Contention 4 at 7. To contend that half the earthquakes that occur on the OZD are expected to exceed the safe shutdown earthquake for San Onofre is totally at odds with these observations.

2. Intervenors' adaptation of Dr. Slemmons testimony fails to take into consideration the conservatism in his methodology. As we explain below, Dr. Slemmons derived estimates of a maximum magnitude earth-

³⁴ 15 NRC at 123.

³⁵ That earthquake occurred on the Newport-Inglewood (NIZD) segment. To assign that earthquake to the South Coast Offshore Zone of Deformation (SCOZD) nearest San Onofre is conservative because (1) the NIZD is closer to the area of high stress at the interaction between the San Andreas fault system and the Transverse Range than are the other segments of the OZD to the south, (2) it has the most prominent surficial anticlines and short but prominent fault scarps, (3) it is coincident with a Mesozoic basement rock discontinuity not known to exist beneath the other segments, and (4) it has a higher level of historical seismicity. Testimony of Dr. Edward G. Heath on Contention 4 at 17.

quake for the OZD by conservatively extrapolating from the maximum earthquakes that had been recorded on similar faults. Thus it would not be appropriate to adjust his final result by yet another standard deviation.³⁶

Dr. Slemmons' preferred method of estimating maximum earthquakes magnitude made use of the observation that, for faults similar to those in the OZD, only a fraction of the total fault length would rupture in an earthquake. The table on page E-14 of his testimony summarizes the historic date for those strike-slip faults he selected. Staff Ex. 1-DBS at E-14. Of 22 earthquakes on 10 major strike-slip faults varying from 272 to 1380 km in length, he selected the 10 maximum rupture lengths to determine the mean of the maximum fractional rupture and its standard deviation.³⁷ His calculated average maximum fractional rupture was 22.1 percent, with a standard deviation of 7.45 percent.

Dr. Slemmons then applied these calculated values to various hypothesized total lengths of the OZD. Assuming the OZD ran 190 km from the northern Santa Monica fault to San Diego Bay yielded an anticipated maximum mean rupture of 44 km (22 percent of 190 km) and a predicted maximum magnitude earthquake of $M_S 6.9$.³⁸ The maximum mean rupture length plus one standard deviation corresponded to a 57 km rupture and a $M_S 7.0$ earthquake. Dr. Slemmons also made calculations for an OZD assumed to be 250 km long which he considered "an extreme length assumption." Staff Ex. 1-DBS at E-13. For a maximum mean rupture of 22 percent, he calculated a maximum magnitude of about $M_S 7.0$. Adding one standard deviation to the maximum mean rupture length, yielded a maximum magnitude of about $M_S 7.1$.

Dr. Slemmons also pointed to further conservatism in his methodology in that if his determination of the maximum percentage rupture for

³⁶ The standard deviation is a measure of the variability in a set of observations. The mean plus one standard deviation for a normal distribution, by definition, encompasses 34 percent of the observations. Technically speaking the standard deviation is the square root of the average of the squared distances of the observations from the mean. R. Levin & D. Rubins, *Applied Elementary Statistics* 95-96 (1980).

Another statistical measure sometimes used is the standard error of estimate. It measures the scatter of observations around a regression line — a line used to estimate the association or relationship between two or more variables. *Id.* at 410, 426. See n.38, *infra*.

³⁷ He did not consider the 12 other earthquakes on these faults for which shorter rupture lengths had occurred.

³⁸ Earthquake magnitude was calculated from the length of fault rupture through a formula Dr. Slemmons derived in his 1977 report utilizing data from 31 strike-slip faults. The general equation he derived was $M_s = 0.597 + 1.351 \log_{10} L$, where L represents rupture length in meters and M_s is the earthquake magnitude from surface waves. Dr. Slemmons did not believe it was appropriate to use the standard error of the estimate for that set of data, 0.694, in conjunction with the method described in the text which already accounts for estimates of error. Tr. 6230-31. Dr. Slemmons also noted that his most recent work would reduce his 1977 standard error of estimate of the maximum magnitude from 0.694 to about 0.2. Tr. 6192, 6307.

strike-slip faults were restricted to faults of a length comparable to postulated lengths of the OZD, lower values for magnitude are adduced. Tr. 6285. See Staff Exh. 1-DBS at E-14. An inspection of the data presented in Dr. Slemmons' table on page E-14 reveals that the fraction of total fault length which ruptures is greater for longer faults than for the shorter ones. For faults nearer in length to the OZD, the Licensing Board noted that the fractional rupture length was only 15-16 percent rather than the 22 percent calculated as the average for all lengths. 15 NRC at 121-23. Applying this percentage to ruptures on the OZD would obviously lead to lower earthquake magnitudes than Dr. Slemmons calculated. *Id.* at 121-22.³⁹ Dr. Slemmons concluded that he has "high confidence in the [choice of a] magnitude of 7" earthquake for the design basis of San Onofre. Tr. 6323.

In sum, Dr. Slemmons' methodology (1) chose the mean of the maximum magnitude earthquakes that had occurred on similar faults, (2) assumed the OZD to be a throughgoing fault, (3) added a standard deviation to the calculated earthquake rupture length, and (4) included in his data longer length faults that had the effect of overstating magnitude. We do not think that intervenors have made a strong showing that it is correct or reasonable to add an additional standard deviation to the earthquake magnitude he estimates, or that the $M_{s7.0}$ magnitude obtained was erroneous.⁴⁰

B. Peak-Ground Acceleration

The determination of the maximum magnitude earthquake that might affect San Onofre is only one step toward the most critical portion of the

³⁹ This Board notes that restricting the data to faults of 410 km or less results (on that limited data base) in a maximum percentage rupture of about 14.2 plus or minus (\pm) 3.4 percent. For an assumed 240 km OZD, that maximum percentage rupture plus one standard deviation yields an estimated magnitude of $M_s 6.8$.

⁴⁰ The choice of a $M_s 7.0$ safe shutdown earthquake for San Onofre is amply supported by other expert testimony in the record. Thus applicant's expert, Dr. Heath, found the area surrounding the San Onofre site to have one of the lowest historic levels of seismicity in Southern California, with every expectation of remaining so. Testimony of Dr. Heath on Contention 4, Figures EGH-F and EGH-G. He thought that the $M_s 6.3$ 1933 Long Beach earthquake on the Newport-Inglewood zone of deformation may be close to the maximum for the zone. *Id.* at 20. Dr. Heath also carried out an analysis by which he related the maximum magnitude earthquake expected on a strike-slip fault to the geologic slip-rate on the fault. Though it appears that this is a somewhat new approach, the results support assigning $M_s 7$ as the maximum earthquake on the OZD. *Id.* at 23-28 and Figure EGH-M.

So too, as already noted *supra*, p. 707, Dr. Smith concluded that earthquakes larger than about $M_s 6.5-7.0$ could not have occurred very often over the past million years without producing more impressive geologic deformation than what is seen in the region of the OZD. Dr. Ehlig, another applicant witness, concluded that the features of the OZD — its geologic strain rate, regional tectonic setting, and "[t]he absence of extensive and/or throughgoing fault ruptures in near-surface strata along much of the OZD" — all support earthquakes of less than about $M_s 7$. Testimony of Dr. Ehlig on Contention 4 at 21-22.

seismic design, establishing the ground motion properties of the site. This latter determination is meant to express the impact at the plant site of the maximum earthquake should it occur at the point on the controlling fault nearest the site. Ground motion properties are usually summarized through the choice of a peak ground acceleration (PGA), or "g" value, expressed as a percentage of the acceleration produced by gravity. Once the peak acceleration is determined it becomes the anchor point for the design response spectrum for the plant.⁴¹

The Board discussed at length the testimony relating to ground motion for the San Onofre site and the related matters of peak ground acceleration and response spectra, concluding that the seismic design bases set at the construction permit hearing were adequate. 15 NRC at 123-150⁴² Intervenor's contest that conclusion, alluding to several claimed errors affecting the plant's design: (1) inadequate weight was given to the testimony of USGS scientist Dr. David M. Boore that for a M_s7 earthquake the peak ground acceleration could be as high as 0.83g; (2) a vertical motion spectrum anchored at two-thirds that of horizontal motion is unduly low; (3) Dr. Enrique Luco's higher peak ground acceleration estimates were wrongly rejected, and (4) the effect of seismic wave focusing which, if credited, also would have resulted in a higher peak ground acceleration, was ignored. We discuss each point in turn.

⁴¹ The plant's seismic design is based on a response spectrum that is a graphic representation of how a structure or component will respond to earthquake motion that includes the assumed peak ground acceleration.

The peak ground acceleration is not in and of itself of significance because the anchor point on the response spectrum is typically at or above 33 cycles per second, a frequency beyond the natural frequencies of a nuclear power plant or its mechanical systems. The importance of PGA relates to the fact that the accelerations at lower frequencies — those within the range of concern for a nuclear power plant — are derived from the response spectrum anchored at a specific PGA. See generally, NRC Regulatory Guide 1.60 (Rev. 1, December 1973). The higher the PGA, the higher will be the response of structures at other frequencies of interest.

For further discussion of response spectra in general and with specific regard to San Onofre, see Testimony of Dr. Robert L. McNeill on Contention 4 at 6-19. See also *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-644, 13 NRC 903, 923-25, and nn.40, 43.

⁴² The seismic design criteria for San Onofre can be summarized as a site specific response spectrum for horizontal motion, anchored at a high frequency acceleration of 0.67g, with a vertical spectrum set at two-thirds of that for horizontal motion (i.e., vertical anchor point acceleration 0.44g). At the construction permit stage for San Onofre this characterization was established to represent ground motion associated with an Intensity X earthquake. For the operating license proceeding, consistent with more recent practice, the NRC required the applicant to show that the maximum reasonable earthquake associated with the OZD would be one of magnitude M_s7 , having the same ground motion properties discussed above (0.67g etc.). See SER at 2-50 through 2-51, 2-66 through 2-68.

1. Dr. Boore's Methodology

Intervenors claim that the Licensing Board "misused, misconstrued, and did not give sufficient weight to" the testimony of Dr. Boore of the USGS, whom they characterize as the "only truly independent witness" on the subject of peak ground acceleration.⁴³ Dr. Boore was co-author of a paper that predicts PGA at various distances from earthquakes of different magnitudes. Interv. Exh. 28. For San Onofre, situated eight km from a possible M_{s7} earthquake, Dr. Boore's method yielded a mean PGA of 0.46g, and a mean plus one standard deviation value of 0.83g. Tr. 6559.⁴⁴

Our review of the record and the Board's decision leads us to conclude that the Board fairly considered Dr. Boore's testimony and adequately explained why his predictions were not reliable for San Onofre. Dr. Boore and his co-author themselves stated that "[f]or distances less than 40 km from earthquakes with M greater than 6.6 the prediction equations are not constrained by data, and the results should be treated with caution." Interv. Exh. 28 at 17. In discounting the reliability of Dr. Boore's model the Licensing Board correctly noted that an appropriate model of peak ground acceleration should be "chiefly controlled by the data rather than by assumptions in the model." 15 NRC at 134.⁴⁵ When Dr. Boore on cross-examination was asked what the effect would be of eliminating the data beyond 50 km, he stated that the correlation revised in that manner gave predictions for San Onofre conditions of 0.31g for mean PGA, and 0.57g for the mean plus one standard deviation. Tr. 6609-10. These values are not greatly at variance with other witnesses' predictions.⁴⁶ Further, applicant's witness Dr. Idriss was of the opinion that the standard de-

⁴³ As noted *infra*, n.46 the USGS position (as opposed to Dr. Boore's position) was that 0.67g was an appropriate PGA for San Onofre.

⁴⁴ Dr. Boore also considered it appropriate that these values be reduced by dividing them by a factor of 1.13 (i.e., to 0.41g and 0.73g) in accordance with the practice of using the average of the two components of recorded horizontal peak acceleration. Tr. 6559-61.

⁴⁵ Applicant's witness Dr. Smith suggested that Dr. Boore's correlations for PGA were controlled by data at large distances from the earthquakes. Testimony of Dr. Smith on Contention 1 at 4-7; Tr. 3261-74.

⁴⁶ The 0.67g peak ground acceleration value for San Onofre was first set on the advice of the USGS at the construction permit hearing and was adhered to by the USGS for the operating license proceeding. See 6 AEC at 942-45; SER, Appendix G at G-5.

The applicant's primary basis for a PGA value was an analysis of 192 PGA recordings from 22 earthquakes by Dr. Lawrence H. Wight. The study resulted in a mean PGA of 0.33g and mean plus one standard deviation value of 0.52g. Testimony of Dr. Wight on Contention 4 at 6-7; Appl. Exh. 11. A similar analysis by applicant's witness Dr. I.M. Idriss yielded a mean plus one standard deviation value for PGA of 0.63g. Testimony of Dr. Idriss on Contention 4 at 7-13. The applicant also used theoretical modeling techniques to determine ground motion characteristics for the site resulting from M_{s7} events on the OZD. Testimony of Dr. Gerald A. Frazier on Contention 4 at 3-21. These results were consistent with those of the empirical studies of Drs. Wight and Idriss. *Id.* at Figs. GAF-C and -D.

viation computed in Dr. Boore's paper was too great for predictive confidence, particularly for close-in locations. Tr. 1737-38.

2. High Peak Vertical Accelerations

Intervenors claim the Licensing Board erred in not being concerned that during certain recent earthquakes, most notably the M_{6.9} Imperial Valley earthquake of 1979, peak vertical accelerations had been recorded which were greater than two-thirds of the horizontal peak acceleration, the ratio chosen for San Onofre's design.⁴⁷ Again, we think the Board adequately explained its reason for believing that high peak vertical accelerations were not significant for the structural safety of San Onofre.

The reasons were three-fold. First, the vertical peaks were of very high frequency, and had little structural damage associated with them. Second, the design of San Onofre assumes that the significant ground motion from all components occurs simultaneously while in fact the recorded high vertical peaks occurred early on, before the maximum horizontal motions. Testimony of Dr. Frazier on Contention 1 at 15-21.⁴⁸ Third, Dr. McNeill, who derived the spectra used for San Onofre's design, noted that acceleration values, rather than acceleration ratios, are the values of design significance. The design spectra for San Onofre, horizontal and vertical, lie above that associated with the Imperial Valley earthquake of 1979 at all frequencies for relevant distances. See Tr. 4008-09, 4024.⁴⁹ We find that the Board's explanation suffices for rejecting the significance of the higher than anticipated ratio of vertical to horizontal motion associated with the Imperial Valley earthquake of 1979.

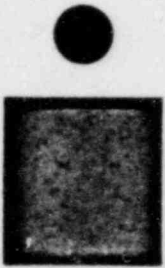
3. Dr. Luco's Testimony

Intervenors also claim that the Board ignored the testimony of Dr. Luco, a Board witness who was called to testify on the earthquake modeling results submitted by the applicant. See, e.g., Testimony of Dr. Frazier on Contention 4; Appl. Exhs. 21, 24. In summarizing his criticism of Dr. Frazier's model, Dr. Luco suggested, without elaboration, that it is possible to have peak ground accelerations of 0.8g from a M_{6.5} earth-

⁴⁷ The design peak vertical acceleration for San Onofre is anchored at 0.44g, or two-thirds its peak horizontal acceleration of 0.67g. See n.42, *supra*.

⁴⁸ Dr. Frazier also noted that in soft sediment there is an upward bias in recorded velocity peaks. Those soft sediment soil conditions are closer to the conditions at Imperial Valley than to the more rock like conditions at San Onofre. Testimony of Dr. Frazier on Contention 1 at 15. See also SER at 2-66.

⁴⁹ The data indicate that even a mean plus one standard deviation vertical response spectrum formed using the near-field data for the Imperial Valley earthquake of 1979 only exceeds the vertical design spectrum for San Onofre at a few frequencies. Appl. Exh. 1, Response to NRC Question 361-64.



quake, a factor of two higher than Dr. Frazier's model would have predicted.⁵⁰ Tr. 4496-97. However, Dr. Luco was unwilling to recommend that or any other "g" value for San Onofre, in view of what is in his opinion, an uncertain definition of acceptable risk in NRC regulations.

Because of the considerable amount of evidence and analysis in the proceeding specifically on the matter of peak ground acceleration (see pp. 711-712, *supra*) we accept, at least for purposes of this stay motion, the Licensing Board's judgment that the weight of the evidence does not support Dr. Luco's position. 15 NRC at 138-140.

4. Effects of Focusing on Peak Ground Acceleration

Finally intervenors claim that the Board unduly minimized the effects that focusing would have to increase earthquake ground motion. Again, we find the criticism wide of the mark.

Focusing is the compression of seismic waves in the direction that a fault ruptures. The Licensing Board noted that the witnesses did not dispute that focusing is a real, observed phenomenon. Instead, the dispute centered on how much higher peak ground accelerations might realistically be expected to result from focusing. 15 NRC at 147-48. As to this, applicant's witnesses testified that the maximum spread between the focused and "defocused" peak ground accelerations would be approximately a factor of two which was already accounted for in their calculations. Tr. 3255-60 (Dr. Smith); see also Testimony of Dr. Frazier on Contention 4 at 12-13. Intervenors witness, Dr. James N. Brune, thought it was possible that focusing could lead to PGAs five times higher in the direction of rupture than in the defocused direction. Tr. 4365. However, he noted that at the frequencies of interest for San Onofre, so large a disparity has never been borne out in any kind of large earthquake, and the observed effects have been in the range of a factor of two as applicant's witnesses testified. Tr. 4365-67.

The Licensing Board also took note of Dr. Smith's testimony that the San Onofre facility does not stand directly in the path of the OZD, the controlling geologic feature, but is eight kilometers off to the side of it and hence not positioned to experience the effects of focusing. The Board summarized its discussion of the issue as follows:

All of the available evidence indicates that where focusing does occur, the resulting differences in high and low PGAs will be about a factor of 2, and that lesser differences will obtain between

⁵⁰ Dr. Luco buttressed his opinion by referring to the results from two published sources. Tr. 5006-07. One of the reports referenced by Dr. Luco, USGS-Circular 672, has been superseded by later USGS publications that predict lower values of PGA. See Tr. 5065.

median and high PGAs. Moreover, there are no major active faults in the site vicinity "focused" — i.e., aimed at — the site. Furthermore, the Intervenor's concerns about focusing are based in the record on little more than its possibility, and an alleged lack of sufficient data. They have failed to advance a plausible theory supporting these concerns.

15 NRC at 150. We cannot say that intervenors are likely to prevail on their critique of the Licensing Board's handling of focusing.⁵¹

....

In view of the extended length of time it takes for a nuclear power plant to proceed from fuel loading and testing to achievement of criticality — some three to four months — we have been able to gain a greater familiarity with the record and the issues than is normally the case when ruling upon a stay motion. Our review at this juncture leaves us with the belief, explained in the preceding pages, that the asserted errors advanced by intervenors in their stay motion do not cast serious doubt on the propriety of San Onofre's seismic design. Nor has the one questionable Licensing Board ruling — that on foreclosure — worked, in practice, to prejudice intervenors' case.

For all the foregoing reasons, intervenors' motion for a stay pending appeal is *denied*.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Shoemaker
Secretary to the Appeal Board

⁵¹ Intervenor's also allege that the Licensing Board wrongly relied on the theory of saturation of earthquake ground motion to decrease PGA. Intervenor's are mistaken. To the contrary, the Licensing Board said that "given the meager and rather confused record on saturation, [we do] not ascribe substantial significance to the [saturation] phenomenon." 15 NRC at 000 (slip opinion at 147). While we do not necessarily agree with the Licensing Board's characterization of the record on the matter of saturation, we find no harm to the intervenors in the Board's assessment of the concept.

Atomic Safety and Licensing Boards Issuances

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Cite as 15 NRC 715 (1982)

LBP-82-25

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Louis J. Carter, Chairman
Dr. Oscar H. Paris
Frederick J. Shon

In the Matter of

Docket Nos. 50-247-SP
50-286-SP

**CONSOLIDATED EDISON
COMPANY OF NEW YORK
(Indian Point, Unit No. 2)**

**POWER AUTHORITY OF THE
STATE OF NEW YORK
(Indian Point, Unit No. 3)**

April 2, 1982

The Licensing Board rules on petitions to intervene and request to participate pursuant to 10 CFR §2.715(c).

INTERVENTION: INTERESTED STATE

Section 2.715(c) of the Commission's Rules of Practice does not limit licensing boards to the recognition of a sole state representative.

INTERVENTION: INTERESTED STATE

The authority of the Licensing Board to admit the Attorney General of the State of New York as a representative of an interested state is not limited by the provisions of a New York State law delegating responsibility for representation of the state to the New York State Energy Office.



INTERVENTION: INTERESTED STATE

A Licensing Board may require a representative or agency of an interested state to indicate in advance of the hearing the subject matter on which it wishes to participate, but such a showing is not required for admission pursuant to 10 CFR §2.715(c).

INTERVENTION: INTERESTED STATE

A party admitted as an interested state under the provisions of 10 CFR §2.715(c) may not reserve the right to intervene later under §2.714 with full party status. A petition to intervene under the provisions of the latter section must conform to the requirements for late-filed petitions.

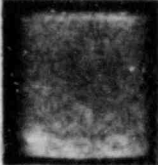
RULES OF PRACTICE: STANDING TO INTERVENE

Where the petition for intervention of the Friends of the Earth was signed by an official of the organization who herself had the requisite personal interests to support an intervention petition, the organization also had standing.

RULES OF PRACTICE: STANDING TO INTERVENE

The fact that the sole or primary purpose of an organization is to oppose nuclear power in general or the facility the subject of the proceeding in particular is not a basis for denying the organization's petition to intervene.

RULES OF PRACTICE: STANDING TO INTERVENE



The Union of Concerned Scientists (UCS) was not required to produce an affidavit from one of its members or sponsors specifically authorizing it to represent the interests of that member or sponsor in this proceeding. The organization's opposition to continued operation of the Indian Point plant and its steps taken to effectuate that opposition were clearly germane to UCS's expressed purposes, and the Board could assume that UCS's sponsors in the vicinity of Indian Point were aware of those activities. Accordingly, UCS could be presumed to represent the interests of such sponsors. *Virginia Electric and Power Company* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-536, 9 NRC 402 (1979).

RULES OF PRACTICE: STANDING TO INTERVENE

Where a non-membership organization has a well-defined purpose which is germane to the proceedings, its sponsors can be considered equivalent to members where they financially support the organization's objectives and have indicated a desire to be represented by the organization. Therefore, where an individual UCS sponsor has standing, this provides a sufficient nexus between the organization and the proceeding to permit representational standing by UCS.

MEMORANDUM AND ORDER

(Ruling on Petitions to Intervene and Agenda for Second Special Prehearing Conference)

I. INTRODUCTION

Eighteen petitions to intervene and requests to participate (petitions) have been filed in this special Investigative Proceeding.¹ Additional pleadings in the form of responses to petitions, amendments to petitions, listings of contentions, objections to contentions, and answers to objections have been filed by the parties (the NRC Staff and the Licensees) and the petitioners. Rulings are made herein with regard to the petitions upon consideration of the foregoing record and the First Special Prehearing Conference held on December 2, 1981. Although some petitions have been granted provisionally or to a more limited extent than was requested, none have been denied in their entirety.

Nine petitioners are admitted to intervene pursuant to 10 CFR §2.714. They are: the Honorable Richard L. Brodsky (Brodsky), Friends of the Earth (FOE), the Greater New York Council on Energy (GNYCE), the New York City Audubon Society (Audubon), Parents Concerned About Indian Point (Parents), Rockland Citizens for Safe Energy (RCSE), the Union of Concerned Scientists and New York Public Interest Research Group (UCS/NYPIRG), the West Branch Conservation Association (WBCA), and the Westchester Peoples Action Coalition (WESPAC).

Nine representatives or agencies of interested states, counties, or municipalities are admitted to participate pursuant to 10 CFR §2.715(c). They are: the Attorney General of the State of New York (Attorney General), the New York State Energy Office (Energy Office), the County of Westchester (County), the Metropolitan Transportation Authority (MTA),

¹ In our November 13, 1981 Memorandum and Order we listed seventeen petitions requesting leave to intervene pursuant to 10 CFR §2.714 or participate pursuant to 10 CFR §2.715. Subsequently we received another, untimely petition which is included herein.

the Council of the City of New York (NYC Council), the Port Authority of New York and New Jersey (Port Authority),² the County of Rockland (Rockland), the New York State Assembly and Its Special Committee on Nuclear Power Safety (State Assembly), and the Village of Buchanan (Village).

In ruling on the petitions to intervene pursuant to Section 2.714, we have studied each petitioner's contentions to determine whether the petitioner has formulated at least one acceptable contention. The rulings here deal with contentions only to that extent. In a further order to be issued shortly following the Second Special Prehearing Conference, a formulation and listing of all contentions to be litigated in this proceeding will be set forth. We turn now to a consideration of petitions, beginning with requests to participate pursuant to 10 CFR §2.715(c).

The regulatory and case-law requirements for intervention and for participation as an "interested state"³ have been very well reviewed by the NRC Staff in its "Response of the NRC Staff to Petitions for Leave to Intervene and Requests for Participation as Interested States Filed in Response to the NRC Federal Register Notice of October 7, 1981," dated November 24, 1981, and need not be reviewed again here. In making rulings on the petitions we have been guided by our interpretation of the degree of compliance of the petitions, plus amendments thereto, with the aforesaid regulations and law, and by the instructions to this Board contained in the Commission's orders of January 8 and September 18, 1981.

II. REQUESTS TO PARTICIPATE PURSUANT TO 10 CFR §2.715(c)

A. Attorney General of the State of New York

The Attorney General of the State of New York, Robert Abrams, petitioned to participate in this proceeding as a representative of the State of New York on October 29, 1981. The NRC Staff responded on November 24, 1981, stating that it supported and welcomed the Attorney General's request to participate pursuant to 10 CFR §2.715(c). Consolidated Edison Company of New York, Inc. (Con Edison) opposed the petition in its responses of November 24 and December 21, 1981 on the grounds that participation of the Attorney General as a representative of an interested

² To avoid confusion the Port Authority and the Power Authority (the Power Authority of the State of New York, Licensee) shall be identified in this proceeding by the appropriate binomial abbreviated designation, i.e., "Port Authority" or "Power Authority" rather than simply "Authority".

³ As commonly used, the phrase "interested state" includes any interested "county, municipality, and/or agencies thereof." 10 CFR §2.715(c).

state is precluded by provisions of New York State law which delegates such responsibility to the New York State Energy Office. The Power Authority did not oppose the petition of the Attorney General in its response dated November 24, 1981, but it stated that it believed that only the State Energy Office was authorized to represent the State of New York in this proceeding.

It has long been the practice in proceedings before the NRC and its predecessor, the AEC, to admit more than one state agency and/or representative, on the grounds that different agencies and representatives of states bring different points of view to proceedings. See *Consolidated Edison Company of New York* (Indian Point Unit No. 2), LBP-73-33, 6 AEC 751 (1973); *Metropolitan Edison Company* (Three Mile Island Nuclear Station, Unit No. 1) (Restart), Memorandum and Order Ruling on Petitions and Setting Special Prehearing Conference (unpublished, September 21, 1979). Our authority to admit interested states as set forth in 10 CFR §2.715(c) says that we shall "afford representatives of an interested state . . . and or agencies thereof, a reasonable opportunity to participate" (emphasis supplied). Clearly, NRC regulations do not limit us to the recognition of a sole state representative. Nor do we think that New York State law can so limit us, particularly where, as here, the Attorney General of the State sees no such bar. Therefore we reject the argument that we should admit only the State Energy Office to this proceeding as a representative of the State of New York. Our responsibility to assure that a complete record is compiled mandates that we hear the views of the several, diverse state representatives and agencies that have petitioned to participate in this proceeding.⁴

We rule that the Attorney General of the State of New York satisfies the requirements of 10 CFR §2.715(c) and admit him to this proceeding as a representative of an interested state.

B. Council of the City of New York

Ten members of the Council of the City of New York (NYC Council) filed a petition on November 6, 1981 to participate in this proceeding as representatives of an interested municipality pursuant to 10 CFR §2.715(c). By amendments to its petition dated December 10, 1981 and February 5, 1982, NYC Council added eighteen additional signatories, making a total that comprises more than a majority of the Council, and it

⁴ The Commission's January 8, 1981, Order (Question No. 7) invites an official position from the Governor of New York State. None of the state officials or agencies to date has been authorized or has attempted to present his position. Unless a state representative or agency comes forth with the Governor's views, we shall solicit them ourselves.

designated Ruth W. Messinger as "coordinator". The NRC Staff in its responses dated November 24 and December 21, 1981, and February 25, 1982 takes the position that the NYC Council has not met the requirements of 10 CFR §2.715(c) because (1) it has failed to show that it is a unit of government and not merely a group of individual representatives, and (2) it has failed to identify a spokesperson. Con Edison, in its November 24 and December 21, 1981 responses, argued that the NYC Council failed to show that it was authorized to represent the City of New York and failed to identify a spokesperson. And in a February 22, 1982 response to the February 5 filing of the NYC Council, Con Edison reiterated its earlier objections and, in addition, argued that the Council's February 5 petition to amend was filed out of time and therefore should be denied. The Power Authority in its response dated November 24 argued that the signatories to the NYC Council petition had failed to show that they were authorized by the Council to represent it in this proceeding and, further, that the interests of the signatories would be adequately represented in this proceeding by the participation of the NY State Assembly, the Attorney General of the State of New York, the Counties of Westchester and Rockland, and the Village of Buchanan. The Power Authority also asked, in the February 22 response, that NYC Council's late petition to amend be denied as untimely. Finally, in a response to the objections to its petitions, dated March 12, 1982, the NYC Council argued that it met the technical requirements of 10 CFR §2.715(c), and that if it had not met the technical requirements, this Board should admit it on discretionary grounds.

To begin with, we reject the Licensees' request that we deny NYC Council's February 5 petition to amend because it was untimely. We do so on the basis of NYC Council's argument with respect to the six factors which must be considered for discretionary standing. Four of those six factors are identical to factors set forth in 10 CFR §2.714(a)(1) for considering late petitions to intervene; indeed, the factors for untimely filings were the genesis of those for discretionary intervention. *Portland General Electric Company* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610, 616 (1976). We find the Power Authority's argument that other governmental agencies will adequately represent the interests of the constituents of the NYC Council to be unpersuasive. As NYC Council points out, it is more likely to represent the interests of New York City citizens in this proceeding than any other petitioner. Moreover, there is no other forum wherein the interests of the citizens of New York City will be protected in this matter. We believe that the NYC Council will be more familiar than other petitioners with problems that might develop in New York City in the event of an emergency with an accident

at Indian Point; therefore the Council's participation can reasonably be expected to assist in developing a sound record. Finally, admission of the February 5 amendment will not delay the proceeding; it may broaden it somewhat, but if so, the broadening will be justified. We find these factors to outweigh the fact that NYC Council failed to show good cause for the late filing.

Having accepted the late-filed amendment to the petition, we must address Staff's objections. Is a petition from a majority of the Council tantamount to an authorization by the Council to participate in this proceeding? We believe it is. We fail to see any substantive reason to deny NYC Council admission on the grounds that a majority of its members signed the petition rather than voted for the same items in a resolution.

Can Ruth Messinger be considered to be NYC Council's spokesperson? We believe she can be. Although it does mystify us, in view of the insistence of Staff and Licensees on this point, that the NYC Council has not claimed that Ms. Messinger will act as its "spokesperson" in just those words, we think that its filings show that she is in fact functioning as the Council's representative. In the December 10, 1981 petition to amend, Ms. Messinger states, "I have been authorized by my colleagues to submit this petition for leave to amend and to coordinate their participation in the the (sic) proceeding. I hereby request that service of all documents be made to me." The first sentence in the foregoing quote was repeated above Ms. Messinger's signature in NYC Council's February 5, 1982 filing. Were this a more leisurely paced proceeding we might be more inclined to be sympathetic with Staff's insistence that technical details of procedure be adhered to, and we might take the time to explore the basis for NYC Council's apparent reticence to give Ms. Messinger formal authorization to be its representative. But we do not have the time to indulge in minor legal technicalities, and we believe the proximity of the Indian Point plants to New York City mandates the participation of the NYC Council.

We rule that the NYC Council has adequately met the requirements for admission pursuant to 10 CFR §2.715(c), and we so admit it to this proceeding. Further, we recognize Ms. Messinger as its spokesperson.

C. County of Rockland

The County of Rockland (Rockland), through the County Attorney, Marc L. Parris, petitioned on November 6, 1981, to intervene in this proceeding pursuant to 10 CFR §2.714, but later, on December 1, 1981, amended its petition and requested to participate as an interested county pursuant to Section 2.715(c). The NRC Staff, in its November 24, 1981 response, stated that Rockland had met both the standing and aspect requirements of 10 CFR §2.714 and should be admitted to intervenor

status, but following Rockland's amendment Staff said it did not object to the changed request. The Power Authority, in its November 24, 1981 response, stated that it did not oppose Rockland's petition. Con Edison, on the other hand, opposed Rockland's petition in its responses dated November 24 and December 21, 1981 on the grounds that the County had not shown that Mr. Parris was authorized to represent it. A resolution attached to Rockland's amendment and characterized in the Rockland filing as "the authorization of the Legislature of Rockland County, directing the Rockland County Attorney to appear in this proceeding" was rejected by Con Edison because "[t]here is no documentation supporting any action taken by the Rockland County Legislature".

We can see no reason to doubt the integrity of the County attorneys for Rockland County. We find that the County Attorney has adequately shown that he has been duly authorized to represent the County of Rockland in this proceeding, and we admit the County to participate as an interested county pursuant to 10 CFR §2.715(c).

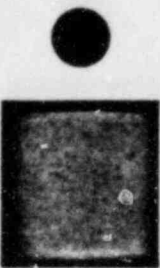
D. County of Westchester

Alfred B. DelBello, Executive of the County of Westchester (County), filed a petition on November 6, 1981 to participate in this proceeding as a representative of an interested county pursuant to 10 CFR §2.715(c). In an amendment to its petition filed December 10, 1981, the County cited the authority by which Mr. DelBello is authorized to represent the County. The NRC Staff, in a response dated December 21, 1981, supported the County's petition and recommended that Mr. DelBello be admitted as its representative pursuant to 10 CFR §2.715(c). The Power Authority stated, in its response dated November 24, 1981, that it did not oppose the participation of Mr. DelBello as the representative of the County of Westchester. Con Edison, on the other hand, opposed the petition in filings dated November 24 and December 21, 1981, on the grounds that Mr. DelBello had not shown that he had been authorized to represent the County by the County's Board of Legislators and therefore should not be allowed to participate pursuant to 10 CFR §2.715(c).

We rule that Mr. DelBello has made an adequate showing that he is authorized to represent the County of Westchester in this proceeding, and admit him as the County's representative pursuant to 10 CFR §2.715(c).

E. Metropolitan Transportation Authority

The Metropolitan Transportation Authority (MTA) petitioned on November 4, 1981 to participate in this proceeding as an agency of an interested state pursuant to 10 CFR §2.715(c). It also requested to be allowed to move to intervene under Section 2.714 at some later time,



should its interest so require. The NRC Staff in its November 24, 1981 response supported MTA's petition to participate as an agency of an interested state but objected to MTA's request to reserve the right to move for full party status later, on the grounds that the request is inconsistent with the requirements of 10 CFR §2.714. Staff pointed out that any later petition must address the requirements set forth in 10 CFR §2.714(a)(1), factors (i) - (v). The Power Authority did not oppose the MTA's petition, but Con Edison stated in its November 24, 1981 response that MTA should be required to indicate the subject matter with respect to which it wished to participate. UCS/NYPIRG, responding to MTA's petition on November 13, 1981, also objected to the request for leave to come in later under 10 CFR §2.714 and said that MTA should be required to indicate the subject matter on which it wished to participate.

While 10 CFR §2.715(c) indicates that a Board may require a representative or agency of an interested state to indicate "in advance of the hearing" the subject matter on which it wishes to participate, such a showing is not required for admission pursuant to that section. We see no need to require additional information from MTA about its interests at this time. With regard to MTA's request to reserve the right to intervene later under Section 2.714, however, Staff and UCS/NYPIRG are quite correct. We rule, therefore, that MTA has met the requirements to participate pursuant to 10 CFR §2.715(c) and is so admitted, but its request to reserve the right to come in later with full party status is denied. Such denial is without prejudice to the MTA's late filing of a petition intended to conform to the requirements for late-filed petitions.

F. New York Assembly and Its Special Committee on Nuclear Power Safety

The New York State Assembly and its Special Committee on Nuclear Power Safety (State Assembly) filed a petition to participate in this proceeding pursuant to 10 CFR §2.715(c) on October 4, 1981 and submitted an amended petition on December 8, 1981. The NRC Staff, in responses filed November 24 and December 18, 1981, supported the petition of the State Assembly. The Power Authority stated in its November 24, 1981 response that it did not oppose the petition. Con Edison, on the other hand, objected to the State Assembly's request to participate as an agency of the state on the grounds that New York State law authorizes only the State Energy Office to participate in this matter.

We reject Con Edison's argument for the reasons set forth, *supra*, in our discussion of the petition of the Attorney General. We rule that the State Assembly meets the requirements for participation pursuant to 10 CFR §2.715(c) and so admit it.

G. New York State Energy Office

The New York State Energy Office (Energy Office) through its General Counsel, Stanley B. Klimberg, on November 6, 1981 petitioned to participate in this proceeding as an agency of an interested state pursuant to 10 CFR §2.715(c). The Energy Office showed in its petition that it was authorized by State law to participate "on behalf of the State of New York and its interested agencies".⁵ The NRC Staff, Con Edison, and the Power Authority supported the petition of the Energy Office in responses dated November 24, 1981.

We rule that the New York State Energy Office has shown that it is authorized to participate in this proceeding pursuant to Section 2.715(c), and we admit it as an agency of an interested state.

H. Port Authority of New York and New Jersey

The Port Authority of New York and New Jersey (Port Authority), in filings dated October 14 and December 1, 1981, has petitioned to participate as an agency of an interested state pursuant to 10 CFR §2.715(c) and also for leave to move at a later time for formal status under Section 2.714 if its interest so requires. In its pleadings the Port Authority showed that it is a bi-state agency appropriately authorized to participate in this proceeding pursuant to 10 CFR §2.715(c). The NRC Staff, in its November 24, 1981 response, supported the Port Authority's petition to participate as an agency of an interested state, but pointed out that a later request to intervene pursuant to 10 CFR §2.714 would constitute an out-of-time filing. Con Edison, in its answer to amended petitions on December 21, 1981, and the Power Authority, in its response to petition on November 24, 1981, both supported the Port Authority's petition to participate as an agency of an interested state.

We rule that the Port Authority of New York and New Jersey has met the requirements to participate in this proceeding pursuant to 10 CFR §2.715(c) and is so admitted, but its request to reserve the right to move for full party status later is denied. Such denial is without prejudice to the

⁵ In a letter to the Board dated November 17, 1981, Howard A. Fromer, Assistant Counsel to the Energy Office, objected because the Board's Memorandum and Order of November 13, 1981 characterized the New York Attorney General as appearing "on behalf of New York State". The Energy Office argued that it should be "noted as appearing on behalf of the State of New York and its agencies" by virtue of its statutory responsibility. In response to that letter, the Office of the Attorney General said, in a letter dated November 23, 1981, that it made no claim to be the sole representative of the State of New York. We are herein designating the Attorney General as a representative of the State of New York and the Energy Office as an agency of the State of New York. See our discussion of the petition of the Attorney General of the State of New York.

Port Authority's late filing of a petition intended to conform to the requirements for late-filed petitions.

I. Village of Buchanan

The Village of Buchanan (Village), within the corporate boundaries of which Indian Point Units 2 and 3 are located, requested to participate in this proceeding pursuant to 10 CFR §2.715(c) through its Mayor, George V. Begany, in a petition filed November 6 and a supplement thereto filed December 8, 1981. Neither the NRC Staff nor the Licensees opposed the Village's petition.

We rule that the Village of Buchanan meets the requirements of 10 CFR §2.715(c) for participation in this proceeding and admit it as an interested municipality.

III. PETITIONS TO INTERVENE PURSUANT TO 10 CFR §2.714

A. The Honorable Richard L. Brodsky

By an untimely filed petition of December 2, 1981, the Honorable Richard L. Brodsky, member of the Legislature of Westchester County, seeks to intervene on behalf of himself and two other named persons under 10 CFR §2.714, and to participate in this proceeding as a representative of an interested municipality (the County) under 10 CFR §2.715(c). Staff answered the petition in its filing of December 22, 1981; the Power Authority answered in its filing of December 21, 1981; Con Edison answered in its filing of December 21, 1981.

PASNY opposes Mr. Brodsky's admission in any manner beyond limited appearance, asserting that he has not made a proper showing that he qualifies under Section 2.715(c); that he has made no showing that he will contribute (hence discretionary intervention is inappropriate); that he may not properly represent third parties; and that he should not be admitted because he opposes the Indian Point plants' operation and opposes nuclear power. (See fn. 7). Con Edison would admit Mr. Brodsky only under 2.714, and then only upon a more convincing showing by him that the balance of the five factors for late filing (Section 2.714(a)(1)) weighs in his favor. The Staff would admit Mr. Brodsky under Section 2.714. The Staff analyzes Mr. Brodsky's status with respect to the five factors governing untimely petitions and finds that, while the balance is scarcely compelling, the notion that Mr. Brodsky's participation will not delay matters (the fifth factor) tips the scale.

In a subsequent filing on January 22, 1982, Mr. Brodsky responded to the answers to his petition. In that document Mr. Brodsky does not further address the five factors of CFR §2.714(a)(1). He does, however, at pages

three and four, allege that he "has sought and received expert opinions, [and] . . . developed and filed legislation . . ." concerning the energy, economic, environmental and other consequences of an accident at Indian Point.

We have carefully considered the filings in this case. We do not believe that Mr. Brodsky should be admitted under 10 CFR §2.715(c). While he may represent (as he avers) 60,000 people in the County Legislature, it appears to us that he was elected by them *solely* to represent them in that body. The notion that he has become, by virtue of his election, their representative in any administrative proceeding he sees fit to enter strikes us as unfounded. Nor has he given us reason to believe he represents the County itself or an agency thereof. Mr. DelBello, whose petition is treated above, has, in contrast, done just that.

Mr. Brodsky also now alleges that he represents three individuals and alleges that their affidavits "are forthcoming." We do not read 10 CFR §2.713(b) to permit representation of individuals by a person who is not an attorney, except to the extent such person is a representative of a "partnership, corporation, or unincorporated association." *Accord, Detroit Edison Company* (Enrico Fermi Atomic Power Plant, Unit 2) LBP-78-11, 7 NRC 381, 387, *aff'd*, ALAB-470, 7 NRC 473 (1978).

We can therefore allow Mr. Brodsky to appear only in his own behalf as an intervenor under 10 CFR §2.714. In that regard we agree with the Staff that he appears to have marginally fulfilled the requirements for late filing. We note that his contentions are, verbatim, those of UCS/NYPIRG, a party admitted herein, but we note also, as stated above, that he claims special familiarity and access to special expertise on at least one issue among the many. Convinced as we are that we must seek all avenues of useful information while eschewing insofar as possible any avoidable delay, we have decided to admit Mr. Brodsky as a *pro se* intervenor under 10 CFR §2.714, and to consolidate his intervention with that of UCS/NYPIRG. The conditions of that consolidation are as follows:

1. UCS/NYPIRG will be the lead intervenor for any contention admitted.
2. Only the lead intervenor will introduce evidence or cross-examine witnesses *except* if Mr. Brodsky can show that he offered evidence to UCS/NYPIRG, who then refused to use it, or he proposed questions on cross-examination which UCS/NYPIRG refused to ask, *and* that such evidence or cross-examination will be of substantial help to the Board in its investigation.

Friends of the Earth (FOE)

By petition of November 4, 1981, Friends of the Earth (FOE) petitioned to intervene on behalf of six named persons, all alleged to be members of FOE.⁶ December 2, 1981, FOE submitted, in cooperation with the New York City Audubon Society (Audubon), two contentions. FOE thereafter submitted an affidavit of Lorna Salzman and amendment to the petition, dated December 3, 1981, a reply to PASNY's responses to the petition dated December 3, 1981, a response to the Staff's response to FOE's amendment dated December 21, 1981, and a response to Staff's response to FOE's contentions, dated January 7, 1982. Fundamentally, as to standing FOE takes the position that its affidavit of Salzman, stating as it does that:

The undersigned . . . hereby attests that she has been duly authorized by her organization [FOE] to act as its representative .

and

. . . the members listed in the original petition to intervene have officially authorized FOE, through personal verbal communication, to represent them . . .

establishes the necessary double nexus member-to-FOE and FOE-to-representative which the Board mentioned at pages 46-50 of the transcript.

Staff submitted a reply to the petition (November 24, 1981), a response to the amendment and affidavit (December 15, 1981), an analysis of petitioners' contentions (December 31, 1981), and a final reply to petitioners' answers (February 11, 1982). Succinctly put, the Staff does not believe a proper nexus has been established nor does the Staff believe that either of the two contentions offered is litigable here in its present form. However, Staff agrees that that portion of Contention I which reads:

Present emergency planning is inadequate to mitigate these health effects, and there are no interim or future protective measures which could feasibly protect the health of the public is arguably a matter which bears upon the answer to Commission Question 4:

What improvements in the level of emergency planning can be expected in the near future, and are there other specific offsite

⁶ The petition refers to these people as "sponsors or members" and later as "members." For the reasons set forth in the discussion of indices of membership in connection with UCS/NYPIRG, *infra*, we make no distinction here.

emergency procedures that are feasible and should be taken to protect the public?

Con Edison, in filings dated November 24, December 21, and December 31, 1981, and February 11, 1982, argues that FOE (and, indeed, all the citizens groups petitions) lack standing by virtue of having failed to establish a nexus to individuals with interest and that their alleged members lack the "indicia of membership" as required by *Health Research Group v. Kennedy, supra*. Con Edison objects to both contentions on grounds of lack of site-specificity and lack of connection to the Commission's questions.

The Power Authority filed documents related to this petition on November 24, December 21, December 31, 1981 and February 11, 1982. The Power Authority has, among other things, moved (in its December 21 filing) to strike FOE's affidavit of Salzman and amended petition on the ground that they were not served upon the Power Authority. Indeed, they apparently were not. We cannot stress strongly enough that participants in this proceeding *must* serve their filings on all other participants. We have deliberately specified a curtailed service list in order to reduce the burden of distribution on participants, and failure to serve all parties is a serious abuse of our procedures. Nevertheless, we are loathe to impose a sanction as strong as striking a submittal which we need in order to make an interlocutory decision. To do so would, in some measure, be to defeat our own purposes. The Power Authority's motion is therefore denied. We caution FOE, however, to serve all papers properly in the future.

The Power Authority objects to FOE's participation on grounds of lack of standing, also citing *Health Research Group v. Kennedy*. The Power Authority further objects to both contentions as lacking specificity and failing to conform to the Commission's ground rules as set forth in this proceeding.

After due consideration we rule as follows: with respect to standing it seems to us that the Salzman affidavit goes very far toward providing the nexus between persons living in the vicinity and Ms. Salzman's representation of them by virtue of FOE's interest. Even were that nexus deemed tenuous, however, we are mindful of the Appeal Board's teaching in *Duke Power Company* (Amendment to Materials License SNM-1773 - Transportation of Spent Fuel From Oconee Nuclear Station for Storage at McGuire Nuclear Station), ALAB-528, 9 NRC 146, 151, (1979) that:

In our view it was enough for standing purposes that the petition had been signed by a ranking official of the organization who himself had the requisite personal interest to support an intervention petition.

Clearly, Ms. Salzman (who signed the original petition) has the requisite personal interest; her address on every service list is in New York City. Clearly also, she represents herself under oath as an official of the organization: its "Mid-Atlantic Representative." Whether in such capacity she is a "ranking official" in the sense above seems to us too thin a hair to split. We find that the requisite standing has been established. We further discern at least the bare bones of an admissible contention in the assertion that there are, in effect, no improvements in the level of emergency which are feasible.

FOE is admitted as an intervenor pursuant to 10 CFR §2.7.4. As noted below, FOE will be consolidated with Audubon because of their identical contentions. We tentatively designate FOE as lead intervenor to assume a role similar to that of UCS/NYPIRG in the consolidation of UCS/NYPIRG with Richard L. Brodsky (q.v.). But we note that, if either FOE or Audubon believes it can show good reason why Audubon should be lead intervenor for the purpose of dealing with a specific contention we will consider redesignation at the time of submission of cross-examination plans.

C. Greater New York Council on Energy

The Greater New York Council on Energy (GNYCE) submitted a timely petition to intervene on November 6, 1981. Thereafter GNYCE submitted amending and supporting documents on December 2, December 9, and December 10, 1981, and January 15, 1982. The latter included two contentions (in the December 2 filing) and affidavits of authorization from a member from an officer of GNYCE (December 10 filing).

Con Edison in its filings of November 24, 1981, and December 21, 1981, objects to GNYCE's standing, questioning the exact nature of the named members' interest and the governance structure of GNYCE. Con Edison, in its filing of December 31, 1981, appears to discern the shadow of an admissible contention in two sentences of GNYCE's first contention, but in a subsequent filing (February 11, 1982), Con Edison opines that no real substance has been added to the shadow.

The Power Authority, in filings dated November 24, 1981, December 21, 1981, December 31, 1981, and February 11, 1982, faults the propriety of GNYCE's chain from member to representative (doubting even whether GNYCE's member is a member). The Power Authority further argues that GNYCE's proposed contentions, even after explication, are outside the scope of the Commission's questions and lacking in specificity and basis.

The Staff, in filings dated November 24, December 21, and December 31, 1981, and February 11, 1982, finds the links from resident member to GNYCE representative substantial enough to support standing. But Staff,

too, believes the contentions to be unrelated to the Commission's questions (or at least unrelated to those questions with which GNYCE would identify them).

We believe GNYCE has clearly shown standing. As to having a litigable contention we believe, with Con Edison, that the ghost of one flickers in the first and last sentences of Contention I. We would accordingly accept GNYCE's offer, made at p. 4 of its January 15 submission, to elaborate further if so requested.

Accordingly, we conditionally admit GNYCE under 10 CFR §2.714. The admission is conditional upon GNYCE's submission of a basis for greater specificity in relation to the following contention:

Viable alternative strategies exist to incurring the excess fuel costs associated with early and permanent shutdown of Indian Point. The failure of State agencies or the utilities to implement such strategies cannot be held to imply that such strategies are not viable, would not save or produce sufficient energy, or that such strategies would not limit or eliminate excess fuel costs.

The basis so provided shall clearly show how resolving this contention could be said in answering Commission Question 6. The alternative strategies suggested shall be such that they could reasonably be adoptable within three to five years following a shutdown. The material shall be submitted by April 12, 1982.

D. New York City Audubon Society

By a petition dated November 6, 1981, the New York Audubon Society (Audubon) sought leave to intervene in this proceeding. The petition is supported by two contentions, filed jointly with FOE, above, on December 4, 1981, and by affidavits of Albert F. Appleton and Asher Fried submitted December 9 and December 12, 1981 respectively.

Con Edison in filings dated November 24, 1981, December 21, and December 31, 1981, and February 11, 1982, objects for the same reasons it objected to FOE's participation, citing *Health Research Group v. Kennedy, supra*, for denial of standing and, of course, objecting to the joint FOE/Audubon contentions as above.

The Power Authority likewise, in filings dated November 24 and December 21 and December 31, 1981 and February 11, 1982, would deny Audubon participation on similar grounds to those on which it objected to admitting FOE. Staff filed documents concerning Audubon on November 24, 1981, December 31, 1981, January 5, 1982, and February 11, 1982. Staff agrees that Audubon has shown standing. However, as with FOE (whose contentions Audubon shares) Staff does not clearly discern an

admissible contention, noting only that part of Contention I may be admissible, as above.

We see a clear nexus to standing in the affidavits supplied. Both affiants attest to membership in Audubon and assert a desire to have interests represented by Audubon. Both attest that they participated in a unanimous resolution to authorize Geoffrey Cobb Ryan to represent Audubon in this proceeding. Clearly both, who say they are members of the Board of Directors of Audubon, give the requisite indices of membership. Both reside within fifty miles of Indian Point. We need not reach the question of whether Mr. Ryan, as a Director of Audubon, who signed the original petition and lists an address in New York, would *per se* qualify Audubon under the *Oconee-McGuire* rule mentioned above. We find Audubon has standing.

As with FOE, we see an admissible contention. We will admit Audubon under 10 CFR §2.714, consolidating it with FOE as noted above.

E. Parents Concerned About Indian Point

Parents concerned About Indian Point (Parents), a voluntary unincorporated association of residents in the area around Indian Point, petitioned to intervene pursuant to 10 CFR §2.714 in an initial filing on November 5, 1981, an amendment filed December 10, 1981, and by contentions filed on December 2, 1981. Parents avers that all its member live within 50 miles of the Indian Point plants, more than half of them live within 10 miles of the plants, shows that it is authorized to represent two members who live at Croton-on-Hudson, and identifies a Special Committee authorized to represent it in this proceeding. Its contentions address the effect of an accident at Indian Point on children within and outside the 10-mile EPZ, and allege that the Emergency Response Plan is inadequate with respect to its provisions for protecting children.

The NRC Staff, in its responses dated December 21 and 31, 1981, and February 11, 1982, states that Parents has met the interest and aspect requirements of 10 CFR §2.714 and has set forth at least one acceptable contention (Contention I, bases 2-8, 13-17, 19, and 21). Con Edison in responses dated December 21 and 31, 1981, states that Parents had satisfied the interest requirement but had failed to set forth an acceptable contention. The Power Authority in responses dated November 24, 1981, December 21, 1981, and February 11, 1982, objects to the admission of

Parents because Parents did not show the requisite interest and does not propose an acceptable contention.⁷

We agree with Staff's overall assessment. We rule that Parents has established standing and has set forth at least one cognizable contention. (Contention I, subject to subsequent limitation by the Board). Parents is admitted to intervenor status.

F. Rockland Citizens for Safe Energy

Rockland Citizens for Safe Energy (RCSE), civic organization located in New City, petitioned to intervene pursuant to 10 CFR §2.714 in an initial filing on November 6, 1981, a supplement containing contentions filed December 1, 1981, and an amendment on December 9, 1981. In these documents RCSE avers that it has about 50 member-families living in Rockland County, many of whom live within the 10-mile EPZ for Indian Point; it is duly authorized by two members (one of whom lives in New City and one in Stony Point) to represent their interests in this proceeding; and RCSE identifies a person authorized to represent it in this proceeding. RCSE sets forth a number of contentions dealing with the Emergency Response Plan for Indian Point.

The NRC Staff in responses dated December 28 and 31, 1981, states that RCSE satisfies the requirements for standing and has submitted several acceptable contentions. Con Edison, in its responses dated November 11, 1981, and December 21 and 31, 1981, agrees that one of the contentions is acceptable but argues that the affidavits "fail to state what interests of these named individuals will be affected by this proceeding." The Power Authority in responses dated November 24, 1981, and December 21, 1981, argues against admitting RCSE on the grounds that "mere recitation of membership is insufficient," that RCSE lacks "an interest specific to itself," and it has not shown that it will contribute positively to this proceeding.

We agree with Staff. We rule that RCSE has shown that it is authorized to represent the interests of two of its members, one of whom lives at New City and the other at Stony Point, communities in close proximity to the plant. It has also identified an authorized spokesman and has

⁷ With respect to Parents, as well as several other petitioners, the Power Authority argues at great length that the organization's opposition to the use of nuclear power precludes it from the right to participate in this proceeding. The Power Authority is wrong. The fact that "the sole or primary purpose of the petitioner organization [is] to oppose nuclear power in general or the facility at bar in particular" is not a basis for denying a petition to intervene. See *Houston Lighting and Power Company* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-535, 9 NRC 377, 396-397 (1979).

submitted at least one cognizable contention (Contention 5). RCSE is admitted to intervenor status.

G. Union of Concerned Scientists and New York Public Interest Research Group, Inc.

The Union of Concerned Scientists and New York Public Interest Research Group, Inc. (UCS/NYPIRG), filed a joint petition to intervene on November 6, 1981, contentions on December 2, amendments to the petition on December 8 and 10, 1981, and a response to objections to contentions on January 29, 1982. In those documents UCS is identified as a nonprofit coalition of scientists, engineers, and other professionals, supported by 95,000 UCS Sponsors nationwide. It has "spent a decade conducting research into nuclear power safety questions." UCS submitted an unsigned affidavit of one of its sponsors, a resident of Croton-on-Hudson, who represented that the Indian Point reactors threatened her health and safety and authorized UCS to represent her interests in this proceeding. NYPIRG was identified as a not-for-profit, non-partisan research and advocacy organization which has been conducting research for the past year and a half on problems relating to emergency planning in the area surrounding Indian Point. NYPIRG provided the affidavit of a member who lives approximately 40 miles from the plants; the member alleged that her health and safety were threatened by the Indian Point plants, and she authorized NYPIRG to represent her interests. Both UCS and NYPIRG identified the spokespersons authorized to represent them in this proceeding.

The NRC Staff responded to the pleadings of UCS/NYPIRG in its filings dated November 24 and December 21 and 31, 1981, and February 11, 1982. Staff states that NYPIRG has established judicial standing and has proposed a number of acceptable contentions relating to emergency planning and to the risks posed by a serious accident at Indian Point. Staff therefore recommends that NYPIRG be admitted to intervene. With regard to UCS, Staff argues that judicial standing has not been established. Staff does not believe that the authorization of a sponsor (assuming that a valid affidavit had accompanied the UCS amendment) provides the "indicia of membership" that is required here. In taking this position Staff relies upon a District Court decision in *Health Research Group Kennedy*, 82 F.R.D. 21 (D.C. 1979). In the absence of standing for UCS, Staff recommends that UCS be granted discretionary intervention because of "the important role played by UCS in the initiation of this proceeding and the likelihood that UCS can make a meaningful contribution due to its asserted expertise . . .".

Con Edison, in its filings dated December 21 and 31, 1981, agreed with Staff that NYPIRG should be admitted to intervene. This Licensee also concurred in Staff's assessment with regard to UCS's petition, relying on *Health Research Group v Kennedy, supra*, as authority for rejecting organizational representation of a sponsor. Con Edison did not recommend that UCS be granted discretionary intervention, however. The Power Authority, in its November 24 and December 21, 1981 responses, opposed the admission of both NYPIRG and UCS, on the grounds that the organizations are opposed to nuclear power in general, have not shown that they have an interest that will be affected, and will contribute to this proceeding.

With regard to the "indicia of membership" problem raised by Staff, we do not find that *Health Research Group v. Kennedy, supra*, requires the conclusion reached by Staff and Licensees. There, the plaintiffs were an umbrella public interest group and one of its subsidiaries. The subsidiary group received no direct financial support from the public, and its parent organization was so broadly based that its contributors could not be assumed to have any knowledge of, or specific interest in, the issues sought to be litigated by the sub-unit. Here, the organizational objectives of UCS in regard to nuclear power are clearly defined and well advertised; there can be little doubt that it is a desire to support the pursuit of those goals that motivates the financial participation of the UCS Sponsors. The primary purpose of UCS in this case is to oppose the continued operation of the Indian Point plants; it was their petition to the Commission to shut down the plants that initiated this proceeding. That opposition and the steps taken to effectuate it are clearly germane to the organization's expressed purposes. We can safely assume that the UCS Sponsors who live in the vicinity of Indian Point are aware of these interests and activities of UCS.

This consideration leads us to the teachings of the Appeal Board in *Houston Lighting and Power Company* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-535, 9 NRC 377, (1979) with regard to the authorization issue of organizational representation. The Appeal Board ruled that there need *not* be a specific representational authorization of a member with personal standing in the case of all organizations. It said:

To the contrary, in some instances the authorization might be presumed. For example, such a presumption could well be appropriate where it appeared that the sole or primary purpose of the petitioner organization was to oppose nuclear power in general or the facility at bar in particular. In such a situation, it might be reasonably inferred that by joining the organization, the members

were implicitly authorizing it to represent any personal interests which might be affected by the proceeding. (footnote omitted)

9 NRC at 396.

Further, the Appeal Board explicitly applied this teaching to UCS in *Virginia Electric and Power Company* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-536, 9 NRC 402, (1979). As Staff pointed out the Appeal Board there found that UCS had not established standing to intervene, but went on to say:

In this connection, we have attached no significance to the fact that the persons specifically identified in the UCS petition were described as "donor" members of the organization (in our judgment there is no necessity here to explore the question whether representational standing can be based on the personal interests of a mere financial contributor to the organization). Further, we reject the argument of the applicant and the staff that UCS was required to produce a specific authorization to represent the interests of at least one of its members shown to possess personal standing. To be sure, such an authorization is normally an ingredient of a demonstration of representational standing. But the authorization may be presumed in the case of members of organizations such as UCS. (citation omitted; emphasis supplied)⁸

9 NRC at 404 fn. 2.

It is clear to us that UCS need not produce an affidavit from one of its members (or sponsors). UCS may be presumed to represent their interests in this matter. Thus the fact that we have not been provided with an executed affidavit is of no consequence.

UCS provided the names and addresses of five of its sponsors in the November 6, 1981, petition of UCS/NYPIRG. All of them live within 25 miles of Indian Point, and affiant Robert D. Pollard attested that he had personally spoken with each of them and they had specifically authorized UCS to represent them. The fact that UCS has sponsors living within 25 miles of the plant is enough to give it standing, provided those sponsors may be regarded in this instance as equivalent to members.

Since the Appeal Board has not reached the matter of standing of "donor" members of organizations, we shall decide the issue as it relates to

⁸ The inclusion by Staff in its December 21, 1981, filing at p. 8, fn. 5, of the parenthetical statement from this quotation, rather than the entire statement, unaccompanied by any discussion to show the clear intent of the Appeal Board, was, in our view, less than candid. We call to the attention of Staff, and all parties, the teaching of the Appeal Board in *Black Fox*, where it said, "Counsel appearing before this Board (as well as other NRC adjudicatory tribunals) have a manifest and iron-clad obligation of candor." *Public Service Company of Oklahoma, et al.*, (Black Fox Station, Units 1 and 2), ALAB-505, 8 NRC 527, 532 (1978).

this proceeding. First we note, as Staff pointed out, that the Licensing Board in *Three Mile Island - Restart* admitted UCS to that proceeding on the basis of UCS Sponsors who lived within 20 miles of the plant. *Metropolitan Edison Company, et al.*, supra. We agree with that determination. In our view, where an individual UCS Sponsor has standing, this provides sufficient nexus between the organization and this proceeding so as to permit representational standing by UCS. Where, as here, a non-membership organization has a well-defined purpose which is germane to the proceedings, sponsors can be considered equivalent to members where they financially support the organization's objectives and have indicated a desire to be represented by the organization.⁹

We rule that UCS and NYPIRG have both established judicial standing and have proposed at least one acceptable contention (Contention I(A)).¹⁰ We admit UCS/NYPIRG to intervenor status and consolidate with it the Honorable Richard L. Brodsky.¹¹

H. West Branch Conservation Association

By timely petition of November 2, 1981, the West Branch Conservation Association (WBCA) seeks to intervene in this proceeding. In response to Staff's and Licensees' positions, WBCA amended that petition on December 2, 1981, supplying affidavits of Melissa Levi, Joan Harding King and Thomas J. King, all as members residing near the plant who wished WBCA to represent them, and an affidavit of Joan Harding King as Recording Secretary of WBCA, attesting that, by vote of its Board of Directors, WBCA seeks to participate herein and names representatives. On January 11, 1982, WBCA filed a further response to comments on its contentions. WBCA's previous filings had not made clear exactly what portions of the statement made were meant as contentions, nor indeed, is

⁹ Though the Court, in *Health Research Group v. Kennedy*, found that the plaintiff organizations lacked standing, it did not dismiss the complaint. Rather, it permitted amendment of the pleadings to substitute other individual plaintiffs deemed to have standing in their own right. In doing so, the Court cited considerations of judicial economy; the original plaintiffs had already extensively briefed the merits of the case. Clearly, the effect of this decision was to permit the public interest groups to continue to pursue the litigation if authorized to do so by the individual plaintiffs (two of whom were supporters and one allegedly a contributor to the parent group).

Here, one or more of the UCS Sponsors could have filed petitions, been substituted as an intervention petitioner, been found to have standing, and then merely authorized UCS to act on their behalf. We decline, however, to approach the resolution of this issue through such a needless paper charade.

¹⁰ Had we not so ruled we would have accepted the recommendation by Staff to admit UCS at our discretion.

¹¹ UCS/NYPIRG is designated lead intervenor. For other details regarding this consolidation, refer to our discussion of Mr. Brodsky's petition, supra.

the January filing very helpful in this respect. We shall assume, however, that it is the January filing to which we should look for the final clarification of WBCA's intended contentions.

Staff answered this petition and the amendments in its filings of November 24, December 11 and 31, 1981, and February 11, 1982. Staff at first advised of the need for amendment to satisfy the requirements of standing, then agreed that the amendments of December 2 cure the flaw. Staff further sees three admissible contentions in WBCA's January filing.

Con Edison in filings of November 24, December 21, and December 31, 1981, and February 11, 1982 opposes admission of WBCA, finding neither proper standing (despite the amending affidavits) nor an admissible contention. The Power Authority takes a very similar position in its filings of November 24, December 21, and December 31, 1981, and February 11, 1982.

We hold that a clear nexus has here been established between named members at risk, WBCA itself, and its named representatives before us. We resolved the issue of standing in WBCA's favor. We further hold that WBCA has presented at least one issue related to the Commission's questions, *viz.* the assertion of financial benefit accruing to Rockland County through the sale of electricity, a matter which relates to Commission Question 6. We also note that WBCA, in its January 11, 1982, filing, supplies a wealth of information on roads and traffic in the area which could be viewed as comprising a contention on emergency planning. While WBCA offers this material as being ostensibly related to Commission Question 1, we see it as relevant under Question 3. Clearly, WBCA's contentions may require restatement, but nonetheless we rule that the petition, as amended, has met the requirements for at least one litigable contention. WBCA is admitted in accord with 10 CFR §2.714.

I. Westchester People's Action Coalition

Westchester People's Action Coalition (WESPAC) submitted a petition to intervene pursuant to 10 CFR §2.714 on November 5, 1981, contentions on December 1 and a supplement to its petition on December 8, 1981, and responses to objections on January 6 and 14, 1982. These filings show that WESPAC is a not-for-profit organization representing approximately 2000 households in Westchester County, all of which are located within 50 miles of Indian Point. WESPAC submitted the affidavit of its Co-chairperson, Mr. Charles A. Scheiner, showing that he is authorized to represent the organization in this proceeding. In addition it submitted a notice of appearance of attorney Alan Latman, Esq., on its behalf. Both Mr. Scheiner and Mr. Latman, who is also a member of WESPAC, live within

15 miles of the Indian Point plants. WESPAC's contentions address alleged deficiencies in the emergency response plans for Indian Point.

The NRC Staff, in its filings on December 31, 1981, and February 11, 1982, stated that WESPAC has shown that it will be represented by a duly authorized representative and has proposed at least one acceptable (subject to modification) contention, but that it has failed to show that at least one member of WESPAC whose interest might be affected had authorized WESPAC to represent him or her. Con Edison, in its December 21, 1981 filing, also objected to the admission of WESPAC because the organization has failed to submit affidavits from members authorizing it to represent them. The Power Authority, in its December 21, 1981 response, objects to WESPAC's admission on the grounds that WESPAC has not shown that its members have an interest in this proceeding, that it refused to file affidavits from members, and that it has not shown that it can contribute to this proceeding.

In objecting to the admission of WESPAC on the grounds that an affidavit from one of its members had not been submitted to clothe the organization in the personal standing of a member, Staff and Licensee appear to have overlooked, in this instance, the ruling of the Appeal Board in *Duke Power Company, supra*, which we quoted in our discussion of the petition of FOE.¹² That ruling governs here. Mr. Scheiner, Co-chairperson of WESPAC, has the requisite personal interest to support the petition of his organization.

We rule that WESPAC has shown that it has standing to intervene in this proceeding and has proposed at least one cognizable contention (Contention 1, as later limited by the Board). It is admitted to intervenor status.

IV. AGENDA FOR SECOND SPECIAL PREHEARING CONFERENCE

At the Second Special Prehearing Conference scheduled for April 13 and 14, 1982, in White Plains, New York, the Board will consult with the parties concerning: (1) the formulation of the contentions to be litigated in this proceeding, and, (2) the discovery to be conducted thereon. We have carefully considered the Commission's instructions contained in fn. 4 as revised in its September 18, 1981, Order, where it stated as follows:

Because the Commission itself is designating by this Order the issues it wishes to be addressed in the adjudication . . . *it is*

¹² And which Staff quoted on p. 4, fn. 3, in its December 15, 1981, response to the amendment of the petition of FOE.

important that contentions raised by parties and sub-issues raised by the Board in this proceeding contribute materially to answering those designated issues.

. . . [T]he Board will not be bound by the provisions of 10 CFR Part 2 with regard to the admission and formulation of other contentions. In granting this discretion to the Board, the Commission emphasizes that its purpose is to ensure that *the Board is empowered only to accept and formulate, after consultation with the parties, those contentions which seem likely to be important to resolving the Commission's questions on pages 9-10, and thereby to assure that the proceeding remains clearly focused on the issues set forth in this Order.* (emphasis supplied)

We have decided that the most effective and efficient way to comply with the intent of the Commission in this investigation is for the Board itself to formulate the contentions to be litigated, basing our formulation on the contentions submitted in the pleadings, the positions of the parties at the Second Special Prehearing Conference, and on our judgement with regard to issues that we believe need to be ventilated.

Accordingly, by subsequent order of this Board the contentions to be litigated in this proceeding will be set forth. For each contention there will be designated a lead intervenor and, where appropriate, other intervenors who have contributions to make to the litigation of that contention. It will be the responsibility of the lead intervenor to prepare filings, present witnesses, introduce documentary evidence, conduct cross-examination, and submit findings of fact with respect to the contention or contentions assigned to it. Contributing intervenors shall assist the lead intervenor by supplying evidence, suggesting questions and plans for cross-examination, contributing to the findings of fact, and providing any other assistance and cooperation that will aid the lead intervenor in contributing to the development of a complete record in this case. If a lead intervenor declines to introduce any evidence proposed by a contributing intervenor or refuses to accept a contributing intervenor's suggestions with regard to cross-examination or findings of fact, the contributing intervenor may petition the Board to introduce such matters on its own behalf.¹³ The petition must show that the independent introduction of material by the contributing intervenor is essential to the development of a sound record.

At the Second Special Prehearing Conference we will hear argument from the parties and participants with regard to the contentions which we formulate and our designation of lead and contributing intervenors. We

¹³ Such petition can be made orally during the course of the hearing.

shall also propose and hear argument on a discovery schedule and procedures.¹⁴

Upon consideration of all of the foregoing and of the entire record in this matter, it is this 2nd day of April, 1982

ORDERED

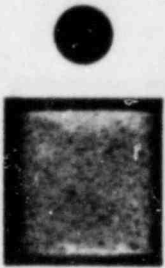
1. That pursuant to 10 CFR §2.715(c) the Attorney General of the State of New York, the New York State Energy Office, the County of Westchester, the Metropolitan Transportation Authority, the Council of the City of New York, the Port Authority of New York and New Jersey, the County of Rockland, the New York State Assembly and Its Special Committee on Nuclear Power Safety, and the Village of Buchanan are admitted as participants to this proceeding.

2. That pursuant to 10 CFR §2.714 the Honorable Richard L. Brodsky, Friends of the Earth, the New York City Audubon Society, Parents Concerned About Indian Point, Rockland Citizens for Safe Energy, the Union of Concerned Scientists and New York Public Interest Research Group, the West Branch Conservation Association, and the Westchester Peoples Action Coalition are admitted as intervening parties to this proceeding, subject to such conditions as may have been set forth herein or will set forth subsequently.

3. That the Greater New York Council on Energy is conditionally admitted pursuant to 10 CFR §2.714 pending further order of the Board.

4. That the Parties and Participants shall attend the Second Special Prehearing Conference on April 13 and 14, 1982 at the Ceremonial Courtroom, Westchester County Courthouse, Grove Street, White Plains,

¹⁴ All parties and participants are put on notice that discovery in the proceeding will be abbreviated and must be conducted efficiently. Put simply, the Board cannot and will not tolerate protracted legal battles over discovery. For guidance, see 10 CFR §2.730(h) and Section III, A-D, of the Commission's Statement of Policy on Conduct of Licensing Proceedings (46 FR 28533, May 27, 1981).



New York to discuss the formulation of contentions and the discovery schedule and procedures.

THE ATOMIC SAFETY AND
LICENSING BOARD

Louis J. Carter, Chairman
ADMINISTRATIVE JUDGE

Oscar H. Paris
ADMINISTRATIVE JUDGE

Frederick J. Shon
ADMINISTRATIVE JUDGE

Bethesda, Maryland

Cite as 15 NRC 742 (1982)

LBP-82-26

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

John F. Wolf, Chairman
Dr. Frank F. Hooper
Gustave A. Linenberger, Jr.

In the Matter of

Docket Nos. 50-522
50-523

**PUGET SOUND POWER & LIGHT
CO., et al.**
(Skagit/Hanford Nuclear Power
Project, Units 1 and 2)

April 5, 1982

The Licensing Board rules on petitions to intervene.

RULES OF PRACTICE: STANDING TO INTERVENE

An intervention petitioner, to have standing, must allege some injury that has occurred or will result from the action taken as a result of the proceedings. A mere academic interest in the outcome of the proceedings will not confer standing.

RULES OF PRACTICE: STANDING TO INTERVENE

The economic concerns of ratepayers of the applicant utilities are not within the "zone of interests" protected by the Atomic Energy Act or NEPA, and such interests do not provide a basis for standing for the representative of the affected ratepayers.

**MEMORANDUM AND ORDER
IN RESPONSE TO PETITIONS TO INTERVENE FILED BY (1) NATURAL
RESOURCES DEFENSE COUNCIL, (2) NATIONAL WILDLIFE
FEDERATION AND OREGON ENVIRONMENTAL COUNCIL, AND (3)
COALITION FOR SAFE POWER/FORELAWS ON BOARD**

Timely petitions for leave to intervene have been filed in these proceedings pursuant to 10 CFR §2.714 by: (1) Natural Resources Defense Council (NRDC); (2) National Wildlife Federation (NWF) and Oregon Environmental Council (OEC) (a joint petition); and (3) Coalition for Safe Power (CSP) and Forelaws on Board (FOB) (a joint petition).

I. NRDC Petition to Intervene

(a) Intervention as of Right

NRDC seeks to intervene in these proceedings to protect its own interests as an entity and the interests of its members. As an organization it and its nationwide membership are dedicated to the defense and preservation of the human environment and the natural resources of the United States.

To have standing in this matter one must satisfy two tests, first, one must allege some injury that has occurred or will result from the action taken as a result of these proceedings. Under this 'injury in fact' test a mere academic interest in the outcome of the proceedings will not confer standing. One must allege an interest arguably within the zone of interest of the Atomic Energy Act and Section 2.714 of NRC's Rules of Practice.¹

The petition lists alleged harm to its member but no harm in fact to NRDC, as an entity. NRDC relies on its claim to be a "special interest" organization with demonstrated concern for environmental and nuclear power matters as its basis for standing. That reliance is misplaced.²

In the Sierra Club case, The Supreme Court said: "a mere interest in a problem no matter how longstanding the interest and no matter how qualified the organization is in evaluating the problem, is not sufficient by itself to render the organization 'adversely affected' or 'aggrieved' within the meaning of APA."

It is clear that under the Sierra Case holding NRDC does not have standing on the basis of its organizational interest.

¹ Portland General Electric Co. (Pebble Springs Nuclear Plant, Units 1 and 2) 4 NRC 610, 613, 614 (1976).

² Sierra Club v. Morton, 405 U.S. 727, 739-40 (1972).

(b) Intervention as a Representative of its Members

NRDC's attempt to show standing through its members interest is not successful for the following reasons.

The affected members interests are predicated on economic concerns as ratepayers of the applicant utilities. It is well established that the interest of ratepayers is not within the "zone of interests" protected by the Atomic Energy Act or NEPA.³

NRDC argues that standing is established by asserting that listed members could be adversely effected by the operation of Skagit/Hanford Nuclear Power Plant. It contends that the operation, if licensed by this proceeding, would cause thermal and chemical pollution in the Columbia River which in turn would increase fish mortality and decrease recreational safety. In addition, it claims its members will incur risks of catastrophic accidents and impacts due to radioactive wastes. The petition fails to allege how NRDC or its member will suffer "injury in fact". The members are customers of utilities in the area but none of them resides within 50 miles of the proposed site.

The Board finds on the basis of the deficiencies indicated above that the NRDC's petition has failed to establish a basis for intervention as of right.

(c) Discretionary Intervention

NRDC has not sought discretionary intervention. However, the factors listed by the Commissioners in the Pebble Springs decision⁴ to be weighed in determining discretionary intervention, have been considered by the Board to the extent possible at this stage of the development of the record. In the light of the allegations in the petition it is concluded that a perceptive determination regarding discretionary intervention cannot be made at this time. Accordingly, discretionary intervention is denied.

II. NWF and OED Joint Petition to Intervene

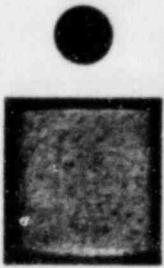
(a) Intervention as of Right

While the joint petition lists alleged harm to its members it lists no harm to NWF or OEC as entities. NWF/OEC organizational interests in environmental problems and nuclear power do not provide a basis for standing on their own.⁵

³ Portland General Electric Co. (Pebble Springs Nuclear Plant, Units 1 and 2) CLI-76-27, 4 NRC 610, 614 (1976).

⁴ Pebble Springs Case, *supra* 4 NRC 610, 614 (1976).

⁵ Sierra Club v. Morton, *supra* 405 U.S. 727; Pebble Springs, *supra* 4 NRC at 613.



The only members identified in the NWF/OEC petition live in Portland, Oregon, 180 miles from the site. This is beyond the area accepted by NRC to establish that possible injury will occur. Accordingly, no basis for standing can rest on the residences of NWF/OEC members. The petition does not explain how the listed members will suffer injuries to their recreational activities as a result of the proposed construction and operation of the Skagit/Hanford Plant. The identified economic concerns of the members as ratepayers to the applicants are not an acceptable basis for standing. None of the standing, alleged bases in the petition are acceptable as a basis to establish standing as a matter of right.

(b) Discretionary Intervention

NWF/OEC's petition does not seek discretionary intervention. However, the Board has considered the possibility. It has found no basis in the petition that NWF/OEC would make a unique contribution to the record. It does not appear that there are any interests, or special knowledge or expertise with respect to the amended application that would warrant this Board to consider allowing NWF/OEC to intervene on a discretionary basis. In the present circumstances, the Board has concluded that discretionary intervention should not be granted.⁶

III. Petition of CSP/FOB

(a) Intervention as Right

The coalition for safe power (CSP) alleges that it is a not-for-profit citizens organization and that it works for safe energy through research and education. Forelaws on Board (FOB) joined the petition by consolidation. Neither the interests nor membership of FOB have been stated in the petition.

Standing exists here for CSP based on an affidavit of Mr. Terry Dana which states that the affiant resides at Richland, Washington, is a member of CSP, and authorizes CSP to represent his interest in this matter.

Since Richland, Washington is about 15 miles from the proposed site it appears that Mr. Terry Dana could be affected by the results of this proceeding.

The Board finds that CPS has established standing on the basis of the residence of its member Mr. Terry Dana.

FOB has not pleaded its interests or identified effected members in the petition. CSP can assert only its own interests in the proceeding and

⁶ Cf. Pebble Springs, *supra* 4 NRC 610.

cannot intervene on behalf of FOB.⁷ FOB's attempt to consolidate with CSP in this matter is accordingly rejected.

It does not appear from the petition that there are any interests, or unique knowledge or expertise with respect to the amended application that would warrant this Board to consider allowing FOB to intervene on a discretionary basis.

Accordingly, it is

ORDERED

This 5th day of April, 1982, that:

- (1) The NRDC petition to intervene is denied;⁸
- (2) The NWF/OEC petition to intervene is denied;⁸ and
- (3) The CSP petition to intervene is granted.⁹

The FOB petition to intervene is denied.⁸

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

John F. Wolf, Chairman
ADMINISTRATIVE JUDGE

⁷ Tennessee Valley Authority (Watts Bar Nuclear Plant, Units 1 and 2) ALAB-413, 5 NRC 1418, 1421 (1977).

⁸ Under 10 CFR §2.714(a)(3) an amended petition to intervene may be filed, at any time up to fifteen (15) days prior to the holding of the special prehearing conference, to cure any deficiencies in the original petition to intervene if the petitioner is able to do so.

⁹ Under the terms of 10 CFR §2.714(b) a petitioner must file "a supplement to his petition to intervene which must include a list of the contentions which petitioner seeks to have litigated in the matter, and the bases for each contention set forth with reasonable specificity . . . A petitioner who fails to file such a supplement which satisfies the requirements of this paragraph with respect to at least one contention will not be permitted to participate as a party."

Cite as 15 NRC 747 (1982)

LBP-82-27

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Ivan W. Smith, Chairman
Dr. Walter H. Jordan
Dr. Linda W. Little

In the Matter of

Docket No. 50-289
(Restart)

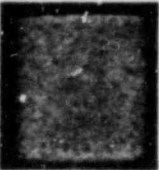

METROPOLITAN EDISON
COMPANY
(Three Mile Island Nuclear
Station, Unit No. 1)

April 5, 1982

Licensing Board, having reserved jurisdiction in Partial Initial Decision LBP-81-59, 14 NRC 1211, December 14, 1981, to consider the Staff's plan for implementing the initial decision, after modification and amendment, adopts the Staff's implementation report.

**RESERVATION OF JURISDICTION: IMPLEMENTATION OF
INITIAL DECISION;
DELEGATION OF AUTHORITY**

Jurisdiction to approve post-decision implementation plan was reserved in view of the fact that the evidentiary record did not permit detailed determination of which considerations require the imposition of rigid license conditions; that the license should not be freighted unnecessarily and too rigidly with license conditions; that enforcement involved its own expertise; that the Notice of Hearing (10 NRC 141, 148-49) assigned responsibility to be shared by the Director of Nuclear Reactor Regulation and by the Board to implement the Board's decision; and that to leave the entire enforcement responsibility to the Staff would be an excessive delegation of the Board's responsibilities.



JURISDICTION: PETITION FOR RECONSIDERATION

An uninvited request to reevaluate the evidentiary record and arrive at a different conclusion made more than two months after the initial decision would, standing alone, be an untimely petition for reconsideration under 10 CFR 2.771 and beyond the Board's jurisdiction.

JURISDICTION: IMPLEMENTATION OF INITIAL DECISION

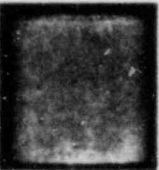
Having retained jurisdiction to approve implementation plan, even though a request for modification of the initial decision could be deemed an untimely petition for reconsideration, it would be pointless for Licensing Board to require the implementation of a condition it no longer supported, and, in any event, the Board's ruling would afford useful guidance to the Appeal Board and Commission on review.

JURISDICTION: IMPLEMENTATION OF INITIAL DECISION

Having retained jurisdiction to approve implementation plan, a request to clarify the scope and purpose of a Board-imposed condition in the initial decision is not a petition for reconsideration and is properly within the Board's jurisdiction.

**MEMORANDUM AND ORDER MODIFYING AND APPROVING NRC
STAFF'S PLAN OF IMPLEMENTATION**

Background and Summary of Rulings



In the Partial Initial Decision of December 14, 1981 (LBP-81-59, 14 NRC 1211) the Board explained that, throughout the decision on plant design and unit separation issues, references were made to the Board's reliance on various Staff "requirements", Licensee "commitments" and Board-imposed "conditions" without studied regard to whether these terms were intended to be conditions or legally-binding technical specifications attached to the TMI-1 license. PID ¶¶ 1198-1202.

We explained further that the evidentiary record did not lend itself to detailed determinations as to which of these considerations require the imposition of rigid license conditions and technical specifications (PID ¶ 1213); that the license should not be freighted unnecessarily and too rigidly with license conditions (PID ¶ 1207); that enforcement involves its

own expertise (PID ¶ 1213); that the Notice of Hearing assigned responsibility to be shared by the Director of Nuclear Reactor Regulation and by the Board to implement the Board's decision (PID ¶ 1216); and that to leave the entire enforcement responsibility to the Staff would be an excessive delegation of the Board's responsibilities (PID ¶ 1216).

Therefore we deferred issuing our final decision on which of the various requirements, commitments and Board-imposed conditions should be made license conditions and we directed the Staff to present a plan for the implementation of the Board's decision on plant design and unit separation matters. Licensee was directed to respond to the Staff's report and other parties were invited to respond. PID ¶ 1217. As to the plant design issues, the Board listed nineteen categories of requirements which, at a minimum, the Staff was directed to address. PID ¶ 1218.¹ The Staff was also directed to include four categories of unit separation requirements in its implementation plan report. PID ¶¶ 1236-37.

The Staff, on February 1, 1982, reported the details of its enforcement plan. On February 22 the Licensee replied to the Staff's report challenging some aspects of the enforcement plan. Union of Concerned Scientists (UCS), the only other party to reply to the Staff's report, on February 17, criticized the Board's approach to enforcement, and faulted some aspects of the Staff's plan. The Staff, by leave of the Board, filed on March 10 a response to the Licensee's position in which the Staff reported that it and Licensee now agree in most of the disputed areas.

The Staff's report addressed each of the matters set out in the Board's directive and other implementation items. We find that the implementation plan is generally sufficient but that it requires some modifications and additions. Below, as modified and amended, we adopt the plan as the Board's order in this proceeding.

Discussion

Steam Generator Bypass Logic Problem

In PID ¶ 1064² the Board required that

... prior to restart, the Licensee propose for Staff approval, a long-term solution to the steam generator bypass logic problem

¹ One requirement, to complete a revised small-break loss of coolant accident analysis under revised assumptions, was later deleted from the decision by the Board's order of January 26, 1982.

² The NRC Staff incorrectly refers to PID ¶ 1174.

for implementation as soon as possible after restart. Prior to restart, the Staff shall certify to the Commission that the Licensee has made reasonable progress in initiating its program for the long-term solution.

In its enforcement plan (page 3, item 5), the Staff proposes that it will require Licensee to upgrade its main steam rupture detection system to safety grade prior to startup following Cycle 6 refueling. The plan also requires (at page 6, item 10) that prior to restart, the Licensee must propose a means to prevent feedwater isolation due to failure in rupture detection systems.

UCS contends (at page 4) that implementation of the solution after the Cycle 6 refueling does not comport with the Board's order requiring implementation as soon as possible after restart. However the Board is satisfied with the time contemplated by the Staff. On the other hand, UCS is correct in that the Staff has failed to provide for certification to the Commission that, prior to restart, Licensee has demonstrated reasonable progress in initiating the longer-term solution.

Accordingly we reiterate the requirement that the Licensee demonstrate reasonable progress prior to restart. If the Staff is satisfied, upon evaluation, that Licensee's proposal of a means for preventing feedwater isolation due to a failure in the rupture detection system itself constitutes reasonable progress, it may so certify. We will not, however, require, as UCS urges (at page 4), a report to this Board of the substance of the program.

Environmentally Qualified Pathway to Cold Shutdown

In our Partial Initial Decision we presumed that Licensee would environmentally qualify the equipment needed to achieve cold shutdown in accordance with Supplement 3 to IE Bulletin 79-01B. But recognizing some doubt about the validity of that presumption, we required that the Commission be informed if the Licensee does not plan to qualify the equipment. PID ¶ 1180.

In its January 28, 1982 Comments to the Commission on immediate effectiveness, the NRC Staff has complied with this directive by informing the Commission, *inter alia*, that its position as set forth in the IE Bulletin has since changed, and that the Staff is not currently aware of any such plans (Comments at 14, 15) by the Licensee. The Staff's report to the Commission is complete. The Licensee has also disclosed its position to the Commission in its January 28 comments on immediate effectiveness (at page 4). The Board's reporting requirement is satisfied and we are also satisfied with the substance of the Staff and Licensee's respective reports.

The Staff has listed under II C, "COMMITMENTS/ REQUIREMENTS TO BE COMPLETED UNDER RESTART", our requirement flowing from PID ¶ 1180 that the equipment either be environmentally qualified or that the Commission be so informed. Licensee believes, apparently, that there is an opportunity for confusion in this organization in that listing it there might be read to require environmental qualification before restart. This interpretation is not likely, but a better organization would be, as Licensee suggests, under II D, "OTHER COMMITMENTS/ REQUIREMENTS" of the implementation plan.

Systems Interaction Studies

The Board specified in ¶¶ 1000 and 1003(f) that TMI-1 is to be included by the Staff in generic reviews of systems interactions. The Staff reports that it is still formulating and testing methodologies and guidance for the conduct of systems interaction studies and is presently not imposing a requirement to conduct such studies generically. Report, pp. 8, 9. However, in response to recommendations by the ACRS, the Licensee has committed to perform a probabilistic risk assessment for TMI-1. *Id.* The Staff states that it will monitor Licensee's efforts to assure that this assessment is performed in accordance with Staff guidance.

Contrary to UCS' comments (at pp. 5, 6) the Staff has not abandoned the generic studies program as is demonstrated by its report that it is proceeding with the formulation and testing of methodologies and guidance. However, the Board and UCS (*Id.*) were both concerned that the Staff's report means that, contrary to the intent of the Board's order, TMI-1 would not be included in any generic reviews. The Board has since been assured that if the presently underway initial studies of the five other plants indicate that the studies are useful and worthwhile, TMI-1 will be included. Tr. 27,013 (Cutchin). This conforms to the intent of the Board's order.

Control Room Design Review

The Staff originally proposed to include prior to restart the following specific license condition:

Prior to startup following Cycle 6 refueling, the Licensee shall correct the deficiencies in the TMI-1 control room that are identified in Items 3b, 3c, 3g, 4c and 10b of NUREG-0752 and its Supplement 1. (See PID, ¶¶ 913 & 919, n.109.)

Staff Report at 3. Licensee responded (at page 3) that this condition should be modified to eliminate Items 3b, 3e, 3g and 10b, as well as the reference to PID ¶ 919, n.,109.³ Licensee's complaint was that its commitment to address these items in a subsequent submission was translated by the Staff into a requirement for unidentified corrections; that Licensee is being treated differently than other operating reactors, and that there is no basis for the schedule imposed. *Id.* at 3-7.

Subsequent to Licensee's response, Staff and Licensee discussed Licensee's concerns and, by leave of the Board, the Staff reported that both agree that the license condition may be reworded as follows:

The Licensee shall correct the human factors deficiency in TMI-1 control room design that is identified in Item 4c of NUREG-0752 and its Supplement 1 prior to startup following Cycle 6 refueling, and the Licensee shall address final resolution of the human factors design deficiencies that are identified in Items 3b, 3e, 3g and 10b of NUREG-0752 and/or its Supplement 1 in its detailed control room design review (DCRDR) report for TMI-1. (See PID ¶ 915).

Staff Response of March 10, 1982, at 1, 2.

The Board accepts the agreed-upon license condition. We also accept Licensee's recommendation that Item II C.8 under COMMITMENTS/REQUIREMENTS TO BE COMPLETED PRIOR TO RESTART should be modified to include *Supplement 1* to NUREG-0752. Thus the modified condition reads:

"8. Staff will review control room modifications against criteria of NUREG-0752 and its Supplement 1, prior to restart (See PID ¶¶ 913-15)." [Footnote omitted]

Work Suspension During Fuel Handling

The Board required that "[d]uring any Unit 2 fuel movements Licensee will suspend work in the Unit 1 area of the fuel handling building . . ." PID ¶ 1326(a). The Staff proposed the following condition:

During any Unit 2 fuel movements Licensee shall suspend work in the Unit 1 area of the fuel handling building. (See PID, ¶ 1326).

Staff Report at 3, Item II.A.7.

Licensee objected to the license condition proposed by the NRC Staff as "constituting too literal an interpretation of the Board's order". Licensee

³ Items 3b and 3g relate to Bailey controllers. Item 3e relates to detection of burned-out indicator bulbs. Item 10b and PID ¶ 919, n.109 relate to in-plant communications.

urged, instead, that the license condition not impose an absolute bar to work in the Unit 1 area of the fuel handling building during Unit 2 fuel movements, but rather that NRC Staff review of Unit 2 fuel movement procedures consider on an *ad hoc* basis whether safety considerations require halting work in the Unit 1 area of the fuel handling building. Licensee Response, p. 8.

Licensee's problem rises not from the Staff's interpretation of the Board's order, but from the order itself. The Staff's initial proposal reflected both the language and the intent of our order. The solution proposed by the Licensee would have the Board reexamine the evidentiary record, draw different inferences from it and arrive at another conclusion. As it turns out, we recognize that the original order should be modified and that the condition agreed upon by the Licensee and Staff and set out below, is appropriate. There is, however, a question of jurisdiction. Licensee's motion appears to us to be an untimely petition for reconsideration, and, standing alone, it would be beyond our jurisdiction. On the other hand we specifically retained jurisdiction to approve the Staff's implementation plan. Even though we did not invite the parties to challenge the decision itself, we see no merit in implementing an order we no longer support. The better course is to proceed as if we continue to have jurisdiction because, even if we do not, our ruling may assist the Appeal Board or the Commission upon any review.⁴

The Licensee has traced the evidentiary pathway to our earlier conclusion. We discussed the potential impacts on Unit 1 operations from disposition of the Unit 2 reactor core at PID ¶ 1254 where we found that fission gas activity in the Unit 2 reactor core is at less than detectable concentrations. In PID ¶ 1255 we found that the fuel handling building ventilation and filtration systems will be in service during (Unit 2) defueling operations in order to mitigate the consequences of a postulated fuel handling accident.

With an environmental barrier in place prior to restart, the only Unit 1 area that potentially could be affected by a Unit 2 fuel handling accident is the Unit 1 fuel handling area. PID ¶ 1256. If a Unit 2 fuel handling accident were to contaminate the Unit 1 fuel handling area, work in the Unit 1 area could be brought to a safe conclusion, the radiological problem could be addressed, and the Unit 1 fuel handling area would be available within a matter of days. *Id.* Fuel handling evolutions generally need not be performed immediately, so we concluded that any delay in gaining access to the Unit 1 fuel handling area would not adversely affect safe operation

⁴ In its order of March 4, 1982 the Appeal Board indicated that our views on the substance of Licensee's concerns would be useful.

of Unit 1 (*id.*); we also found that if a true safety need required quick entry to the Unit 1 fuel handling area, such entry could be made. *Id.* at n.157.

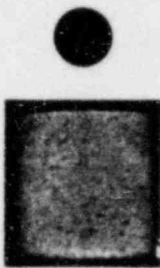
Nevertheless we stated that potential Unit 2 fuel handling accidents "will not adversely affect safe operation of Unit 1, *in that during any Unit 2 fuel movements, Licensee will suspend work in the Unit 1 area of the fuel handling building . . .*" [Emphasis added] See PID ¶ 1256. The source of this observation was the written direct testimony of NRC Staff witness Stoddart, ff. Tr. 10,159, at 22-23. This conclusion is contrary to the explicit assumption of other testimony that operations may be taking place in the Unit 1 fuel handling area during Unit 2 fuel movements. Tr. 10,062 (Fuhrer).

Licensee argues that we may have misunderstood the thrust of Mr. Stoddart's written testimony. His testimony states that "[s]uspension of work in the TMI-1 area during TMI-2 fuel movement will be a *procedural* requirement [emphasis added]." Stoddart, ff. Tr. 10,159, at 22-23. Later Mr. Stoddart refers to both hardware modifications and to "the described administrative controls", which probably refers back to the procedural requirement to suspend work. Licensee would have us construe this testimony as relating to *ad hoc* procedural controls that might be imposed on work in the Unit 1 fuel handling area depending upon the nature of fuel movements taking place in the Unit 2 fuel handling area, and not as an absolute requirement that work always be precluded in the Unit 1 fuel handling area during Unit 2 fuel movement.

Licensee recognizes, however, that its reading of Mr. Stoddart's testimony may not be free from doubt. But Dr. Bellamy, chief of technical support for the NRC's onsite Three Mile Island Program Office (TMIPO), provided testimony which, in Licensee's view, resolves the matter.

Dr. Bellamy testified that the Staff did not have in mind any specific cases where there would be a specific restraint on Unit 1 operation but that before any activities are approved at Unit 2, the Staff would impose an additional limiting condition of operation which in the Staff's judgment should be imposed. He was referring specifically to a situation where there could not be movement of Unit 1 fuel during movement of fuel from the Unit 2 pool. Tr. 10,206.

Having reconsidered the testimony of the Staff witnesses on the matter, the Board agrees that the record does not require an absolute bar to any work in the Unit 1 area during Unit 2 fuel movements. The Staff itself also now expressly agrees that such a ban is not necessary. Staff March 10 Response, at 3. As a result of Licensee's objection, the Staff discussed the matter with the Licensee and the Commonwealth of Pennsylvania and all agree that the condition may be reworded as follows:



During any Unit 2 fuel movements in the fuel handling building, the Licensee shall suspend work in the Unit 1 area of that building, unless the Licensee has submitted to the NRC Staff for its review specific written procedures for the planned movements of Unit 2 fuel and an evaluation of the potential impacts of those fuel movements on personnel working in the Unit 1 area of the building and the Staff has agreed that the potential impacts of the planned Unit 2 fuel movements on personnel working in the Unit 1 area of the building do not require that work in the Unit 1 area of the building be suspended.

Id.

The Board is satisfied with the modified condition.

Filtration During Fuel Handling

In PID ¶ 1326(a) we also required that “. . . whenever Unit 1 fuel movements are in progress, the engineered safety feature filtration systems for Unit 1 will be in operation.” Because of a potential need for prompt relief from the literal and unforeseen reach of this order the Licensee filed a separate motion on March 12 seeking clarification of its limits. We divided Licensee's motion into its pre-restart and post-restart aspects, and on March 23 we clarified the order to exclude pre-restart engineered safety features (ESF) filtration as a Board requirement on jurisdictional and safety grounds. We now rule on the remaining aspects of the Licensee's motion.

Licensee makes three additional requests for changes in the Board's fuel handling order. First, we are requested to clarify that the ESF filter system need only be “operable”, rather than “in operation” during fuel movements because actual operation of the ESF filter system is initiated only during accident conditions. The Staff agrees (March 25 answer) and explains that it supports Licensee because the final design of an ESF filter system that is to be merely “operable” during fuel movements and put into operation only upon the occurrence of a fuel handling accident, rather than “in operation” during fuel movements, must include provisions for its automatic actuation by a safety grade actuation system that senses an appropriate signal and automatically actuates the ESF filter system. The Staff also notes that rewording the license condition as the Licensee requests would permit the condition to be satisfied by a final ESF filter system design that does not include such an actuation system if the ESF filter system is required to be in operation during TMI-1 fuel movements by either the technical specifications or the operating procedures.

The Board verified in a telephone conference on March 26 that the Licensee agrees that the Staff's characterization is accurate. On this basis we clarify our order accordingly. We use the term "clarify" intentionally although it might appear that Licensee's request was for reconsideration. This is because we would view an "operable" ESF filter system with provisions for automatic safety grade actuation to be, for practical purposes, in "operation" even though no filtration is actually demanded and performed at the time. In any event, the condition proposed by the Licensee satisfies the Board's original concern.

Second, Licensee wishes it clarified that the ESF filter system need be operable only when fuel is in transit within the fuel handling building because the system would serve no purpose when fuel movements are confined to the reactor building. Third, Licensee points out that the condition should not apply to fresh unirradiated fuel. Both of these requests reflect the intent of the original order and are appropriate for clarification. The following condition proposed by Licensee, and approved by the Staff, resolves all areas of fuel-handling clarification and is approved:

After the restart of Unit 1 and prior to the movement within the Unit 1 fuel handling building of any irradiated Unit 1 fuel, Licensee shall install, and have operable, an engineered safety features (ESF) filtration system for the Unit 1 fuel handling building. The ESF filtration system for Unit 1 shall be operable whenever irradiated Unit 1 fuel is moved with the Unit 1 fuel handling building.

Items That are Not Licensee Conditions

We directed the Staff to report how it intends to be assured that the Licensee will abide by any items the Staff does not plan to impose as license conditions or how it intends to be assured that the Licensee will seek relief from such items in an appropriate manner. PID ¶ 1217. The Staff reported:

The Staff does not propose to implement any special enforcement procedures for TMI-1 after restart. The normal enforcement procedures relied on by the Staff to assure compliance by all Licensees with items not specifically addressed in Technical Specifications or other license conditions will be relied on by the Staff to assure that the Licensee for TMI-1 operates TMI-1 safely [unless otherwise required by the initial decision].

Report at 9.

We have since discussed this matter on the record with the interested parties and the Staff informs the Board that it does not intend to exclude from its TMI-1 restart implementation program any special inspections or verifications required or depended upon by the Board with respect to requirements which did not rise to the level of license conditions or technical specifications. Tr. 27,015-19.⁵ With this understanding we approve the Staff's report with respect to items which are not license conditions or technical specifications. We will add then the following language (as it appears in brackets above) to the end of the Staff's statement:

“ . . . unless otherwise required by the initial decision.”

References to Partial Initial Decision

Licensee requests that the Staff be directed to retain the parenthetical references to the partial initial decision and/or the evidentiary record which accompanies the items listed in the Staff's report. The purpose is to ensure that future questions about any condition can be resolved in the relevant context. We agree that this is appropriate — the Staff did not comment on this request. Moreover we would expect that any dispute would be discussed against the relevant background of the entire decision and relevant Board orders.

ORDER

As modified above, the Board adopts the Staff's implementation report of February 1, 1982 as the Board's order in this proceeding. It is appealable. For review purposes it should be treated as a Supplement to the Partial Initial Decision of December 14, 1981. Within ten days after service of this Order any party may take an appeal to the Appeal Board

⁵ TMI-1 restart project manager, Mr. Jacobs, stated that the Staff reviewed the initial decision for this purpose. While the project manager cannot recall whether the Staff identified anything specifically related to inspection following restart, he believes that the Staff would have captured any such requirement and that a special inspection required by the Board was not intended to be included in the phrase “normal inspection procedures”. Tr. 27,018 (Jacobs). The Board itself is not aware of any special verification required to be performed outside the subject matter covered by license conditions. Our modification is a precaution against any oversight.

by filing exceptions to all or portions of it. A brief in support of the exceptions shall be filed within thirty days thereafter or within forty days in the case of the Staff.

THE ATOMIC SAFETY AND
LICENSING BOARD

Walter H. Jordan
ADMINISTRATIVE JUDGE

Linda W. Little
ADMINISTRATIVE JUDGE

Ivan W. Smith, Chairman
ADMINISTRATIVE LAW JUDGE

Bethesda, Maryland
April 5, 1982

Cite as 15 NRC 759 (1982)

LBP-82-28

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

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

In the Matter of

Docket Nos. 50-329 OM
50-330 OM
Docket Nos. 50-329 OL
50-330 OL

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

April 12, 1982

The Licensing Board denies an intervenor's motion for suspension of construction pending resolution of an assertedly unresolved generic safety issue concerning the potential effects of electromagnetic pulse (EMP) on nuclear power plants.

**ADMISSIBILITY OF CONTENTION: ELECTROMAGNETIC PULSE
(EMP)**

A contention concerning the effect on a nuclear plant of electromagnetic pulses (EMP) possibly resulting from a nuclear detonation at a high altitude cannot be considered in an operating license proceeding, as a result of 10 CFR §50.13, which expressly does not require operating license applicants to provide design features or other measures for protection against the effects of enemy attack or the deployment of weapons incident to national defense activities.

MEMORANDUM AND ORDER
(Denying Wendell Marshall's Motion for
Termination of Construction Pending
Resolution of EMP Issue)

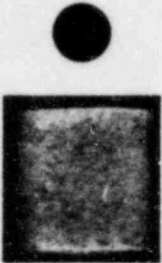
On December 16, 1981, Mr. Wendell H. Marshall, representative of the Mapleton Intervenors and a party in the pending operating license proceeding, filed a letter (which we interpret as a motion) asking this Board to halt construction of the Midland facility pending resolution of an assertedly unresolved generic safety issue concerning the potential effects of electromagnetic pulse (EMP) on nuclear power plants. In letters dated January 21, 1982 (at pp. 10, 15) and February 23, 1982, Mr. Marshall provided further comments on the EMP question. And by letters dated March 22 and 25, 1982, Mr. Marshall reiterated his request to stop construction. In responses dated December 28, 1981 and January 25, 1982, the Applicant and Staff, respectively, opposed the request on the basis of its lack of relevance to the ongoing OM proceeding and, hence, its not being properly before this Board.

As we understand it, the electromagnetic pulses to which Mr. Marshall is referring would possibly result from a nuclear detonation at a high altitude and could affect the operation of nuclear plants. The NRC Staff is apparently conducting certain studies on the effects of EMP on nuclear plants. We agree with the Applicant and Staff that this matter is not relevant to the soils matters which are presently before this Board. Beyond that, the matter cannot be considered as a part of our forthcoming operating license review, since it is barred by 10 CFR §50.13, which provides

An applicant for a license to construct and operate a production or utilization facility, or for an amendment to such license, is not required to provide for design features or other measures for the specific purpose of protection against the effects of (a) attacks and destructive acts, including sabotage, directed against the facility by an enemy of the United States, whether a foreign government or other person, or (b) use or deployment of weapons incident to U.S. defense activities.

To the same effect, see *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-42, 14 NRC 842 (1981); *id.*, LBP-81-57, 14 NRC 1037 (1981).

For the foregoing reasons, it is, this 12th day of April, 1980
ORDERED



That Wendell H. Marshall's request for us to halt further construction on the Midland facility pending resolution of the EMP question be, and it hereby is, *denied*.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE

Cite as 15 NRC 762 (1982)

LBF-82-29

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Herbert Grossman, Chairman
Robert L. Holton
J. Venn Leeds

In the Matter of

Docket No. 50-367
(Construction Permit
Extension)

NORTHERN INDIANA PUBLIC
SERVICE COMPANY
(Bally Generating Station,
Nuclear-1)

April 12, 1982

Licensing Board issues proposed order to terminate the proceeding involving an application for extension of the construction permit's construction completion date. The termination would be conditioned upon applicant's implementing a Board-approved site restoration plan under Staff supervision, but not upon applicant's paying intervenor's attorneys' fees and expenses.

LICENSING BOARDS: DISMISSAL OF PROCEEDINGS

Board weighs reasons for granting termination conditioned upon implementation of site restoration plan against those for requiring restoration before termination, and proposes immediate, conditional termination.

LICENSING PROCEEDINGS: DISMISSAL; ATTORNEY'S FEES

Absent statutory exception, the "American Rule" of not awarding attorneys' fees and expenses is binding upon administrative agencies. *Turner v. FCC*, 514 Fed. 1354 (D.C. Cir. 1975).

LICENSING PROCEEDINGS: DISMISSAL; ATTORNEYS' FEES

Even if the Commission has the authority to do so, it has not adopted a policy of awarding attorneys' fees and expenses.

LICENSING PROCEEDINGS: DISMISSAL; ATTORNEYS' FEES

The exception to the "American Rule" of not awarding attorneys' fees and expenses embodied in the Federal Rules of Civil Procedure, which permits the award to prevent a duplication of expenses where the dismissal is without prejudice, does not apply to the termination of a construction permit extension proceeding.

MEMORANDUM AND ORDER
(Issuing Proposed Order Terminating Proceeding)

MEMORANDUM

The Board has before it a number of unresolved questions concerning the method and timing of the termination of this proceeding in light of Northern Indiana Public Service Company's (NIPSCO's) decision not to complete construction of the Bailly Generating Station. In our order of January 29, 1982, we approved NIPSCO's revised site restoration plan and directed NIPSCO to begin implementing that plan forthwith. Instead, NIPSCO has moved for reconsideration of the order and evinces a reluctance to begin site restoration without the finality of a termination order that decides in advance all of the conditions under which the project is to be terminated. Staff agrees with NIPSCO. Porter County Chapter Inter-venors (PCCIs) seek to delay the issuance of an order of termination until NIPSCO has completed site restoration according to the agreed-upon plan, so that the Board can retain jurisdiction to insure that the plan is properly implemented.

Other matters pending include the questions of whether the termination of the proceeding should be "with prejudice" or "without prejudice," and whether the termination should be conditioned upon NIPSCO's payment of PCCIs' expenses and attorney's fees in the proceeding. A further question raised by PCCIs, as to whether discovery should be permitted with regard to site restoration, unlike the other questions which we answer directly in this order, would be mooted by our decision to terminate the proceeding (thereby precluding the possibility of further discovery). PCCIs' concerns

are addressed indirectly by the reporting requirements made a condition to termination.


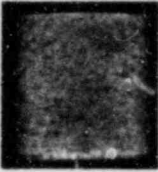
A. Termination at this Juncture

The Board has weighed a number of considerations for and against terminating the proceeding at this juncture. Some of the reasons for not terminating are, as follows:

- (1) The excavation to be backfilled has been in existence for a number of years. The lack of financial incentive to fill it, general corporate inertia, and the absence of initiation and completion dates in the restoration plan, suggest the possibility of an extended or indefinite delay in completing (or even beginning) the restoration.
- (2) Incorporating the terms of the revised site restoration plan in the termination order would seem to foreclose the possibility of modifying the plan without breaching the terms of the termination order regardless of how beneficial such change might appear. No machinery would exist for modifying the site restoration plan.
- (3) In the event that NIPSCO were to breach the terms of the site restoration plan, made a condition of the termination order, or merely fail to continue to implement the plan, the means of enforcing the conditions or ven conferring jurisdiction upon a responsible instrumentality are hazy, at best.
- (4) Were the Board to withhold the termination until the site restoration plan is implemented, we could insure its implementation within a reasonable time, permit reasonable modifications to the plan after giving full weight to the positions of the parties, and serve as an inducement for NIPSCO to complete the site restoration (in order to terminate the proceeding).

On the other hand, we see the following reasons to terminate the proceeding at this juncture:

- (1) By not terminating, we run the risk of wasting valuable Board time in considering petty disputes, promoted to litigable issues because of the basic antagonism between the parties, as amply evidenced in the past (and at present, by the current discovery dispute).
- (2) The mechanical function of supervising the implementation of a site restoration plan should not require the presence of a hearing board and the Staff believes that it is able to insure implementation.

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- (3) By insisting upon termination at this juncture with the current site restoration plan as a condition of termination, NIPSCO apparently accepts the immutability of the terms of the plan and, consequently, is willing to forego the possibility of any future modification even under changed circumstances.
 - (4) Finally, but not the least in our consideration, there is the Appeal Board's approval of the general procedure of terminating proceedings subject to site restoration conditions, rather than having the Licensing Board supervise the restoration and then terminate the proceeding. *Toledo Edison Company* (Davis-Besse Nuclear Power Station, Units 2 and 3), ALAB-622, 12 NRC 667 (1980); ALAB-652, 14 NRC 627 (1981). To depart from a general procedure sanctioned by the Appeal Board, even under reasonable (but not compelling) circumstances, stands little chance of success.

On balance, we have found most weighty NIPSCO's willingness to bind itself to the exact terms of the current site restoration plan and Staff's confidence in its ability to insure the implementation of the site restoration plan even in the absence of a live proceeding over which the NRC has undisputed jurisdiction. Moreover, we are spelling out in considerable detail the requirements for site restoration, including initiation and completion dates, reporting requirements, and an inspection requirement, consonant with the general provisions of the site restoration plan, to insure either that the plan is fairly implemented within a reasonable time or that a firm basis is established for taking action to compel implementation.

B. Termination With or Without Prejudice

NIPSCO and Staff take the position that the termination of this proceeding should be without prejudice; PCCIs contend that it should be with prejudice. As we read the submittals of the respective parties and the cases upon which they rely, *Philadelphia Electric Company* (Fulton Generating Station, Units 1 and 2), ALAB-657, 14 NRC 967 (1981) and *Puerto Rico Electric Power Authority* (North Coast Nuclear Plant, Unit 1), ALAB-662, 14 NRC 1125 (1981), we see only a semantic difference between the parties. It appears to us that the parties and the Board are in agreement on the effect that termination of this proceeding should have on future activities at the Bailly site, notwithstanding the parties' disagreement as to how the effect should be characterized.

As we understand that effect, which would be automatic (by operation of law) even without our characterizing the termination, Construction Permit No. CPPR-104 will expire without opportunity for further extension because the time for filing a timely application for extension has

passed. Since there has been no decision adverse to NIPSCO's building a nuclear plant at the Bailly site, NIPSCO would be free to file a new application to construct a nuclear plant on that site. We see no reason to depart from that result by either failing to specifically foreclose NIPSCO from reviving Construction Permit No. CPPR-104, or by permitting the expiration of that permit to prejudice NIPSCO's right to file a new application for a construction permit. We would spell out that result to assure its certainty.

C. PCCIs' Claim for Attorney's Fees and Expenses

On the basis of the recent Appeal Board decision in *North Coast*, ALAB-622, *supra*, PCCIs have moved the Board to impose the condition upon NIPSCO's withdrawal of its application for extension of construction permit that NIPSCO pay PCCIs' expenses and attorneys' fees in this proceeding. In particular, PCCIs rely upon footnote 11 to that decision (Slip Op. at 17), which reads as follows:

We note that the case at bar did not entail lengthy discovery, or proceed through the trial stage. It hardly got off the ground. We leave open the question whether something short of a dismissal with prejudice, such as conditioning withdrawal of an application upon payment of the opposing parties' expenses, might be within the Commission's powers and otherwise appropriate where the expenses incurred were substantial and intervenors developed information which cast doubt upon the merits of the application.

NIPSCO and NRC Staff oppose the imposition of that condition primarily on the grounds that the Commission lacks the authority to award attorneys' fees and expenses and that the circumstances for awarding those fees and expenses do not exist in this proceeding. We decline to impose that condition.

Under the "American Rule," attorneys' fees and expenses are borne by the respective parties. They are not awarded to the prevailing party, as in England. The Supreme Court has recently reaffirmed the American Rule and indicated that it would recognize only statutory exceptions to the rule. *Alyeska Pipeline Service Co. v. Wilderness Society*, 421 US 240 (1975); *F. D. Rich Co. v. United States*, 417 U.S. 116 (1974). Absent a statutory exception, the American Rule is not only binding upon courts but upon administrative agencies as well. *Turner v. FCC*, 514 F.2d 1354 (D.C. Cir. 1975).

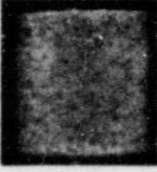

PCCIs attempt to create for themselves an exception based upon NRC rules that is analogous to an exception recognized under the Federal Rules of Civil Procedure. Federal Rule 41(a)(2) permits a plaintiff to dismiss his action only "upon such terms and conditions as the court deems proper."

Cases dismissed without prejudice under that rule have permitted the allowance of attorney's fees against the dismissing party. PCCIs contend that the language of 10 CFR §2.107(a) similarly permits the awarding of attorney's fees and expenses by requiring that the withdrawal of an application after the issuance of notice of hearing be "on such terms as the presiding officer may prescribe."

Even if PCCIs' are correct that the wording of 10 CFR §2.107(a) is similar to Federal Rule 41(a) and that Licensing Boards have the authority similar to Federal courts to award the fees and expenses under an exception to the American Rule, the requisite conditions are absent in this proceeding. In *Smoot v. Fox*, 353 F.2d 830, 833 (6th Cir. 1965), the Court of Appeals recognized that the cases permit the awarding of attorney's fees against the dismissing party only when the action is dismissed without prejudice. The reasoning for such rule, the court observed, is to compensate the defendant for expenses in preparing for trial in light of the fact that a new action may be brought in another forum. However, where the dismissal is with prejudice, fees and expenses will not be awarded because the cause is finally being terminated and the defendant cannot be made to defend again.

In the instant proceeding, that reasoning would preclude awarding PCCIs their attorneys' fees and expenses. Whether the termination of this proceeding is with or without prejudice, the effect of termination is to rescind the construction permit with finality. Where the statute of limitations has run on filing an application for extension of the construction permit (as it has here, under 10 CFR §2.109), even a dismissal without prejudice is a final determination of applicant's rights to the construction permit which cannot be further litigated. *CF. Carr v. Grace*, 516 F.2d 502 (5th Cir. 1975). To extend the Federal Rule 41(a)(2) exception so as to award attorneys' fees and costs, where the effect of the termination is equivalent to a determination on the merits against the dismissing party, would constitute a repudiation of the American Rule, not an exception. We do not believe that the decided cases establish a basis for awarding the fees and expenses under those circumstances.

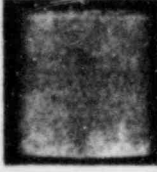
We recognize that NIPSCO will be free to file a further application for construction permit for the Bailly site, notwithstanding the expiration of the current construction permit, upon the withdrawal of the application for extension. If NIPSCO does file a further application and PCCIs choose to oppose it, PCCIs will incur further expenses. We cannot, however, equate the expenses incurred in this proceeding, involving only the merits of whether good cause had been established for extending the existing construction permit, with those that might be incurred in a further construction permit proceeding where the issues would be entirely different. Only the expenses already incurred in the *original* construction permit proceed-



ing can logically be considered as subject to duplication in a future construction permit proceeding involving the same site, and we are not being asked to condition our termination on the recovery of those expenses incurred in the prior litigation—a matter clearly outside of the Board's power.

Moreover, even if the Commission has the authority to condition a termination upon a reimbursement of the contested expenses beyond the scope of judicial precedent, this Board lacks the authority to impose such a condition. We can go only as far as established precedent without adopting new Commission policy, and Commission policy can only be adopted by the Commission itself. The licensing and appeal boards are not empowered to make policy. *Offshore Power Systems* (Floating Nuclear Power Plants), CLI-79-9, 10 NRC 257, 261 (1979); *South Carolina Electric and Gas Company* (Virgil C. Summer Nuclear Station, Unit 1), LBP-81-47, 14 NRC 866, 875 (1981), affirmed on other grounds, ALAB-663, 14 NRC 1140 (1981). We find no indication that the Commission has adopted a policy that goes beyond the established exceptions to the American Rule, none of which apply to the instant proceeding.

D. Conditions Imposed on Termination of this Proceeding



In addition to conditioning the termination upon the revised site restoration plan, the Board considers it imperative that further conditions be imposed to ensure that the site is restored without delay. Taking into account the revised site restoration plan's estimate (at p. 2) of approximately 120 days to complete backfilling (which will not begin, if the dredging option is elected, until the summer of 1982), the Board considers it reasonable to require the backfilling operations to begin by August 1, 1982 and to be completed by September 1, 1983. These time requirements would permit NIPSCO to elect the dredging option with the knowledge that, under unforeseen circumstances, dredging could be continued through two summer seasons if necessary. To ensure that the parties and NRC Staff are kept informed of the progress of site restoration, the Board would impose a periodic reporting requirement on NIPSCO that can easily be accommodated. Similarly, to ensure satisfactory completion of the site restoration, or provide a basis for agency or judicial intervention if the site restoration is not satisfactorily completed within a reasonable time, the Board would impose a notification and inspection requirement upon completion of the project (or on the required completion date, whichever is appropriate). We would also require a completion report by NRC Staff to the NRC Commissioners.

E. Proposed Order.

The following is our proposed order:

PROPOSED ORDER

1. That NIPSCO's motion to terminate proceeding is granted and its application for extension of construction permit is deemed withdrawn on the conditions set forth in the following paragraphs;
2. That Construction Permit No. CPPR-104 is deemed to have expired without further opportunity to NIPSCO to revive such permit;
3. That neither the expiration of Construction Permit No. CPPR-104, nor the termination of this proceeding (or any matters that have transpired during this proceeding), shall preclude NIPSCO from applying for a new construction permit in the future with regard to the Bailly site;
4. That NIPSCO must implement the revised site restoration plan agreed to by NIPSCO, NRC Staff, and PCCIs, and approved by the Board by Order dated January 29, 1982;
5. That NIPSCO must begin implementation of that plan no later than August 1, 1982;
6. That NIPSCO must complete the implementation of that plan no later than September 1, 1983;
7. That NIPSCO and NRC Staff must send a report (jointly, if possible, or separately) to each of the individuals and organizations currently on the service list on June 1, 1982 and the first day of each third month thereafter, and on the completion date of the site restoration (but no later than September 1, 1983 if not completed), reporting on the progress of the site restoration, to include a description of all activities undertaken and all matters accomplished; an estimate of the percentage of completion of the site restoration; and an estimated completion date for site restoration;
8. That, at the completion of the site restoration, but no later than September 1, 1983, if not completed, NIPSCO is to give notice of, and arrange for, an inspection of the site (under reasonable conditions) between 10 and 20 days thereafter at which each party, if an individual, or one representative from each organization party (even if intervening jointly with other organizations), may be present;
9. That, in the event NIPSCO has not completed its site restoration by September 1, 1983, NRC Staff must file a complete report with the NRC Commissioners, with copies to those currently on the service list,

describing the status of the site restoration, giving the reasons why the site restorations has not yet been completed, and making recommendations for future NRC actions to compel the completion of site restoration;

10. That there be no modifications to the site restoration plan or the other conditions herein imposed upon NIPSCO with regard to site restoration without the approval of a representative of the Business and Professional People for the Public Interest (BPPI), which shall be deemed to have succeeded to the interests of PCCIs upon termination of this proceeding (or a representative for PCCIs if the proceeding has not yet been terminated);

11. That the conditions imposed by this termination order be considered as an obligation assumed by NIPSCO in consideration of the Commission's terminating this proceeding prior to the restoration of the site, enforceable by the NRC Commission and the courts.

ORDER

For all of the foregoing reasons and based upon a consideration of the entire record in this matter, it is, this 12th day of April, 1982

ORDERED

That the parties shall have 12 days from the service of this Memorandum and Order to file objections and/or requested modifications to the proposed order, stating their reasons. No replies will be permitted, except by further order of the Board.

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

Herbert Grossman, Chairman
ADMINISTRATIVE JUDGE

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**James P. Gleason, Chairman
Paul W. Purdom
Glenn O. Bright**

In the Matter of

**Docket Nos. 50-387-OL
50-388-OL**

**PENNSYLVANIA POWER AND
LIGHT COMPANY and
ALLEGHENY ELECTRIC
COOPERATIVE, INC.**

**(Susquehanna Steam Electric
Station, Units 1 and 2)**

April 12, 1982

The Licensing Board issues its Initial Decision, presenting findings of fact and conclusions of law on the matters in controversy and authorizing the issuance of an operating license consistent with the conclusions of the Board. The issuance of a license is made subject to certain conditions which require the Director of Nuclear Reactor Regulation to make findings on several emergency planning matters. The license is also subject to the outcome of radon proceedings pending before the Atomic Safety and Licensing Appeal Board.

TECHNICAL ISSUES DISCUSSED:

Quantities and health effects of isotope, Technetium; need for power; emergency evacuation; stress corrosion cracking; decommissioning; low-level waste storage; health effects of transmission lines; emergency planning; scram discharge volume breaks.

APPEARANCES

**Messrs. Jay Silberg, Esq., Matias F. Travieso-Diaz and Bryan A.
Snapp, Esq. for the Applicants**

Dr. Judith Johnsrud, State College of Pennsylvania for the Intervenor, Environmental Coalition on Nuclear Power

Thomas J. Halligan, Berwick, Pennsylvania for the Intervenor, Citizens Against Nuclear Dangers

Gerald Schultz for the Intervenor, Susquehanna Environmental Advocates

Robert Adler, Esq., Assistant Attorney General, for the Commonwealth of Pennsylvania

James M. Cutchin, IV, Esq. and **Mary E. Wagner, Esq.** for the Nuclear Regulatory Staff

INITIAL DECISION

OPINION

I. BACKGROUND

This is a decision on an application from the Pennsylvania Power and Light Company and the Allegheny Electric Corporation, Inc. (Applicants) for a license to operate a nuclear power plant. The application is for the operation of two boiling water nuclear reactors, Units 1 and 2, at the Applicants' Susquehanna Steam Electric Station site, in Luzerne County, Pennsylvania. Permits to construct the units, each of which has a rated output of 1,085 megawatts of electrical power were issued in November 1973.¹

In addition to Applicants and Staff, the parties to this proceeding are the Commonwealth of Pennsylvania (Commonwealth), the Susquehanna Environmental Advocates (SEA), the Environmental Coalition on Nuclear Power (ECNP), the Citizens Against Nuclear Dangers (CAND) and Colleen Marsh (in behalf of herself and 11 other individuals). A Licensing Board originally approved the admission of 18 contentions for litigation purposes² and three additional contentions were subsequently accepted.³

¹ 43 Fed. Reg. 35406.

² See Board Memorandum and Order, October 26, 1978.

³ LBP-79-29, 20 NRC 586 (1979); Board Memorandum and Order of July 7, 1981. As a result of Commission action on Table S-3, (44 Fed. Reg. 45362), the Board permitted Technetium-99 to be considered in a contention dealing with the uranium fuel cycle.

The Board⁴ conducted eight days of prehearing sessions. Limited appearance statements were received from members of the public on March 20-21, 1980 and October 8, 19 and 23, 1981.

As a result of the withdrawal of six contentions by party intervenors and the granting of summary disposition motions filed by the Applicant and Staff,⁵ nine contentions remained at issue for the hearing:

- Quantity and health effects of technetium⁶ (Contention 1)
- Need for power (Contention 4)
- Evacuation (Contention 6)
- Unresolved generic safety issue (Contention 7)
- Decommissioning (Contention 9)
- Storage of low-level radioactive waste (Contention 11)
- Health effects of electric fields (Contention 17)
- State and County emergency planning (Contention 20)
- Scram discharge volume break (Contention 21)

The decisional record of the proceeding consists of a) the Commission's Notice of Hearing; b) the petitions and pleadings filed by the parties; c) the transcripts of the hearing, and d) the exhibits received into evidence.

This Board's jurisdiction is limited to a determination of findings of fact and conclusions of law on matters put into controversy by the parties to the proceeding or found by the Board to involve a serious safety, environmental or common defense and security question.⁷ The Board has made no such additional determinations in this case.

II. CONTENTIONS

1. Health Effects of Nuclear Fuel Cycle

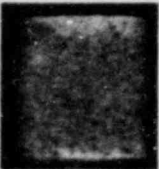

The sponsors of Contention 1 questioned the quantities and health effects of various isotopes released throughout the uranium fuel cycle. Following summary dispositions by the Board and a stipulation of the parties, the issue narrowed to the assessment of the quantity and health effect of Technetium (Tc-99) released during the fuel cycle as a result of

⁴ The Atomic Safety and Licensing Board appointed to consider this matter was reconstituted. (46 Fed. Reg. 18826)

⁵ See Board Orders of March 16, 1981, May 20, 1981, July 27, 1981, August 31, 1981, September 23, 1981, September 29, 1981, October 12 and November 2, 1981. (Also see Tr. p. 1018 and p. 1834 on Contentions 14 and part of 2.)

⁶ Part of Contention 1 was eliminated by stipulation between ECNP, Applicants and Staff. The stipulation, which was approved by the Board, provides that the Susquehanna operating license will be subject to the outcome of the consolidated radon proceedings currently pending before the Appeal Board.

⁷ 10 CFR 2.760(a)



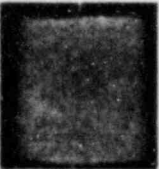
the operation of Susquehanna and the impact of this assessment on the cost benefit balance.

Technetium Production and Releases

Tc-99 is produced by fission in the operation of a reactor such as Susquehanna. Reactor operation yields Tc-99 at a rate of 390 to 500 curies (Ci) per reference reactor year (RRY). Because the reactor fuel is encapsulated, essentially all of the Tc-99 produced is retained within the fuel assemblies until they are processed. The potential for release and the rate of release of Tc-99 from the spent fuel to the environment depends on the type of fuel cycle; in a once-through fuel cycle, the spent fuel stored at reactors or in interim facilities is packaged for ultimate disposal in a stable geologic repository. Proper design and siting will provide reasonable assurance of long term isolation. (Board Findings 4, 5, 6, and 8).

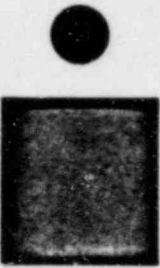
In the uranium-only recycle option, spent fuel is sent to a reprocessing plant. There uranium is separated from the fission products. The remainder of the Tc-99 goes to the high level liquid waste (HLLW) treatment facility and thence to a geologic repository. Except for minor releases to the atmosphere during solidification, essentially all the Tc-99 in the high-level liquid waste stream is contained in the solidified packaged material sent to the geologic repository. The Tc-99 accompanying the uranium is virtually all separated out and sent to a low-level, near surface burial facility. Small atmospheric releases of Tc-99 may occur during HLLW processing, during UF_6 conversion, and at the enrichment plant. In addition, there would be surface water discharges during the enrichment process. (Board Findings 7, 8, and 9).

Technetium Disposal



The intervenor, ECNP, claims that in the absence of certainty concerning permanent disposal of Tc-99 bearing wastes, the quantity and radiological health effects of Tc-99 associated with Susquehanna have not been properly factored into the cost-benefit balance for the plant. The point is made by ECNP that no waste repository can be guaranteed to provide perfect containment for a million years and it objects to the fact that no selection of a geological medium or media for disposal has been made.

While it is true that no repositories have been selected, Applicants' witness testified that stable geologic repository sites capable of meeting proposed technical criteria do exist and he believes such a site, isolated



from groundwater over long periods of time, will be obtained. For the purposes of his analysis, he used the criteria in the proposed 10 CFR Part 60, which provides for containment package integrity for a minimum of 1000 years after which the maximum release rate would not exceed one part in 100,000 of the inventory per year thereafter. However, for this analysis, all of the Tc-99 was assumed dissolved in groundwater over a period of 100,000 years. The witness said he does not really believe that a mechanism exists for migration of the Tc-99 from the repository to surface water (Englehart, Tr. 1857).

The Board finds that there is no need to assume that the geologic repository will provide perfect containment for a million years, but rather that releases expected from the repository after 1000 years have been factored into the cost-benefit analysis to meet the requirements of 10 CFR part 60. In view of the unrefuted testimony that geologic sites exist that meet the criteria, Applicant's assumption that sites will be made available is reasonable.

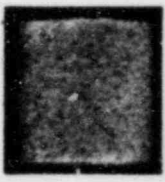

Assessment of Doses and Health Effects

ECNP argues further, that in the absence of summation of doses and health effects of all Tc-99 associated with the operation of Susquehanna 1 and 2 for the full detoxification period, its quantities and health effects have not been adequately assessed.

The Applicants' expert on the environmental effects of the nuclear fuel cycle reviewed the basic assumptions and calculations for estimating the releases of Tc-99 for the fuel cycle associated with the operation of Susquehanna. Utilizing models for his calculations, the witness quantified Tc-99 releases attributable to Susquehanna and the radioactive dose commitments caused by such releases. The witness found the results in population doses insignificant compared with those from natural background.

The Staffs' expert witnesses presented independent calculations estimating the quantities of Tc-99 which would be released from a supporting fuel cycle for light water cooled reactors like Susquehanna and the health effects resulting from such Tc-99 releases. The conclusion was similar to the Applicants', namely, that population doses from Tc-99 releases were insignificant when compared with the natural background exposures and that its impact could not influence the cost benefit balance for the facility.

The releases of Tc-99 were computed for once-through and uranium-only recycle options by Applicants on an annual basis. These releases were the basis for calculations of doses expected from operation of Susquehanna. The Applicants assumed the maximum of 500 Ci/RRY is available for

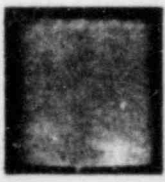


potential releases. The Staff computed releases independently and from these estimated doses and risks. The Staff made computations for 100 and 1000 years. Cumulative releases were computed for the first 2000 years and an annual release thereafter. Population doses similarly were estimated for the first 2000 years cumulatively and on an annual basis thereafter. Therefore, it would be untrue to say that the doses have not been calculated for the full detoxification period. A summation was not made because it was felt such calculations so far into the future would be meaningless because of uncertainties inherent in such projections.

ECNP is also concerned that the dose to a maximally exposed individual was not calculated and that calculations made were theoretical and hypothetical. ECNP further claims that natural background radiation and doses therefrom have nothing to do with the Susquehanna facility and its operations.

The Board finds, that Applicants have reasonably assessed the doses and health effects resulting from Tc-99 releases associated with fuel cycle for Susquehanna even though no summation has been made. This is so even though exposure to the maximally exposed individual was not computed. The testimony shows that such an individual would receive nowhere near the population doses calculated, which were insignificant compared to natural background doses. (Englehart, ff. Tr. 1852 at pp. 20-21). The fact that computations were based on theoretical calculations and hypothetical assumptions is not in itself a basis for discrediting the estimates so long as there is a sound basis for them. There was no testimony in refutation of the testimony presented and cross-examination failed to discredit the witnesses and their computations and assumptions. Calculations and parameters were based on NUREG-0002, the Generic Environmental Statement on Mixed-Oxide Fuel (GESMO). While these proceedings have been interrupted, there was no suggestion that the models used were invalid.

ECNP also questions the assumption for residence time for Tc-99 in soil in view of the variability of this factor in different soils. The Applicants' witness used a factor of 15 years when a factor of 30 years for residence time was used in one of the references cited. The witness explained that he felt the residence time used would be appropriate for a mixture of inorganic and organic soils and if other times were used, it would alter other factors in a compensating way. The Board finds the approach taken by the witness is reasonable.



Finally, notwithstanding the Intervenor's objection, the Board accepts comparisons of doses with those experienced from natural background as reasonable. Other Boards have accepted such comparisons and so has the Appeal Board. Of course, the operation of Susquehanna does not enter into background doses, but it is significant to know the relative magnitude of

Susquehanna's estimated doses in comparison with the radiation that humans experience and have experienced for generations.

Conclusion

The Board finds the testimony of Applicants and Staff's witnesses consistent and the testimony is not refuted. Intervenor presented no direct testimony by experts and its cross examination failed to impeach the credibility and conclusions of these witnesses. While ECNP draws conclusions from this testimony at variance from the Staff and Applicants, the Board's review of the testimony in its entirety does not suggest that the concerns of ECNP form a valid basis for questioning the calculations and the findings of the Staff and Applicants based on them.

The Board finds the degree of scientific data presented by the Applicant and Staff is sufficient to conclude that the methods for calculations are adequate and that doses and health effects from Tc-99 from the fuel cycle for Susquehanna are shown to be insignificant. The Board finds the comparison(s) with natural background radiation a valid measure of the significance of doses. However, that is not the only basis for making such a conclusion. The doses themselves are very small and the potential effects will not be measurable.

2. Need for Power

The proponents of Contention 4 questioned the need for the Susquehanna facility on the grounds of a) low growth rate; b) electric capacity in excess of needs; c) inadequate conservation programs; and d) failure to consider alternatives such as solar energy. Prior to the hearing, the Board granted summary disposition motions filed by the Staff on 4c and 4d, but denied such motions on 4a and 4b.

Simply stated, the remaining parts of the contentions allege that Applicants' existing capacity can meet customers' needs for the next 30 years (plant's useful life period), and that the output from Susquehanna will be available for sale outside the service areas of the Applicants. If this is true, the intervenors state, the cost-benefit balance is tilted against authorization of an operating license for Susquehanna.

Capacity and Growth

Testimony by Applicants and Staff shows that existing capacity can meet current needs of customers in the service areas. The forecast for

annual rate of growth in demand has been revised downward by Applicants from 2.5 percent to 2.2 percent and peak demand growth rate from 2.2 percent to 2.0 percent. The Applicants and Staff concede that the addition of Susquehanna will provide a greater reserve margin than required. The Applicants project, however, that requirements for the winter peak of the Pennsylvania-New Jersey-Maryland Interconnection (PJM), in which they participate, mean the Applicants need additional capacity by the mid-1990s. Since lead time of construction is about 10 years, this capacity would have to begin construction in mid-1980s. This evidence contradicts that part of the contention that claims such facilities are not needed for the next 30 years.

Even though there appears to be no immediate need for additional capacity, the evidence shows that Susquehanna will provide less costly operations than the plants whose operations will be replaced. These benefits will accrue to the Applicants' customers. Hence, one of the justifications for operation of Susquehanna is that there will be operational cost savings that will benefit the customers. And conversely, it would be more costly to customers if Susquehanna is not permitted to operate. Witnesses for both the Applicants and Staff pointed to other actions besides reserve margin to be considered in assessing costs and benefits including fuel diversity and conservation of oil as well as operating cost savings. (Board Finding 34.)

The Applicants estimated that, even with an assumption of no growth in demand, their customers would still benefit in less costly operations from the operation of the Susquehanna facility. The Staff's witness projected a saving even if a negative growth rate existed so that a benefit would still flow to its customers.

With respect to the portion of the contention that alleges electric power produced by Susquehanna will be available to sell outside the service areas of the Applicants, the Applicants deny the validity of the claim. The Susquehanna production, which is cheaper, will be the basis for billing customers of the Applicants in the service areas. More costly operation will not necessarily be shut down, but instead that production will be sold to PJM as needed where it is still cheaper than other capacity available to PJM. Such sales are also beneficial to the Applicants customers.

Costs of Abandonment

Evidence in the hearing, that was unrefuted, showed an abandonment of Susquehanna would cost, depending on conditions of growth, between \$6.6 billion to \$9.2 billion from 1983 to 1992. These costs, in terms of revenue requirements, were reduced to half if only one unit was abandoned.

Some costs for ratepayers may go up if and when Susquehanna goes on line because the utility is permitted to recover total costs, including capital costs. However, these costs are partially offset by lower fuel costs for Susquehanna and sales of other power output to PJM. (Board Finding 37.)

In this case, the Board has to determine if an operating license is to issue. Plant construction is virtually completed. It is idle speculation to consider if a plant should have been built. It has been. Thus, the decision is between permitting the plant to operate or abandoning it. Most of the capital costs have been incurred and must be considered whether the plant is operated or abandoned. It deserves mention here that due to consideration of these kinds of issues, the Commission has removed the need for power issue from operating license proceedings effective April 26, 1982. (47 CFR 12940.)

Under these circumstances, the Board finds it appropriate to consider the savings in fuel costs resulting from operation of Susquehanna as compared with alternates with more expensive fuels. It is also appropriate to consider costs of abandonment in comparison with operation. The Board sees no objection to PP&L's plan to sell electricity from existing plants that are more expensive to operate than Susquehanna to other members of PJM.

Conclusion

Because of the lower operating costs and costs of abandonment versus operating, the cost-benefit balance is tilted in favor of issuing an operating license. The Board concludes that neither low growth nor excessive capacity nor both support the contention that a license should not be granted.

3. Evacuation Emergency Plan

Each of the four Intervenors in the proceeding proposed parts of Contention 6 relating to the Applicants' responsibilities to provide protective action in the event of a serious accident. In addition to raising an issue of the necessity of evacuating people outside the facility's low population zone, questions were raised over alleged lack of training for personnel participating in evacuation procedures and also the ability — or lack thereof — of an important State agency, the Office of Radiological Health, to respond during an incident.

New Regulations

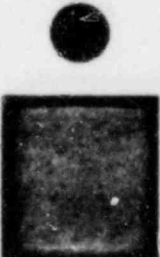
Prior to March 6, 1979, when the proposed contentions on this aspect of emergency requirements were accepted by the Board, evacuation considerations beyond the low population zone were not required by the Commission's regulations. See New England Power Company *et al.* (NEP Units 1 and 2), ALAB-390, 5 NRC 733, 747 (1977). Subsequent to the Three Mile Island occurrence, emergency imperatives for operating licenses were raised and upgraded. New regulations became effective on November 30, 1980. During the same time frame, a joint report of the Nuclear Regulatory Commission (NRC) and Federal Emergency Management Agency (FEMA) was adopted which established criteria to guide the preparation and evaluation of radiological response plans (i.e., emergency preparedness), in support of nuclear power facilities. Under the new scheme and regulations, FEMA reviews and determines the adequacy of all off-site nuclear planning and response (State and local government) and the NRC reviews and judges the Applicants' on-site emergency planning and the findings made by FEMA. It is clear the regulations contemplate the integration of off-site and on-site emergency plans and necessitate a close working relationship between State and local officials with the Applicant.

NRC's new regulations extend planning requirements to emergency planning zones surrounding a nuclear facility. These areas, with a radius of approximately ten miles and designated as the plume exposure pathway, Emergency Planning Zone (EPZ), are considered as a region where projected doses from traditional design basis accidents would not exceed Protective Action Guides outside of the zone. Emergency planning is deemed essential within the zone to assure that prompt and effective actions can be taken to protect the public in the event of an emergency. The regulations bring out that operating licenses will not be issued absent a finding by the NRC that the state of emergency planning (off-site and on-site) provides a reasonable assurance that adequate protection measures can and will be taken in the event of a radiological emergency. (See Board Findings 49 and 50.)

Notification and Evacuation

The procedures for notifying the public in an emergency at Susquehanna involve, in a sequential pattern, actions by the licensee, the State and local government officials. (Board Findings 51 and 52.)

The Applicants' plan calls for the notification to be communicated to State and local government officials in the plume exposure planning zone

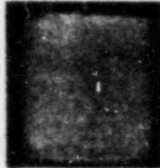


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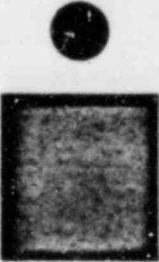
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Notification and Evacuation



The procedures for notifying the public in an emergency at Susquehanna involve, in a sequential pattern, actions by the licensee, the State and local government officials. (Board Findings 51 and 52.)

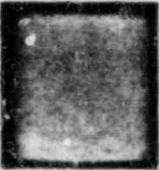
The Applicants' plan calls for the notification to be communicated to State and local government officials in the plume exposure planning zone



within fifteen minutes of an initial declaration of any level of emergency. After assessment of the incident, recommendations for appropriate protective action are forwarded to the state Bureau of Radiation Protection (BRP) which, in turn, advises the Pennsylvania Emergency Management Agency (PEMA), the lead State agency for coordinating emergency responses. PEMA has the responsibility of initiating through County officials warning signals to the public as well as messages of instructions on actions to be undertaken. Alerting the citizenry to the existence of a serious incident occurring at a facility is accomplished through activating a system of sirens installed by the Applicant throughout the plume exposure pathway, EPZ. Siren tones are designed to alert the public to the communication of television and radio emergency broadcast messages. A supplemental notification activity in the twenty-seven (27) municipalities within the zone is planned for those who might fail, due to hearing defects or other difficulties, to receive the emergency messages. (Board Finding 53)

In meeting the standards of the regulations and the recommended criteria of NUREG-0654, HMM Associates produced an evacuation time estimate study for the Applicants' emergency plan covering the plume exposure pathway, EPZ. It considered all segments of the population — permanent, transient and special facility distributions — and computed evacuation times. It used a highway network for evacuation based on State and local emergency plans and a network computer model which accounts for traffic congestion and route choices during evacuation. The study reviewed evacuation at different time periods and under adverse weather conditions and concluded that evacuation could be accomplished in normal weather in less than six hours and in less than nine during the most severe weather conditions modeled. (Board Findings 55-62.)

Narrow Roads and Adverse Weather Conditions



The Commonwealth of Pennsylvania (Commonwealth or State) contends Applicants' emergency plan, in the absence of written school evacuation plans, cannot provide reasonable assurance that adequate protection measures can and will be taken during a radiological emergency. It recommends in proposed findings that a full power license be denied until a condition is met that such plans are developed. The plan for evacuating school children and other members of the non-auto-owning population call for evacuation to be accomplished by the use of buses, the availability of which, the State contends, depends on written school plans. Such plans are not in existence yet, although PEMA has requested their preparation.

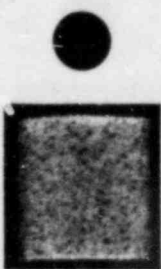
In commenting on these proposed findings, the Applicant and Staff question the legitimacy of this issue as being among the specific deficien-

cies alleged to exist in Applicants' emergency plan by this part of Contention 6. We think otherwise. This not a matter where the Licensing Board is asked to decide a case on a theory different from the one on which it was tried. Niagara Mohawk Power Co. (Nine Mile Point Nuclear Station, Unit 2), ALAB-264, 1 NRC 347, 354 (1977). Here, all parties were put on notice that the school transportation issue was within the boundary of the contention, the testimony of the Commonwealth referred to the subject and Applicants' and Staff's witnesses commented on it extensively. Simply stated, the issue challenges the Applicants' burden of proof that its planning effort has been adequate in providing evacuation for all persons within the plume exposure pathway, EPZ, over narrow roads and under adverse weather conditions. Availability of an adequate number of buses and the time for them to reach schools was assumed by the HMM study, an assumption subject to contradictory testimony. Accordingly, the argument runs that if the availability of an adequate number of buses is not assured, there can be no reliable estimate of time for evacuating this segment of the population and as a consequence, the Applicants' plan is to that extent deficient.

The Applicant and Staff point out that neither the regulations nor criteria guidance establish maximum time allowances for evacuation but merely require the preparation of time estimates. It seems apparent, however, since evacuation is one option during a radiological emergency, that those responsible for making the appropriate choice need to be able to depend, in doing so, on the reliability of the time estimates submitted. We believe the Commonwealth makes an effective request. All parties interrogated on the question — witnesses for the Commonwealth, Staff and Applicants — agreed that written school plans would be preferable prior to operation of the facility. Although there is no specific recommendation in NRC guidelines for written school evacuation plans, there is a guide which calls for written agreements or signatures to verify agreements among local agencies and other support organizations. This would appear to apply to the school plans in question. The Staff's witness indicated that the guidelines in this area were left somewhat general due to the great variations among States and local governments regarding their particular relationships with bus operations and facilities.

Capabilities of Office of Radiological Health

Testimony on this part of Contention 6 was received from witnesses for the Applicants, the Staff and the Commonwealth, none from any of the Intervenor. The witnesses included the Chief of the Division of Envi-

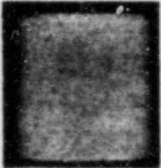


ronmental Radiation who has the responsibility for BRP planning for accidents at nuclear facilities and routine surveillance of environmental radiation, a former Director of PEMA and now a consultant for the Applicants on emergency planning assistance and an emergency specialist employee from FEMA with responsibility for reviewing radiological emergency plans within the State of Pennsylvania.

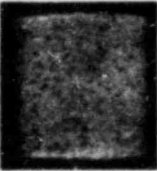

The functions of the State's Office of Radiological Health were transferred some ten years past to the Bureau of Radiation Protection (BRP). The BRP exercises a major role in responding to radiological incidents. Its basic charter is to provide immediate assessments of such incidents to PEMA and to recommend appropriate protective actions for the State and local governments to implement. The Agency's plans in an emergency call for a prompt and continuing dialogue with Applicants' emergency personnel, evaluation of radiological data provided by the Applicants and subsequent confirmation by off-site monitoring measurements and liaison operations at Applicants' emergency operating facility. It is primarily looked to for making vital recommendations to PEMA concerning matters of evacuation, public information and instruction. The BRP maintains seventeen (17) off-site but in-place monitoring instruments for routine measurements which are a part of a total grouping for reviewing environmental data that includes thirty-five (35) locations belonging to the NRC and sixty (60) to the Applicants. (Board Findings 70 and 71.)

The State's witness was examined extensively by an intervenor and the Board regarding its funding, personnel, equipment and operations. The evidence reflected that there has been a substantial increase in funding for the Office in the past two fiscal years, additional technical people have been hired to complement the scientific expertise on board, a twenty-four hour response capability has been developed and additional radiological monitoring and analytical equipment has been obtained. The representative from FEMA also gave testimony that the resource capability for BRP to respond to an incident at Susquehanna was adequate. (Board Findings 72-78).

Training Deficiencies and Inadequate Radiation Safeguards




Responsibility for training of emergency workers has been assumed by PEMA for off-site activities and for on-site by the Applicants. (Board Finding 80.) Testimony was received on the adequacy of the training efforts of both parties from witnesses for the Applicants, the State and the Staff.



The Applicants' on-site program for emergency workers includes training, maintaining site-specific equipment and interface operations. The training covers, as appropriate, emergency plan overview, dose calculations and projections, protection actions, basic radiation theory, plant layout and access control. In addition to fire, police and ambulance/rescue personnel, relevant training is to be provided for State and local government and hospital complements. In total, Applicants' plans call for training several hundreds of members of various agencies. About two hundred police, fire and ambulance service personnel have already participated in training sessions and it was anticipated that the training program would be completed initially by the end of 1981 with an annual retraining effort being contemplated. The facility's quality assurance organization will monitor implementation of the Applicants' training programs. (Board Findings 81 and 82.)

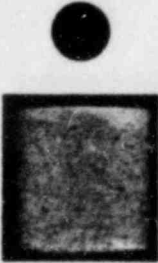
The Applicants are providing additional equipment on-site to augment response efforts and have developed fire pre-plans covering every section of the plant to expedite fire handling and to minimize radiation exposure. Radiation protection clothing and equipment, including a thermoluminescent dosimeter for each worker, will be provided and health physics personnel will accompany the workers to assume responsibility for their safety and minimize dangers from radiation hazards. If necessary to counteract radioiodine inhalation, a supply of potassiumiodide will be available for controlled use. (Board Finding 83.)

The off-site training program is a responsibility of PEMA. Annex E of the State's emergency plan lists courses for training by title, target audience (prospective attendees), duration and organization sponsoring the course. The plan also sets out the undertaking of other State, County and facility organizations for training, drills and educational programs. An annual publication by PEMA lists the times and places where the courses will be conducted. FEMA provides some funds for these training sessions and the State's programs are frequently held in various local regions to minimize expenses. (Board Findings 86, 87 and 89.)



The Luzerne County plan lists the number of individuals it will provide for the training sessions provided by State and Federal agencies and the County has also undertaken to provide training for municipal emergency response people and police and fire personnel. In addition to relevant training for radiological emergencies, emergency workers off-site are to be provided with dosimetry as a protective measure to enable them to observe radiation data. (Board Findings 88 and 91.)

Both the Staff and FEMA witness testified to the adequacy of the emergency plans of Applicants, State and local government respectively on training of emergency workers and protections against radiation hazards.



They also affirmed the plans conformity to the recommendations of the guidance of NUREG-0654.

Conclusion

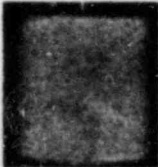
Except for written school plans, the Board finds the emergency plans concerning notification, evacuation, training programs and radiation hazards adequately address the requirements, recommendations and standards of 10 CFR 50.47(b), 10 CFR Part 50, Appendix E and NUREG-0654. The Board finds further that the Bureau of Radiation Protection is able to adequately perform its responsibilities in the event of an accident.

4. Unresolved Generic Safety Issue

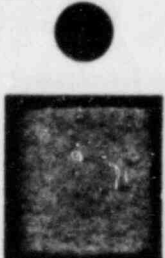
The intervenor, ECNP, proposed in Contention 7 to litigate a number of unresolved generic safety issues relevant to the Susquehanna facility. Summary disposition motions filed by the Applicants were granted for those parts of the contention dealing with the pressure suppression containment structure, BWR core spray nozzles and anticipated transients without scram (ATWS) system.

The remaining part of the contention questioned whether the problem of stress corrosion cracking in the stainless steel piping of the reactor had been solved. This problem, which has been known to industry and the NRC for several years, is one of a number of unresolved generic safety issues; so-called because of the difficulty of their absolute resolution. Absent such absolute resolution, it is necessary to demonstrate that even though not completely understood, sufficient measures are taken to assure that the phenomena do not constitute any undue risk either to the reactor or to the public.

Conditions for Cracking



In the instant case, a great deal of information has been obtained through analytical, field and laboratory efforts by both the NRC staff and industry on the causes of and solutions to the cracking problem. It has been determined that for such cracking to occur, three conditions must exist: a susceptible material, a tensile stress in excess of the local yield stress, and the presence of a corrosive atmosphere or medium. Elimination of any one of the conditions should eliminate the problem; elimination of all three, where feasible, is even more desirable.



It was determined early on that cracks occurred generally in areas immediately adjacent to welds (the heat-affected zone, or HAZ). This led to a determination that the welding process in 304 stainless steel, in itself could produce sensitization and high levels of residual stress. Other very high stress levels could be avoided by designing systems to ASME Code requirements but the HAZ problem required special treatment. (Board Findings 97-99.)

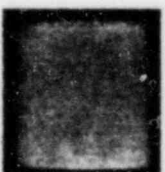
Solutions for Cracking Problem

A number of methods have been determined to be effective in either eliminating this cracking problem or rendering it insignificant. Solution heat treatment can be used for shop piping erections. Another method can be used in field fabrication — a technique known as induction heating stress improvement. Use of high-ferrite, low-carbon stainless steel weld metal as cladding is effective. Use of weld metal with high ferrite content and use of low-carbon stainless steel piping is also effective.

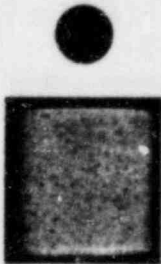
All of the above methods, where feasible, have been used in the Susquehanna system. In addition, augmented inspection of welds in the reactor coolant boundary not replaced with corrosion-resistant metal will be performed. The reactor coolant itself will be deaerated so that free oxygen levels are very low, thus reducing the corrosiveness of the water. (Board findings 100-102.)

Finally, it is well documented, both experimentally and through experience, that austenitic stainless steel is highly ductile and not subject to sudden fracture. If a crack should develop in a pipe, it will leak before it breaks or before the crack propagates. A sensitive leak detection system has been installed in the Susquehanna plant to detect such leaks, in conjunction with detection of temperature and pressure changes and drain pump activities. The combination of augmented in-service inspection and leak detection instruments make it highly unlikely that any cracking will not be detected and corrected before any pipe rupture might occur. (Board findings 109-112.)

Conclusion



Based on the uncontroverted evidence in the record, the Board finds that, contrary to the allegation of the contention, stress corrosion cracking of stainless steel piping in coolant water environments is a well understood phenomenon; that adequate measures have been taken by the Applicants in



accordance with NRC Staff guidance in NUREG-0313 to prevent or avoid the occurrence of such cracking at Susquehanna and that in the event such cracking were to occur, there is a high likelihood that it would be detected prior to the development of any significant safety hazard.

5. Decommissioning

Intervenors in Contention 9 attempt to discredit the validity of Applicants' costs for decommissioning. Basically their argument contends that the costs of decommissioning will equal at least the facility's construction cost and that charges for environmental hazards associated with decommissioning, particularly for workers, have not been reflected in its estimates. Intervenors argue that when these costs are properly assessed, they will tilt the cost-benefit balance against operating the facility and that the Applicants are not financially qualified to assume the decommissioning costs.


The process of decommissioning is one whereby, at the end of the plant's useful life, any residual radioactivity level is low enough to allow unrestricted use of the site. To date, three methods have been used: immediate dismantlement, safe storage followed by deferred dismantlement, and entombment, with immediate dismantlement being the most expensive. (Board Findings 115-116.)

Although conceding the fact that no plant of the size of the Susquehanna facility has been decommissioned and actual expenditures for such an undertaking are therefore not available, the Applicants' evidence demonstrates that the tasks associated with decommissioning or dismantling a nuclear facility are a series of straightforward and relatively uncomplicated projects which are subject to accurate costs estimates. (Board Finding 117.)

Costs of Decommissioning

Applicants calculated the cost of decommissioning using the results of a Commission-funded study done by the Pacific Northwest Laboratory (PNL) of the Battelle Memorial Institute. With suitable adjustments for specific reference plants, the total cost of immediate dismantling of both Susquehanna units was put at \$191 million (1980 dollars). The Staff performed a similar but independent calculation using somewhat different assumptions, and arrived at a cost of \$157 million (1980 dollars).

To further substantiate the validity of these estimates, results from actual decommissionings were used, particularly that of the Elk River reactor. To ensure that immediate dismantlement was the most expensive mode, cost estimates using the PNL study were made on the other methods. (Board Findings 122-124.)



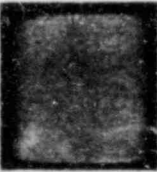
In challenging the accuracy of Applicants' decommissioning costs, Intervenor questioned the substantial construction costs increases since the facility's license permit was issued in 1973 and the unescalated amount provided by the Applicants for decommissioning. The Applicants' witnesses stated there had not been a substantial increase in dismantling costs over the years and indicated that future inflationary increases in decommissioning costs were not included because of a State's Public Utility Commission (PUC) requirement that such costs be reflected in terms of current dollars.

Radiation Hazards

A substantial amount of cross-examination was concerned with radiation hazards facing workers during plant decommissioning. The PNL study included methods for estimating the radiological effects of decommissioning both to workers and the general public. For workers, the estimates were 3,690 man-rem for immediate dismantlement, 776 man-rem for safe storage and deferred dismantlement, and 3,146 man-rem for entombment. These amounts are on the order of, or less than would be received under normal operation of the plant, and within allowable Commission limits for worker exposure. (Board Findings 126-127.)

For the general public, the estimate for the 50-year radiation dose equivalent to the lung per unit for the maximum exposed individual are 0.041 mrem for immediate dismantlement, 0.0031 mrem for safe storage, and less than 0.038 mrem for entombment. Population doses for a population of 3.5 million within a 50 mile radius of the site are 0.05 man-rem, 3×10^{-4} man-rem, and 0.04 man-rem, respectively, for immediate dismantlement, safe storage and entombment. Therefore, decommissioning should present no serious radiation hazards to either the workers or the general public. (Board Finding 128.)

The PNL Study reached its results, which have not been substantially criticized, by using examples of actual experience gained in various decommissionings, the use of carefully planned work procedures where possible, and the use of routine facility radioactive containment source terms based on acceptable modeling procedures. The study, in considering such contamination at a generic facility comparable to Susquehanna, includes an analysis where the contaminants were increased by a factor of three (3). It concluded that with proper remote procedures being utilized, decommissioning could take place without a significant increase in the occupational radiation dose. The PNL study has been used in the Staff's generic environmental impact study on nuclear facility decommissioning, NUREG-0586, January 1981, (Feldman, ff. Tr. 1344 at pp. 4-5).



Conclusion

On the basis of uncontroverted evidence in the record, we find, contrary to the allegations in the contention, that the health cost and monetary cost of decommissioning the Susuchanna facility have been adequately assessed and that these costs when added to other monetary and health costs will not tilt the cost benefit balance against authorizing operation of the facility.*

6. On-Site Storage of Radioactive Waste

Contention 11 alleges the Applicants fail to meet Commission's standards for on-site storage of low-level radioactive wastes to provide safe storage of such waste for up to 10 to 15 years, and creating thereby an unreasonable risk to petitioners. Inasmuch as the regulations do not specify the amount of space to be provided, nor any definite length of time for storage, we cannot find the Commission's rules have been violated. We do, however, consider whether Applicants' proposed facility presents an undue risk to the health and safety of the public.

Applicants intend to ship all low-level radioactive wastes (LLRW) generated by the facility to a commercial disposal site, but believe that it is prudent to build a LLRW facility for on-site storage in case off-site disposal is not available. Applicants do believe, however, that such off-site disposal will be available. (Board finding 132.)

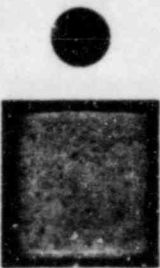
The low-level radioactive waste holding facility (LLRWHF) is a reinforced concrete vault, meets the applicable seismic and flooding criteria, and can withstand tornado force winds, though not necessarily tornado induced missiles. It has a design life of 40 years, and if necessary, can accommodate the LLRW generated in four years of two-unit operation. Process wastes will be stored in solidified form; contaminated trash will be stored in 55-gallon steel drums. (Board Findings 133 and 134.)

Radiation Dose Exposure

The facility is designed to minimize exposure to operating personnel, and it is expected that worker exposure will be well within 10 CFR Part 20 and 40 CFR Part 190 limits. (Board Finding 140).

An analysis of expected radiation dose received by an individual at the site boundary, assuming maximum radiation levels in the waste, with the

* See fn. p. 824, Findings on Decommissioning, INFRA.



facility completely full of waste and the continuous presence of the individual for one year, showed a dose of 1.1 mrem would be sustained under such conditions. This is well within 10 CFR Part 20 limits. A study of potential accidents at the LLRWHF shows that resulting radiation levels would be a small fraction of 10 CFR Part 100 guidelines. (Board Finding 141 and 142).

Conclusion

Based on the uncontroverted evidence in the record, the Board finds that the Applicants' proposed LLRW storage plan does not present an unreasonable risk to the health and safety of the public under either normal operation or hypothetical accident conditions. Accordingly, we find the Applicants have provided adequately for safe on-site storage of low-level wastes.

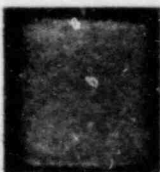
7. Health Effects of Electric Fields

The 500 kV transmission lines serving Susquehanna will produce a calculated maximum electric field of 11 kV/m at the ground level at the point of minimum clearance on the right-of-way and 2.28 kV/m at the edge of the right-of-way. It is alleged by Contention 17 that these electrostatic fields will be harmful to living organisms in the vicinity of the transmission lines. (Board Findings 144-145.)

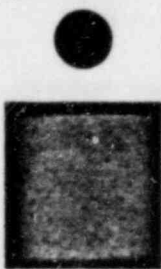
Testimony was presented concerning epidemiological studies of workers exposed to electric fields, experimental exposure of human subjects and test animals to electric fields, and theoretical analyses of the potential effects of exposure to electric fields.

Applicants presented prepared testimony concerning an extensive review and analysis of the literature concerning effects of electrostatic fields. This review was further elaborated in redirect examination. Staff presented a similar and generally consistent review and analysis with the addition of information from some on-going studies. Intervenors relied primarily on information from a case before the New York State Public Service Commission in 1976-78.

Epidemiological Studies



Several studies were cited from the United States and Europe of workers in the electric power industry. Populations exposed and unexposed to electric fields showed no differences in indicators used. The indicators



used varied among the studies, and included such factors as state of health, physical, mental, or emotional characteristics, medical visits and druggists bills. (Board Finding 148.)

Experimental Studies


In several experimental studies involving human subjects where they were exposed to 12 kV/m or higher electric fields, there were no detrimental effects. (Board Finding 151.) Various test animals have been exposed to electrostatic fields, including mice, rats, monkeys, and swine. The preponderance of evidence indicates that test animals exposed to electric fields of up to 100 kV/m do not experience significant harmful health effects. (Board Finding 152.) Some results indicate physiological and/or behavioral responses. These were criticized because they have poor experimental design or poor control of experiments, fail to be reproducible, are not statistically significant, have internally inconsistent results, experienced concurrent interfering factors (such as a disease outbreak among test animals), and lack of hazard significance. (Board Finding 156.) Responses to questions, however, reveal that some of the tests that showed no significant effects had such small numbers of test animals that they, too, were not statistically significant, for example tests using monkeys.

There is ongoing research funded by the Department of Energy on transmission line effects. It is guided by an Interagency Advisory Committee on Electric Field Effects. Thus far, some statistically significant effects have been observed in mice and rats exposed to field strengths of 4-20 kV/m. These effects are so subtle and small in magnitude, however, that further research is needed to determine if they have any biological significance. The levels of long term exposure to the general population from Susquehanna lines would be less than 2 kV/m, well below these values where effects have been observed in these studies. (Board Finding 159.)

Theoretical Evidence

Theoretical evidence suggests that currents produced within the body by Susquehanna lines could be on the order of 0.1 to 1 milliamperes per square meter. These are well below the level of perception. They cannot produce sufficient heating of tissues or molecular polarization or deformation to cause significant biological effects. (Michelson, ff. Tr. 1046 at p. 6.)

While some writers have postulated behavioral and central nervous system modification from such exposures, a mechanism to cause these



effects is unknown. The Board found Applicants' witness, Dr. Michaelson, to be thoroughly familiar with the pertinent scientific studies and capable of making judgments as to their validity and significance and the Staff witness, Mr. Gears, generally corroborated Dr. Michaelson's testimony. The intervenors witness, Mr. Amory, relied primarily on the record of a hearing before the New York State Public Service Commission for his direct case and to discredit Dr. Michaelson's credibility. The Board notes the New York State Public Service Commission found in favor of a position contrary to that cited by Mr. Amory.

Analysis of Tests

The Board notes that high voltage electric fields have been shown to produce some effects in test animals although some studies may be ruled out because of poor experimental design or lack of statistical significance. However, there remain some valid studies that appear to show statistically significant effects. The question is do these effects have any biological significance for the test animals and, in turn, people. The Board adopts Dr. Michaelson's position that there can be a stimulus from an electric field that causes a measurable effect without this effect necessarily being considered adverse or hazardous to the health of test animals or people. Because of the judgment involved in determining hazard, interpretations may be controversial. The Board concurs with the Staff's witness, Mr. Gears, that where results vary, effects are small and subtle, the applicability to field conditions questionable, and human effects speculative, the preponderance of evidence has to be considered.

The Board finds the epidemiological evidence to be convincing that no harmful effects to the general population are anticipated as a result of exposure to the Susquehanna lines. Human experiments, theoretical explorations and animal experiments support this conclusion. Some tests do show results that could be interpreted as adverse, but these are so flawed that the results are inconclusive. Valid ongoing tests have not shown effects at the levels produced by Susquehanna lines, although there have been some observations at higher levels that require further research to define their significance from a biological standpoint.

The Susquehanna lines would meet the only standards known to exist, namely Soviet standards. The Soviets have established standards that limit electric fields to 12 kV/m at points where lines cross roads and 15 kV/m elsewhere along unpopulated sections. (Board Findings 150, 160.) The Applicants have stated that they would take steps, if necessary, to limit exposures at ground level at highway crossings to 7.5 kV/m. (Board Findings 157.)

The Board recognizes the Applicant's hesitancy to put conclusions in absolute terms. It is difficult, if not impossible, to prove a null hypothesis. However, where current research results tend to be negative, the Board believes this is a reasonable factual basis for decision. Should future research find positive results, appropriate action may and can be taken at that time.

Conclusion

The Board finds that the epidemiological evidence indicates that the electric fields to be generated by the Susquehanna 500 kV transmission lines will not cause adverse health effects to people, and the preponderance of the evidence reflects that there will be no adverse effects to animals, plants or people. Accordingly, there is no basis for requiring a modification in the transmission lines or its right-of-way.

8. State and County Emergency Planning

Contention 20 was sponsored by the Susquehanna Environmental Advocates (SEA) and was based on drafts of State and County emergency plans filed before 1981. As accepted for litigation, however, its allegations were evaluated against the plans currently under review: the State plan of February 1981 and the plan of Luzerne County of August 20, 1981. (Swiren, ff. Tr. 2671 at p. 3); also see SEA motion for allowance of new contentions dated May 6, 1981 and Board Order of July 7, 1981.) Testimony was submitted by the Applicants, the Staff and the Commonwealth of Pennsylvania and the Board also sponsored two witnesses from Luzerne County. None of the Intervenor offered direct testimony. Exhibits were accepted into evidence from the Staff and the Commonwealth and are referred to, as appropriate, in the findings of fact.

Several developments relating to emergency planning occurred during the evidentiary hearing and deserve comment here. The first involved Intervenor CAND's withdrawal from participation in the consideration of Contentions 6 and 20 on grounds that the emergency plan of Columbia County, which was not placed in evidence, was a necessary ingredient to litigating these contentions. Part of that County is within the plume exposure pathway, EPZ. Commission regulation and guidance on emergency planning contemplate the integration and coordination of the Applicants, State and local government plans but deficiencies in plans must, for purposes of addressing such controversies in a hearing forum, be specifically alleged. Here, Contention 6 involves the Applicants' plan and Contention 20 is concerned with shortcomings in the plans of State and

Luzerne County. Columbia County's plan was not in issue. It should also be noted that there was testimony that Columbia County's draft plan was in the same state of completion as Luzerne County's and the plan was made available to all parties prior to the evidentiary proceeding.


The second development concerns a motion made by SEA and denied by the Board, to keep the record of the proceeding open until the governments emergency plans were completed. At the time of the evidentiary hearing, neither the State nor Luzerne County plan had been submitted to FEMA for final review. The Intervenor was advised that outside of issues raised sua sponte, Licensing Boards are restricted to adjudicating only those matters raised by the contentions. See 10 CFR 2.760a. A decision as to any other matters which need to be considered prior to issuance of an operating license is the responsibility of the NRC Staff. *Consolidated Edison Co. of N.Y., Inc.* (Indian Point Nuclear Generating Station, Units 1, 2 and 3) ALAB-319, 3 NRC 188, 190 (1976).

Based on evidence submitted on the plans as they existed at the time of the hearing, the Intervenor failed to demonstrate to the Board that completion of the emergency plans was essential to consideration of those inadequacies alleged in Contention 20.

During the hearing, there was substantial cross examination participated in by various representatives of SEA, and by Counsel for the State, the Applicant and the Staff as well as members of the Board. The findings of fact, infra, cover each section of NUREG-0654 which the contention challenges as being ignored or not complied with by the emergency plans of the State or County (Luzerne) or both. Here, we discuss our resolution of those issues which received material discussion in the proceeding.

Communication of Information

Questions were raised in the hearing whether the State and Luzerne County plans conformed to the recommended criteria on information that was to be made available to the permanent and transient adult population within the plume exposure pathway. Doubts were raised over the subject matter, its method of delivery, the obligation for costs of printing and distribution and the time period that such information should be in possession of those who were to receive it. The thrust of these inquiries challenge the adequacy of planning for public information which is required to meet the standards of the regulations that call for making vital information available to the public on a periodic basis. The Commonwealth of Pennsylvania has suggested in proposed findings that absent a pre-emergency dissemination of public information, there should be no finding




as is required by the regulation of reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

However, testimony at the hearing provides relevant and acceptable responses to the issues raised in this regard. (See Hearing Transcript pp. 2547-55, 2605-07, 2616-18, 2627-33, 2674.) There was a clear demonstration that the State and County had given extensive consideration to their public information responsibilities. What was not as obvious, however, is the complementary relationship important to a proper exercise of those responsibilities. Although the public information guidance of NUREG-0654 reflects that the recommended criteria are applicable to State and local governments, as they are to the nuclear facility organization as well, we do not conclude that this calls for duplication in effort or programs. One of the fundamental principles of NUREG-0654, as we see it, is the integrated development of emergency response plans. (See NUREG-0654 FEMA-REP-1 Rev. 1, pp. 23-24). This integration was recognized, in part, by PEMA's own public information officer who testified that the public information responsibilities were a joint and cooperative responsibility of the State, the County and utility. (Corney, Tr. p. 2628.)

A consideration of all the testimony makes evident the respective sharing of these obligations. The plans for public information contemplate the publication of printed information containing, among other items, material on radiation and evacuation routes to be distributed by means of brochures and possibly telephone directories to members of the permanent and adult transient population. Although no decision had been made, the Applicants' major witness expressed an opinion, that, following a similar undertaking at the Three Mile Island Facility, the Applicant would assume responsibility for financing the public information costs. This possibility is reinforced to a degree by suggestions of assistance contained in the funding and technical assistance section of the federal guidance. (NUREG-0654, p. 25.)

With respect to the necessity of implementing public information prior to the facility's operation, we subscribe to its accomplishment but fail to comprehend the Commonwealth's concern. This is particularly so where, as here, FEMA's representative (a major reviewing factor in the Applicants' effort to obtain a license) testified that such information should be distributed prior to the plant's operation. Since all parties concur in this aspect of the program for informing the public, we can reliably assume it will materialize as expected. Accordingly, no justification exists for the condition requested by the State.

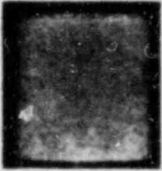


Traffic Control

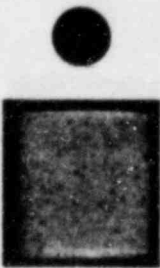
Arguably, no more critical item in emergency planning exists than that which deals with the movement of people and vehicles during an evacuation. Traffic control raises issues of policing the activity, the manpower forces assigned to it and the manner in which they are expected to operate. Contention 20(2)(d) alleges that the Luzerne County plan provides an outline for traffic control under "Police group" and does not list the units to be available for the operation.

The County plan places responsibility for the execution of traffic control plans on the Luzerne County Police Group chief, in cooperation with the Pennsylvania State police and municipal police forces. In the evacuation highway network, a number of access control and traffic control points have been identified and designated to be controlled by the State Police. (Board Finding 173.) The State Police Traffic Control Plan, which is referenced in the County's plan, proposes the availability of 200 State Police officers to man such points and backup assistance is to be provided by the Pennsylvania National Guard. Municipal police are obligated to assure the flow of traffic within their municipalities. The review by FEMA of these plans indicates that the County plan needs additional specification in the allocation of State police manpower for access and traffic control points and also the manner in which local police resources are to be utilized. We concur as due to its unique level of importance, proper planning in traffic control for evacuating an area of over 50,000 people requires precise operations. To that extent, the potential for problems is minimized and the proper development of the range of protective responses recommended by NUREG-0654 is assured. (See Hearing Transcript, pp. 2679-83.)

Notification to the Public



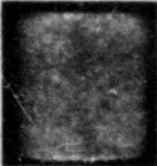
An essential element in planning for radiological emergencies is the development of a procedure for notification of such an incident to members of the public. Both the Commission's standards and criteria require the establishment of means to provide for both early notification and clear instructions. The method for accomplishing this in connection with an emergency at the Susquehanna facility is through the initiation of a system of sirens covering most and eventually all of the plume exposure pathway area. The siren warnings are designed to lead people to turn to television and radio sets for the reception of appropriate messages of instruction through an emergency broadcast system. (Board Finding 176.)




Under the County's response plan, municipal officials are designated as being responsible for insuring the receipt of warning information to the resident and transient population, as well as industries and institutions, within the municipalities' boundaries. The method proposed for performing this responsibility is through a door-to-door type procedure using speech amplification equipment. Contention 20(3)(a) questions the procedures on the basis that details for its execution are missing in the plan and letters of agreement with political subdivisions to assume responsibility for door-to-door notification are not in existence.

Although the County plan calls for utilization of municipal police and fire departments to carry out the notification procedure, there is testimony to the effect that such a warning program is viewed as only a backup to the siren system and that a backup notification procedure is not required. We do not agree. The fundamental obligation of a warning notification system is communication to all segments of the public. By definition, this covers individual with hearing impairment and those who for a variety of causes fail to hear siren signals as for example, due to surrounding noise conditions or certain sleeping environments. We do not see such a notification procedure in terms of a backup except in a circumstance where a breakdown of the siren system has occurred. We must conclude — and we believe this to be the plan's intent — that the notification program within municipalities is not only a supplement but an integral part of the warning system for disseminating appropriate information to be public as recommended by the regulations. That being so, this part of the notification procedure must be contained within the plan before operation, to the same degree as is required of the siren system itself. (See Commonwealth Ex. No. 9, Annex C; also Swiren ff. Tr. 2671 at p. 10.)

School District and Municipality Plans



There was substantial disagreement in this proceeding, as we indicated earlier, over the issue of transportation (availability of buses) to handle the evacuation needs of school children and other non-auto owning members of the population. The State's witnesses indicated that the availability of an adequate number of buses for this purpose could not be ascertained until written school emergency response plans were completed. Acknowledging the need for such plans, witnesses for the Applicant and Staff nevertheless subscribed to a belief that operation of the Susquehanna facility could proceed without them. The foundation for those judgments rested on the experience already accumulated by school districts in handling early school departures during snow storms and other conditions of inclement weather.



Additionally, the view was expressed that other nuclear facilities were operating without apparent difficulty within the State in the absence of written school plans. The implication here, presumably, is that imposing a condition for such plans at the Susquehanna plant would represent unfair and inequitable treatment.

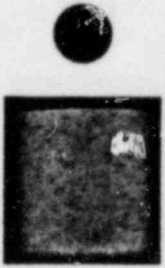
An additional aspect of this controversy relates to the current status of municipal emergency response plans. In addition to the provision for evacuating all school children by bus, the County plan calls for the evacuation of non-auto owning persons by bus from selected pick-up points in various municipalities. The identification of transportation needs and pick-up points is a municipal responsibility under the County plan. However, neither of these objectives are capable of accomplishment since all municipal plans have not been developed to this point. Although the testimony is conflicting on the question of whether an adequate number of buses exists to evacuate school children without a return trip, it is clear that resolution of this matter and therefore the availability of buses for both groups cannot be resolved without prepared school plans which will define and disclose school requirements. (Board Finding 185.)

Written School Plans

In our prior comments here, we concluded that written school plans were a necessity. We support that judgment with our belief that completion of municipal emergency plans must also be assured prior to operation of the facility. When several large groups of individuals depend for evacuation purposes on a single source of transportation, it would be difficult to determine in the light of the present status of planning that there is a reasonable assurance that adequate protective measures in this area can and will be taken in the event of a radiological emergency. The fact that PEMA has encouraged the dispatch of letter to all district school Superintendents to facilitate the preparation of such plans and the fact that most municipalities have completed their planning up to this point are considerations that suggest the planning efforts in both areas will be completed in the near future. If the opinion of the majority of witnesses that support this conclusion is correct, no harm will result from our protective rendering here.

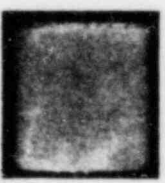
Availability of Dosimeters

The Commonwealth has requested the Applicants' operating license be made subject to an NRC finding that an adequate number of dosimeters




are available for distribution to off-site emergency workers. There is no disagreement that State and County plans require these workers be equipped with three dosimeters, two self-reading and a third, a thermoluminescent (TLD) type or that the State's supply is inadequate. Nor is there substantive disagreement that federal guidance only recommends a requirement for emergency workers to have two dosimeters — one self-reading and the other a TLD. The dispute centers instead on the question of whether the federal government has the responsibility to furnish the necessary equipment. Unfortunately, that dispute cannot be resolved here since it presents a matter beyond our domain. In operating license proceedings, a hearing Board's jurisdiction is limited to the issues placed in controversy by the parties and to matters raised *sua sponte* by the Board. 10 CFR Part 2, Appendix A, VIII(b). The question of responsibility for supplying dosimeters cannot, as the State argues in its proposed findings, be considered as within the boundary of Contentions 20(5b) or 20(8)(a) although those contentions do, in fact, relate to such equipment. Even though a State's position in Commission proceedings is a protected one and its participation is unfettered by many requirements imposed on other parties, it must observe, nevertheless, the same procedural necessities applicable to other participants. This includes advancing issues it wants litigated in such a time framework that opposing parties will be able to respond in a meaningful manner. See *Gulf States Utilities Company (River Bend Station, Units 1 and 2) ALAB-444, 6 NRC 760, 768 (1977)*. Here, the State did not advance the dosimetry matter in its responses of August 10 and October 5, 1981 in complying with our request for the Commonwealth to delineate its concerns. It was only during cross examination of FEMA's representatives during the evidentiary proceeding that the State first raised the dosimetry issue to the status of controversy. However, that is too late for either the parties' or the Board's consideration.

Reception and Mass Care Centers



SEA's contention 20(7)(e) invites some confusion due to changes in name designations in State and County plans of relocation centers as reception centers, host areas counties or areas and shelter areas as mass care centers. The criteria of NUREG-0654 propose that relocation (reception) centers and shelter areas (support mass care centers) be located on maps with evacuation routing as part of the emergency plans of State and local governments to implement protective response measures. Four support counties are listed in the Luzerne County plan but their response plans, required by the State, have not been finalized. Accordingly, the

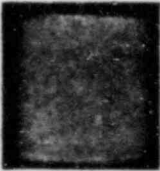


mass care facilities which are to be located partly in these areas have not been identified as yet. As a result of this status of things, the County plan currently identifies the location of reception centers but only those mass care centers located within Luzerne County. The Luzerne County plan reflects that reception centers are considered as pass-through facilities where evacuees merely obtain information and directions to mass care facilities. The County has entered into a written memorandum of understanding with local chapters of the American Red Cross through which these organizations have undertaken to handle the mass care centers in the event an emergency requires their utilization. (Board Finding 188.)

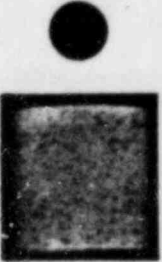
Traffic Congestion

Questions were raised in the proceeding concerning a lack of identification in State or County plans of traffic impediments on evacuation routes and their failure to deal with such restrictions by not including contingency measures. As we indicated in our comments on Contention 6, the time estimate evacuation study performed by HMM Associates utilized a computer model which was designed to allow for traffic congestion. The highway network used in the study was also physically inspected for problem areas. To control the flow of traffic in an evacuation operation, the State and local plans recognize the basic responsibility of the State Police who will man both traffic access points and previously designated traffic control points where bottlenecks to traffic flow would normally occur. As an aid in assisting in the elimination of impediments, the State Department of Transportation is charged with removing obstacles to the flow of traffic and the Pennsylvania National Guard is also given an assignment of complementing duties. This array of manpower should be adequate to the success of this mission if the need should arise, as well as the handling of traffic if the traffic light system through a loss of power ceases functioning. This latter possibility was suggested by intervenors during the hearing.

Ingestion Exposure Pathway



An allegation concerning the ingestion exposure pathway (fifty mile radius around a nuclear facility) raises questions regarding the State's plan to comply with the recommendation of NUREG-0654, J. 11. In essence, the criticism was made that the plan fails to (1) identify procedures for detecting contamination; (2) identify procedures for imposing protective

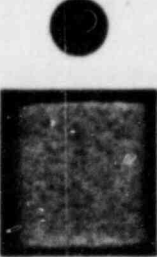


action measures such as impoundment, decontamination, processing, decay, product diversion and preservation; (3) mention maintenance of maps for recording data on surveys and monitoring, land uses, dairies, food processing plants, watersheds and facilities, crop information, and (4) include up-to-date lists of milk and food processors or products originating within the ingestion zone but located elsewhere. The State's plan for handling protection responses in the ingestion pathway involves the coordinated activity of a number of State agencies, principally the Department of Agriculture, the Department of Health and the Department of Environmental Protection with its key office, referred to earlier, the Bureau of Radiation Protection (BRP). Simply stated here, samples of milk, produce, and water are to be tested for contamination and responses to protect the public's food supply and water are then recommended to PEMA.

The BRP plan includes protective action guides (PAG) for food, milk and water by which levels of contamination are correlated with protective responses and protective action options are included in the Department of Agriculture's plan. Currently, the State's plan for the ingestion exposure pathway is being revised and a complete appendix will be published providing a detailed specification of governmental responsibilities in this area including the establishment of means to protect the public from contaminated food and water and to provide guidance to farmers for protection of livestock and harvested crops. Maps have been prepared for the purpose of recording essential information and data on land uses and crop information and up-to-date lists of processors of food, agricultural items and milk products originating in the ingestion pathway are obtainable.

Medical Services

In contention 20(9)(a and b), SEA challenged the adequacy of State and County plans on the arrangements made for medical services for contaminated individuals. NUREG-0654 L. 1 and L. 3 recommends that lists of hospitals be compiled which are considered capable of providing such medical support and also that arrangements be made for local and backup hospitals and medical services that can provide radiation exposure evaluation and handling of contaminated individuals. The State plans lists all hospitals within the State having 'radiation treatment capability' and the Luzerne plan lists such hospitals in the area surrounding the Susquehanna facility, citing some as support hospitals and others as back-up support. (Board Finding 194.) The state plan indicates that a list of site specific and back-up hospitals for the plan was being developed. We would



assume that these designations when finally developed will have met in a meaningful manner the criteria of NUREG-0654 L.1 so the "arrangements" with those hospitals for the required support would have been concluded as a result.

Conclusion

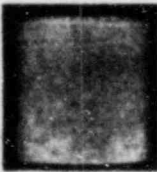
Based on the evidence of record, the Board finds that contrary to the Intervenor's contention, the emergency response plans of the Commonwealth of Pennsylvania and Luzerne County, except as they fail to assure the availability of plans from Municipalities and School Districts, are in substantial conformance to the recommendations and guidance of NUREG-0654. The Board finds further that those planning areas requiring further development will be addressed over the next several months. The deficiencies in the plans concerning Municipalities and School Districts will be addressed in the Board's Order herein.

9. Scram Discharge Volume Break

Contention 21, sponsored by both the Susquehanna Environmental Advocates and the Citizens Against Nuclear Dangers, alleges that a break in the scram discharge volume (SDV) will release radioactive water which can disable the major safety cooling systems in a brief period of time. This would result from the released water flowing into the reactor basement where the cooling system pumps are located, thus flooding and rendering them inoperative.

The SDV is basically a tank which receives reactor coolant displaced by insertion of the reactor control rods. The Coolant enters the SDV through the scram exhaust valves, which open upon receipt of a scram signal and close when the scram is reset. Scram reset also opens the SDV vent and drain valves which are closed upon receipt of a scram signal. The contained coolant is then discharged to the building sump, and the SDV is thus prepared for the next scram actuation. A break in the SDV with the scram exhaust valves open would result in release to the building of water at reactor temperature and pressure. (Board Finding 204.)

Staff Evaluation



The Staff has evaluated this problem generically and has issued its findings in NUREG-0803. It identifies three general areas of concern:

integrity of the SDV piping; emergency procedures to successfully mitigate a leak or break; and the environmental qualification of equipment needed to detect and mitigate the consequence of an SDV break. It also proposes a series of site-specific recommendations to which Applicants have committed themselves. (Board Finding 206.)

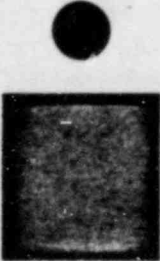
Probability of SDV Break

The SDV systems are designed and fabricated in accordance with high quality standards, such that they are highly resistant to cracking, fatigue, corrosion, brittle fracture and other failure mechanisms. They are also in-service inspected according to ASME code requirements. Operating experience shows that no SDV leaks or breaks have been reported in 20 years of BWR operation. These factors strongly support an argument that a break in the SDV system is a very low probability occurrence.

SDV System Breaks

If a break in the SDV system should occur, resetting the scram will close the scram exhaust valves, thus terminating the coolant flow to the SDV. If the scram cannot be reset, the leak must be identified and isolated. A leak can be identified by a number of indicators; existence of a leak is therefore not dependent upon a single instrument. The reactor is then depressurized to limit the amount of coolant released to the building and manually operated isolation valves are utilized to stop any further leakage. (Board Finding 209 and 211.) While a radiological field of some strength will exist in the building, appropriately equipped personnel will be able to enter the containment to close the isolation valves without exceeding 10 CFR Part 20 dose limits. (Board Finding 212.)

Adequate core cooling must be maintained during this period. While the system is pressurized, the main feedwater pumps, the condensate pumps and the condenser will be used. These are located in the turbine building and are not subject to flooding. When the system is depressurized, the residual heat removal (RHR) system provides low-pressure coolant injection. If the RHR pumps, which are located in the reactor basement, should be flooded, the RHR service water pumps, which are located in the emergency service water pumphouse and not subject to flooding, can deliver water directly from a 25 million gallon spray pond. (Board Findings 213-214.)



At Susquehanna, all of the emergency systems located in the reactor basement are in compartments which are watertight with respect to each other. The stairwells are also equipped with watertight doors. The basement sump pump should also remain in service. However, even if all these measures were defeated, it would take several hours to flood the basement to a one foot depth. Inasmuch as all motors driving emergency core cooling system pumps are six feet above the basement floor, loss of these motors would not occur until many hours after the onset of the accident, if at all. (Board Findings 218-220.)

Conclusion

On the basis of the uncontroverted evidence in the record, we find that a break in the scram discharge volume of the control rod drive system is unlikely and that if such a break should occur, its consequences could be mitigated before major safety systems would be damaged. Accordingly, we find that contrary to the allegations of the contention, a break in the scram discharge volume of the Susquehanna facility cannot disable major safety systems.

The matters examined during the evidentiary hearing which are not discussed in this Opinion were considered by the Board and found either to be without merit or not to affect our decision herein. Findings of fact and conclusions of law which are annexed hereto are incorporated in the Opinion. In preparing its findings of fact and conclusions of law, the Board reviewed and considered the entire record and the findings of fact and conclusions of law proposed by the parties.⁸ Those proposed findings not incorporated directly or inferentially in this Initial Decision are rejected as being unsupported by the record of the case or as being unnecessary to the rendering of this decision.

Accordingly, for all the foregoing reasons it is this date April 12, 1982 ordered that the Director of Nuclear Reactor Regulation is authorized to issue operating license to the Applicants for Units 1 and 2 at the Susquehanna Steam Electric Station, subject to the conditions being complied with as stated.

⁸ Proposed findings were submitted on all contentions by the Applicant and Staff; on Contentions 6 and 20 by the Commonwealth and on Contention 1 by ECNP. No other party filed proposed findings.

FINDINGS OF FACT

III. CONTENTIONS

Health Effects of Nuclear Fuel Cycle (Contention 1)

1. This contention was modified by the Board on March 27, 1980, to treat technetium-99 (Tc-99) similarly to radon-222, following the Commission's amendment of Table S-3 of 10 CFR §51.20 (44 Fed. Reg. 45362, August 12, 1979).

2. The Applicants, Staff and intervenor ECNP stipulated that a condition will be imposed on operating licenses for the Susquehanna units, making the licenses subject to the outcome of the consolidated radon proceedings currently before the Appeal Board. Except for the quantities and health effects of technetium, and the stipulation regarding radon, the parts of this contention concerned with other isotopes were dismissed by the Board through granting motions for summary disposition filed by the Applicant and Staff.

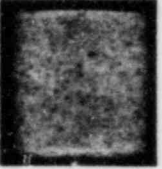

3. Contention 1, as litigated, reads as follows:⁹

... The quantity of technetium-99 which will be released from waste management or reprocessing activities resulting from operation of the Susquehanna facility, has not been, but should be adequately assessed. The radiological health effects of technetium should be estimated and these estimates factored into the cost-benefit balance for the operation of the plant.

4. Technetium, which is produced by fission of uranium-235 and by neutron activation of molybdenum-98, has no stable isotopes and is rarely found in nature. Tc-99's half-life is 220,000 years and it decays to stable ruthenium-99 by emitting low energy beta particles. Because of its low beta energy, it poses no significant external exposure hazard, and the potential health hazard associated with Tc-99 is from possible ingestion or inhalation (Englehart, ff. Tr. 1852 at pp. 2-3).

5. During operation, Tc-99 is produced at the rate of 14.3 Ci/MT of uranium or 500 Ci/RRY and essentially all of the isotopes produced by

⁹ Applicants presented testimony of Richard W. Englehart, Ph.D., a Senior Executive Consultant and Manager, Radiological Programs Department, Environmental Service Division, NUS Corporation. The Staff's witnesses were Fred D. Fisher, Ph. D., leader of the Environmental Radiation Emergency Support Section, Uranium Fuel Licensing Branch, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, NRC; Dr. Edward F. Branagan, a Radiological Physicist and Dr. R. K. Struckmeyer, an Environmental Analyst in the Radiological Assessment Branch, Office of Nuclear Reactor Regulation. The Intervenors presented no direct testimony.



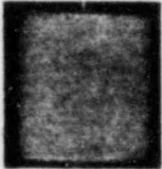
fission remains in the encapsulated spent fuel. No releases occur in storage at the reactor or in interim storage facilities. (Ibid. p. 3.)

6. Under the once-through fuel cycle (no reprocessing), the stored spent fuel is packaged for ultimate disposal in a stable geologic formation. Containment package integrity for a minimum of 1,000 years is required by the proposed 10 CFR Part 60 with a maximum release rate of one part in 100,000 per year thereafter. For the analysis by Applicants' witness, all of the Tc-99 is assumed to be dissolved in groundwater over a period of 100,000 years. (Ibid. pp. 4-5.)

7. In the uranium-only recycle operation, the spent fuel is dissolved in hot nitric acid forming a non-volatile stable pertechnetate acid and no Tc-99 releases are expected at this stage. The nitric acid solution is subjected to a series of solvent extraction cycles to separate the uranium from the fission products and in this partitioning, over the long term, it is estimated that 8 to 25 percent of the Tc-99 will remain with the uranium product stream with the balance going to the high-level liquid waste (HLLW) stream. The HLLW stream goes to a treatment process and, potentially, to environmental releases. In the uranium-only recycle fuel cycle, there is a separate plutonium waste stream that would contain 1 percent, more or less, of Tc-99, but because of the future uncertainty of plutonium recovery, it was conservatively assumed that the Tc-99 will be apportioned only between the uranium stream and the HLLW stream. (Ibid. pp. 6-7.)

8. In the conversion of the uranium product stream of fuel, some Tc-99 is contained in low-level solid waste (LLW) produced which is buried in a shallow facility. At some future time, some fraction of 40 - 125 Ci/RRY may be available for human intake because of groundwater intrusion and conveyance. (Ibid. p. 10.)

9. In the re-enrichment process, direct emission of Tc-99 to the atmosphere is estimated to be 6.6×10^3 Ci/RRY and to surface water, 8.5×10^2 Ci/RRY. (Ibid. p. 11.)



10. The predominant dose pathway for atmospheric releases of Tc-99 is soil deposition, root uptake, and human ingestion. The pertechnetate ion, which is the most stable chemical form of Tc-99 in aqueous solution, is weakly retained in non-organic soils and strongly retained by organic soils. Consequently, uptake by vegetation is site dependent. For inorganic soils, a conservatively high residence time is one year and for organic soils it would be much longer. For the calculations done by Applicants' witness, an average residence time of 15 years was used and a soil-to-plant transfer factor of 50 pCi/g fresh vegetable weight per pCi/g dry soil weight, both of which are characterized as conservative. (Ibid. pp. 12-13.)

11. Using models and calculations of Roddy, *et al.*, population doses were estimated. However, since Roddy, *et al.*, used a soil-to-plant transfer factor of 0.25 pCi/g instead of 50, Roddy's calculations were scaled up by a factor of 140 to account for the difference in transfer factors. As adjusted, and using a source term of 0.0066 Ci/RRY, annual population doses from atmospheric releases are calculated to be in man-rem/RRY: total body, 6.8×10^{-4} ; bone: 0.0016; kidney: 0.031; and gastrointestinal (GI) tract: 0.134. Annual population thyroid doses based on factors from Killough, *et al.*, are less than 0.1 man-rem/RRY. (Ibid. p. 14.)

12. Doses resulting from surface water releases from enrichment processes are estimated to be in man-rem/RRY; 8.2×10^{-3} total body, 0.12 GI tract, and 0.52 thyroid. (Ibid. p. 15.)

13. A model developed by Adam and Rogers for the Maxey Flats commercial low-level waste disposal facility was used by Applicants' witness for computation of groundwater releases from shallow burial sites. This model assumes a groundwater transport distance of 800 meters to a surface stream. Population doses result downstream from use before the stream reaches the ocean. The Maxey Flats pathway is one of the longest potential fresh water paths of any LLW site in the United States. The exposed population is assumed as 5.7×10^6 . For a shallow land burial of 125 Ci/RRY, calculated annual population doses are in man-rem/RRY; 0.0012 total body, 0.018 GI tract, and 0.077 thyroid, and it is assumed these rates will continue over 10,000 years. (Ibid. pp. 15-17.)

14. Calculations of Tc-99 from high-level waste repositories are based on the NRC proposed technical criteria which after 1,000 years of isolation would restrict the annual release rate to 1×10^{-5} of the inventory (or 0.005 Ci/RRY from an inventory of 500 Ci/RRY). (Ibid. p. 17.)

15. Assuming, very conservatively, that the liquid pathway for deep repositories followed that of shallow burial sites, after 1,000 years of isolation the expected annual population dose would be four-tenths that of shallow sites or a maximum of 0.00048 whole body, 0.0072 GI tract, and 0.0308 thyroid, man-rem/RRY. (Ibid. pp. 17-18.)

16. According to the Applicants' witness, the major potential for population doses from release of Tc-99 would result if this material were to be released to groundwater from waste burial sites or repositories for either spent fuel or reprocessed wastes. It would be expected that such releases would not exceed 10^{-4} of the inventory per year for LLW sites, or 10^{-5} for HLLW sites. Yearly doses resulting from operation of Susquehanna from buried high level wastes based on a once through fuel cycle would be approximately in man-rem: 0.031 whole body, 0.46 GI tract, and 1.97 thyroid. For the uranium-only recycle option, the atmospheric releases over the life of the plant from enrichment process in man-rem are: .043 whole

body, 1.97 kidney, 8.58 GI tract, and 6.4 thyroid; and for surface water releases: 0.52 whole body, 7.7 GI tract, and 33.2 thyroid. The Low Level Waste Storage for the recycle option release to groundwater over 10,000 years results in population doses of in man-rem/year: .077 whole body, 1.15 GI tract, 4.93 thyroid. High Level Waste Storage doses for this option would be the same as for the once-through fuel cycle. (Ibid. pp. 18-19.)

17. The Applicants' witness considers the releases of Tc-99 attributable to Susquehanna to be an insignificant increment to the natural background dose of the affected population. The population dose from natural sources per year is assumed to be 100 millirem per person per year. This would be an annual dose of 570,000 man-rem for a population of 5.7 million downstream from disposal site. From a shallow land burial of the yearly releases of Tc-99 at Susquehanna, the increase per person in an average thyroid dose would be 8.6×10^{-4} mrem, the whole body dose increase would be 1.3×10^{-5} mrem, and from a high level waste repository, the individual dose would be 3.5×10^{-4} mrem, or less than one-thousandth of a percent of the annual dose due to natural background radiation. (Ibid. pp. 20-21.)

18. The Staff's witness, Dr. Fisher, testified on the quantities of Tc-99 releases from the supporting fuel cycle for light-water-cooled reactors. He considered operation without recycle and with recycle of uranium or uranium and plutonium. Using the ORIGEN burn-up code, the witness estimated that 391 Ci of technetium-99 will be contained in the spent fuel from one year of operation of a plant like Susquehanna. In calculating releases from this amount of Tc-99, Dr. Fisher then assumes total and prompt releases (less than 100 years) to surface waters of technetium-99 disposed of with low-level wastes by shallow land burial. For geologic repository disposal, it is assumed waste packaging will retain its integrity for 1000 years, that groundwater required 1000 years to reach surface waters, and that the leach rate of waste form is not more than 0.00001 per year. For reprocessing, the estimates of releases were developed by combining data on the properties of Tc-99 with operating performance characteristics and typical equipment used. Liquid releases associated with spent fuel storage were calculated to be 3.2×10^{-5} Ci/RRY in both cases, i.e., with and without recycle. There are no airborne releases without recycle, but there are with reprocessing. Liquid releases are computed from shallow land burial of low level wastes associated with recycle and the geologic repository for high level wastes in both cases. (Fisher, ff. Tr. 1880 at pp. 1-5.)

19. The testimony of Staff witnesses Branagan and Struckmeyer dealt with the radiological health effects of Tc-99 releases from the fuel cycle.

Doses were computed in three steps and the quantities of Tc-99 released per RRY were taken from Dr. Fisher's testimony. R/BGAD and LADIAP computer codes were used to estimate population doses per Ci of Tc-99 to the air and water and the parameters used in codes were taken from the Generic Environmental Statement for Mixed-Oxide Fuels (GESMO), NUREG-0002. Population doses were estimated for 100 years and 1000 years and were estimated per RRY by multiplying the quantities released in gaseous and liquid form by the population doses per Ci of Tc-99 released. Cumulative releases were computed for the first 2000 years and an annual release thereafter. (Branagan and Struckmeyer, ff. Tr. 1894 at pp. 1-3.)

20. Potential health effects were computed by multiplying the population dose per RRY by somatic (i.e., cancer) and genetic risk estimators. The risk estimators used by the Staff were based on the BEIR I Report. These were: about 140 potential deaths from cancer per million person-rem and about 260 potential cases of genetic disorders per million person-rem. The cancer fatality risk estimates are based on the "absolute risk" model in BEIR I rather than the "relative risk" model which would produce higher estimates by a factor of four. The BEIR III Report estimates 1.5 to 2 times as many potential non-fatal as fatal cancers. (Ibid. pp. 4-5.)

21. The total body risk equivalent population dose is about 5 person-rem/RRY for prompt releases. The annual total body risk equivalent population dose is about 4×10^{-3} person-rem/RRY and is about 1000 times less than the total body risk equivalent population dose for the first 2000 years (i.e., 5 person-rem/RRY). The total body risk equivalent population dose for both 100 year and 1000 year environmental dose commitment times are about the same because almost all of the population doses are received in the first 100 years. (Ibid. p. 6.)

22. There may occur about 0.0007 cancer fatalities/RRY due to prompt releases of Tc-99. The number of potential cancer fatalities from each assumed annual release of TC-99 from a high level waste repository for time periods beyond 2000 years (i.e., about 5×10^{-7} potential fatal cancers/yr/RRY) is about 1400 times less than the cumulative value for prompt releases during the first 2000 years (i.e., about 7×10^{-4} potential fatal cancers/RRY). (Ibid. p. 7.)

23. There may occur about 0.00006 genetic disorders/RRY due to prompt releases of Tc-99. The number of potential genetic disorders from each assumed release of TC-99 from the fuel cycle for the time periods beyond 2000 years (i.e., about 2×10^{-8} potential disorders/yr/RRY) is about 3000 times less than the cumulative value for prompt releases during the first 2000 years (i.e., about 6×10^{-5} potential genetic disorders/RRY).

This analysis indicates that the total body risk equivalent dose from TC-99 is about 5 person-rem/RRY. In the FES (p. 4-33), it is stated that the population dose should not exceed 100 person-rem/RRY, a more conservative estimate. (Ibid. p. 7.)

24. The population dose per RRY (i.e., about 5 person-rem, total body risk equivalent) from TC-99 releases from the fuel cycle is about one percent of the population dose (i.e., about 640 person-rem, total body) for the rest of the fuel cycle. Consequently, the radiological impacts from exposure to TC-99 releases from the fuel cycle have an insignificant effect on the cost-benefit balance. (Ibid. p. 9.)

2. Need for Power (Contention 4)

25. As a result of a successful motion for summary disposition filed by the Staff, only the following parts of this contention were considered during the hearing:¹⁰

4. The Susquehanna facility (or, at least, Unit 2 thereof) is not needed, and as a result, the cost-benefit balance is tilted against authorization of operating licenses (or at least, a license for Unit 2), for the following reasons:

a. Information supplied in the Applicants' ER shows that, at the *very low* growth rate scenario, the entire output of both units will be available for sale outside the service areas of the Applicants as the units come on line (ER, Table 1.1-15.)

b. The electric capacity of the lead Applicant in 1977 was 40 percent greater than customer needs and demands from existing facilities. Latest projections of energy use and requirements during the next 30 years for the Applicants' service area, the period equal to the projected plants' "useful life," show that the Applicants can meet the needs of their customers through existing facilities and sources.

26. PP&L prepared a demand forecast in October 1980, which was revised on September 28, 1981. (McNair, ff. Tr. 1957 at p. 1.) The current forecast includes conservation and new technology events likely to occur in the next 20 years. A net reduction of 1000 MW of load is

¹⁰ The Applicants' witnesses, both from the Pennsylvania Power and Light Company were Grayson E. McNair, V.P. Consumer and Community, who testified on the development of sales and peak load forecasts and Wm. F. Hecht, Mgr. of Systems Planning, who testified on the need for energy and capacity from Susquehanna. The Staff's witness was Dr. Raghav Prasad, an economist with the Argonne National Laboratory, who testified on the benefits to be derived from operation of the Susquehanna facility. No intervenor put on direct testimony.

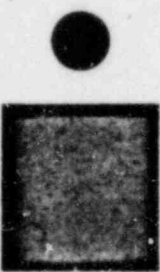
expected from conservation and new energy technologies, and 400 MW from shifting on-peak loads to off-peak.

27. PP&L has forecast loads using econometric models, traditional or judgment methods, probability band forecasts, short-term, and peak load forecasts. The econometric model uses historic values to measure interrelationships of key variables. Assumptions were developed by Data Resources, Inc. and were used to develop a 25 year macroeconomic outlook. Forecasts of future energy use were made for various components of the residential, commercial and industrial sectors. The DRI forecast selected by PP&L to produce the base case evaluation was called Cyclelong 2005. It assumed a moderate real national output growth for an annual average GNP growth rate of 2.3 percent. The expected values for real annual increases in prices through the year 2000 were 2 percent for coal, 2 percent for oil, and 6 percent for natural gas. The forecast for real electric price increases was -0.2 percent annually. The econometric point estimate forecast for the year 2000 is 35,000 million kWh. Varying real electric price increase from 1 percent to -3 percent and keeping oil and gas constant gives a range from 39,7000 GWh to 56,000 GWh. (Ibid. pp. 4-9 and see Graph 1, Rev. 1, p. 11.)

28. The traditional or judgment method of forecasting allows the forecaster a freer hand to employ relationships that cannot be formulated as equations. All factors that would push consumption up are lumped together, whether consistent or not, and then the same is done for factors that would push consumption down. Adjustments are made for conservation, throwover (i.e., substitution of fuel sources), and residential conversions of energy systems. A band forecasts are produced with an upper and lower boundary. The forecasts are based on detailed estimates for various components of the specific sectors. Adjustments are made based on assumptions for economic growth and prices. The results are a forecast of 34,000 GWh to 59,000 GWh. If cogeneration is considered, the range is 27,000 to 54,000. (Ibid. pp. 12-18, and see Graph 2, p. 19.)

29. Long-term judgment forecasting is improved by forming consistent sets of assumptions for estimating most probable outcomes. A refined probability band forecast is developed. This method predicts a continuation of conservation to 1986, followed by an era of throwover from oil and perhaps natural gas to coal and nuclear to 1997. The final three years to 2000 will experience maturation of alternate renewable fuels and energy sources. Under this method, the year 2000 demand varies about 32,000 GWh to 44,000 GWh. (Ibid. pp. 20-22.)

30. Normally, short-term forecasts are made for 18 months. The 1980 short-term forecast was extended to 1986 using long-term judgment forecast information. In addition, information was obtained from local home



builders, commercial operations, and industrial customers regarding their expectations relative to new construction, additions and/or layoffs of workers, production increases and conservation accomplishments. Past experience has shown that these statements of expectations tend to be overly optimistic and have to be adjusted downward before they can be used to forecast effects on electrical loads. Furthermore, because of the cyclical nature of the economy, a depression was hypothesized to occur during the forecast period. Other economic assumptions were included. A 1981 short-term forecast has subsequently been made for 1982 and 1983. The latest figures for a 1982 forecast were $23,771 \times 10^6$ kWh and for 1983, $24,400 \times 10^6$ kWh. (Ibid. pp. 24-26. Also see Table 3A, p. 26A.)

31. Plant capacity required is based on peak load i.e., maximum hourly demand for electricity. Peak load demand is developed by research on use by each rate class, i.e., customers paying the same rate schedule to define historical load characteristics. Assumptions are factored into forecasts relative to the level of economy, fuel price levels, conservation and new technologies. PP&L has peak loads in the summer and winter with the annual peak load occurring in January. A winter peak forecast of 6,860 MW for 1995, a sales growth to 1995 of 2.5 percent per annum and a 2.4 percent peak load growth are forecast. For planning purposes, a range of growth rates of 1 percent and 3.5 percent were investigated. (Ibid. pp. 27-29 and see Graph 5, p. 32.)

32. The Applicants' witness, McNair, explained the recent changes in the company's forecasts. The new forecast was approved September 28, 1981 and was lower than previous ones. The new compound growth forecast is 2.2 percent compared with the prior one of 2.5 percent and the new compound growth rate for peak load is 2.0 percent, rather than 2.2 percent. These changes are attributed to a slower growth in the economy, a lower number of new dwelling units, and lower annual use of electricity in electrically heated dwellings. (See McNair supplemental affidavit, ff. Tr. 1950 at pp. 1-2).

33. Electricity generated by Susquehanna will have the lowest operating costs of any facility on the PP&L system other than hydroelectric ones. Susquehanna will displace other plants that use more costly fuels such as oil and coal and the generation capacity freed thereby will, in turn, be used to displace other even more costly generation on the PJM interconnection. Thus, that part of the contention is inaccurate that states "the entire output of both units will be available for sale outside the service area." When Susquehanna is placed in service, PP&L will credit energy generated by these units to its customers. (Hecht, ff. Tr. 2049 at pp. 3, 5.)

34. The Applicants concede that capacity with Susquehanna added may be greater than required, but reserve margin is only one factor in

analyzing the "appropriateness" of new capacity. Other factors are diversity of fuel sources, conservation of oil and overall economics. Operation of Susquehanna will result in significant operating cost savings, fuel diversity, conserve substantial quantities of oil, and also provide a supplemental margin of service reliability for unexpected contingencies. (Ibid. p. 4.)

35. By PJM agreement, PP&L must maintain a reserve margin of about 10 percent over its winter peak. PJM has an overall peak in the summer but this is tending to change to a winter peak which is forecast for the late 1990's. As this occurs, the reserve margin requirement is projected to increase to 20 percent. Because the lead time for new construction is 10-12 years, PP&L would not be able to meet its reserve margin obligation in the mid-1980's unless other facilities were added that have relatively high operating costs, such as oil and gas-fired combustion turbines. The addition of Susquehanna will substantially benefit the reserve margin. (Ibid. pp. 7-8.)

36. Coal is considered vulnerable to a coal miner's strike and oil supplies are vulnerable to embargoes and other supply problems. The present mix of capacity by fuel sources is about 63 percent coal, 33 percent oil, and 4 percent hydro and the addition of Susquehanna will result in 49 percent coal, 26 percent oil, and 22 percent nuclear. (Ibid. pp. 8-9.)

37. Some costs will go up when Susquehanna goes on line because the utility is permitted to recover the total costs of providing service. These costs include capital-related costs (depreciation, return on investment, and taxes) and operating and maintenance costs (i.e., wages, material, contract engineering and labor, etc.), to operate and maintain its units. These increased costs are partially offset by lower fuel costs and increased sales to other members of PJM. The fuel costs for electricity used by PP&L's customers will be less with Susquehanna. Operation and maintenance costs include a calculated cost for decommissioning of \$191 million for a total annualized cost of \$18.5 million. For purpose of calculations, a pessimistic lifetime capacity factor of 50 percent, as well as an optimistic factor of 80 percent are used. (Ibid. pp. 9-10, 14 and p. 24.)

38. The calculations show that without Susquehanna, PP&L's revenue requirements for fuel and interchange costs would increase. The January 1982 present worth of those costs would be \$3.6 billion for low growth (1 percent) and \$4.7 billion for high growth (3-1/2 percent). (Ibid. p. 21.)

39. If Susquehanna were abandoned, PP&L's revenue requirements between 1983 and 1992 would be \$6.6 billion (low growth) to \$9.2 billion (high growth) higher than if the plant were to be placed in service as scheduled. The January 1982 present worths of those increases are \$2.6

billion to \$3.6 billion. A year's delay would increase revenue requirements for 1982-92 by \$400 million to \$800 million. (Ibid. pp. 21-24.)

40. The effect of an assumed growth rate of zero in energy sales and peak load even if combined with a 50 percent capacity factor shows a benefit of \$3.15 billion in the first 10 years with a present net worth of \$1.32 billion. (Hecht, supplemental affidavit, ff. Tr. 2051 at p. 2.)

41. The NRC Staff determination of benefit is not limited to conclusions regarding reliability or growth in electrical energy requirements. The benefit from operation of Susquehanna is the assurance of a low cost supply of electrical energy through minimization of production costs achieved through a substitution of electricity generated by this facility for electricity generated by more expensive units. Any reduction in total demand would not alter this condition. (Prasad, ff. Tr. 2196 at pp. 2-3.)

42. Only 2 percent and 23 percent of the capacity available to PP&L and PJM in 1982 can generate electricity at a cost equal to or lower than will be provided at Susquehanna, and this capacity is hydro or other nuclear. The remaining 98 percent of PP&L's capacity is coal (64 percent) or oil (34 percent). The remaining 77 percent of PJM's capacity is coal (34 percent), oil (26 percent), or combustion turbines (17 percent) (oil or gas). If Susquehanna is not operated, replacement energy would come from these more expensive fossil fuels. (Ibid. pp. 4-5.)

43. Even assuming that demand would decline so low that generation from 43 percent of PJM's capacity is not required, and that Susquehanna will operate at 60 percent capacity, and also considering fuel costs inflation, the fuel cost savings in the first year of operation of Unit 1 is \$30 million, and in 1983 with both units in operation, \$64 million. (Ibid. p. 6.)

44. An analysis by the U.S. Department of Energy estimated fuel replacement costs for Susquehanna in 1982 at \$162 million per year, based on equal replacement by coal and oil. The Applicants' witness analyses were based on an unusually low demand where coal would be the only replacement fuel. In either case, however, substantial savings from operation of Susquehanna exist. (Ibid. p. 7.)

45. The Board finds that the operation of Susquehanna will result in fuel diversity, conservation of oil and lower fuel costs of operation. The Board finds it will be more costly at this stage to abandon the plant than to operate it.

46. The Board finds that the plant is not needed at present to meet current reserve margin requirements, but it will help meet reserve requirements of the PJM power pool sometime between the mid-1980's and early 1990's.

47. The Board finds that operation of Susquehanna will permit its output to be substituted for more expensive operations in meeting its customer's needs.

3. Evacuation Emergency Plan¹¹ (Contention 6)

48. ECNP, in part and SEA, in part sponsored this contention, which, as admitted for hearing purposes, read as follows:

6. The emergency plan proposed by the Applicants is not sufficient to assure prompt notification and evacuation of all areas in which persons may be exposed to radiation doses in excess of those permitted by existing radiation exposure standards for the general public and Protective Action Guides. Specifically: a. The plan fails to account adequately for narrow roads and adverse weather conditions in the vicinity of the site. b. There is considerable question of the ability of Pennsylvania's Office of Radiological Health to fulfill its assigned functions in the event of an emergency. The Director of that office stated at a public meeting that his staff would not be able to respond at all hours to an accident at a nuclear facility. He has also, by affidavit, denied having made such a statement. This question must be resolved. Furthermore, the office has been unsuccessful in obtaining the amount of funding required to provide adequate qualified staff and equipment to be able to expand its capability to monitor and respond to a radiation emergency situation at Susquehanna. c. The plan includes insufficient information with respect to either the training of or the adequacy of radiation hazard safeguards to protect local emergency units which may be required to participate in emergency evacuation procedures or which may be required to deal with on-site situations. The plan does not state whether the public or the utility will provide the training in protection and procedure required by local emergency units to coordinate a safe, systematic evacuation.

49. Applicants for facility operating licenses are required by NRC regulations to submit emergency plans and the standards and requirements

¹¹ The Applicants' witnesses were Scott T. McCandless, Project Mgr., HMM Associates, who testified on a time evacuation study; Oran K. Henderson, V.P., Emergency Management Services, Inc. on the capabilities of the Bureau of Radiation Protection and off-site training; Robert M. Carroll, consultant, Emergency Management Services, Inc. on school evacuation and Steven H. Cantone, Mgr., Nuclear Support, Pennsylvania Power and Light Co. on on-site training; the Staff's witnesses were Stephen H. Chesnut, NRC Emergency Preparedness Branch, who testified on on-site emergency planning and Bruce J. Swiren, Federal Emergency Management Agency on off-site emergency planning; the Commonwealth's witnesses were Margaret A. Reilly, Bureau of Radiation Protection, who testified on the capabilities of BRP and a panel composed of Adolph Belser, Kenneth Lamison, Ralph Hippert, and Joan Comey, officials with Pennsylvania Emergency Management Agency who gave testimony on State and County emergency planning. No direct testimony was introduced from any intervenor.

for such plans are addressed in 10 CFR 50.47 and 10 CFR Part 50, Appendix E.¹² The regulations refer to NUREG-0654 FEMA-REP-1 Rev. 1, a document prepared to provide guidance and acceptance criteria for the development of emergency plans.¹³

50. NRC regulations and NUREG-0654 establish standards and criteria for the development of procedures to be followed by the Applicants in notifying State and local response organizations of radiological emergencies. The emergency plans must also provide for early and prompt communications with the public.¹⁴

51. For any radiological emergencies, responsibilities have been assigned and procedures established by the Applicant for the prompt notification of State and local response organizations. (SER Supp. 1, App. D, pp. 5-6 and SER Supp. 2, App. D, p. 3. See also Commonwealth Ex. 8, App. 3.)

52. Emergency response plans of the State and local county government provide for notification, communication of emergency warnings and instructions to members of the public. (Belser *et al.* ff. Tr. 2586 at pp. 1-3, Commonwealth Ex. 1, pp. 17-18; Commonwealth Ex. 8, Commonwealth Ex. 9.)

53. Specific messages for the public that relate to various levels of emergency have been included in local government response plans and the Applicants have developed a system for prompt alerting of the public to receive such messages through radio and television. For those with hearing difficulties or a lack of reception capabilities, the notification system will be supplemented by local police and fire forces in selected areas. (Commonwealth Ex. 9, Annex D, App. 1-5, pp. D1-D5. SER Supp. 1, App. D, p. D-6. Also see Commonwealth Ex. 9, Annex C., p. C-1. Belser *et al.* ff. Tr. 2586 at p. 2.)

54. In addition to requiring notification and instruction to the public within the plume exposure pathway, an area of about ten (10) miles in radius, emergency planning zone plans must include "A range of protective actions . . . for the plume exposure pathway EPZ for emergency workers

¹² See 10 CFR 50.34(b)(6)(v).

¹³ 10 CFR 50.47(b) n.1.

¹⁴ "Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations and the public has been established; and means to provide early communication and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established." 10 CFR 50.47(b)(5).

"Provisions exist for prompt communications among principal response organizations to emergency personnel and to the public." 10 CFR 50.47(b)(6). Also see NUREG-0654 II.E. pp. 43-48.

and the public.¹⁵ And they also require the license applicant to provide an analysis of the time required to evacuate and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations. However, maximum time allowances for evacuation are not required.¹⁶

55. The Applicant has provided an evacuation time estimate study for the plume exposure pathway EPZ prepared by HMM Associates. (McCandless Testimony, ff. Tr. 2250.)

56. The evacuation time estimate study calculated the time required to evacuate from the plume exposure pathway EPZ, all permanent residents, transient population and special facilities containing school students, hospital patients and nursing home residents, as well as inhabitants of non-automobile-owning households. (Ibid. p. 6).

57. HMM Associates used a computer evacuation simulation model to develop time estimates that has been validated by field data and a Federal Highway Administration model. The model has been used previously to estimate evacuation times for eight (8) nuclear power plant sites. (Ibid. p. 4.)

58. The highway network in the time estimate study for evacuation was taken from State and County emergency plans and validated for use by field inspections. (McCandless, Tr. pp. 2277-78; Belser *et al.*, ff. Tr. 2586 at pp. 3-4, 27.) Major evacuation routes were selected by PEMA in conjunction with the Commonwealth's Department of Transportation. (Belser, Tr. pp. 2638-39.)

59. Field inspections of intersections and links in the highway network and traffic controls were undertaken for information in the time estimate study. (McCandless Tr. pp. 2252-53 and 2278-80.) Only outbound links of the highway network were used, so that evacuation traffic could bypass accident obstacles without excessive delay. (Ibid. p. 2264.)

60. The evacuation time analysis considered several different time periods, different populations, and adverse weather conditions (snow or rainfall, flooding of Susquehanna River, icing and winter storm) in meeting the recommendations of NUREG-0654. (McCandless ff. Tr. 2250 at pp. 8-11; also see NUREG-0654, App. 4.)

61. The assumptions used for evacuation mobilization and preparation times of different population groups were based on discussions with County officials. (McCandless ff. Tr. 2250 at p. 7.)

62. The Applicants' time evacuation study calculated the entire plume exposure pathway EPZ could be evacuated with six hours or less during

¹⁵ 10 CFR 50.47(b)(10).

¹⁶ 10 CFR Part 50, App. E, IV. See also NUREG-0654, p. 61 and App. 4.

weekdays, five hours or less during weekends or night periods and in less than nine hours under the adverse weather conditions reviewed. The time estimates are comparable to those at other nuclear power plants studied by HMM. (Ibid. pp. 8-12.)

63. The Commonwealth of Pennsylvania and HMM agree that if buses are required to make two trips to accommodate evacuation of the non-auto-owning population, another hour and 40 minutes should be added to the weekday time period. (McCandless Tr. p. 2260; Belser *et al.*, ff. Tr. 2586 at p. 27.)

64. In the event of a nuclear emergency, it is planned that all students in school will be evacuated and will not be sent home. (Carroll, Tr. p. 2333.)

65. Both the Commonwealth of Pennsylvania and local plans contemplate the use of school buses for evacuation of students where required. (Commonwealth Ex. 8, p. 15 and Ex. 9, Annex N, p. N-1.)

66. The evacuation of students by buses is assumed to start ninety minutes after an evacuation signal is communicated. (McCandless, ff. Tr. 2250 at p. 7.)

67. Although there is no specific requirement to have written school evacuation plans in meeting the recommendations of NUREG-0654, there is general agreement among the parties that written school emergency plans should be prepared prior to the facility's operation. (Carroll, Tr. p. 2317; Belser, Tr. pp. 2607-2608; Swiren, Tr. pp. 2675-76.) It should also be noted that the Luzerne County Plan refers to "the development of protective action plans" being a responsibility of school officials. (See Commonwealth Ex. 9, App. N.)

68. There are no written evacuation plans by schools within the plume exposure pathway EPZ at the present time. (Carroll, Tr. p. 2317; Henderson ff. Tr. 2546 at p. 28.)

69. NUREG-0654 recommends written agreements among Federal, State, and local agencies and other support organizations having emergency response roles within the Emergency Planning Zone. (Staff Ex. 7, p. 32.)

70. The functions of the Office of Radiological Health named in the contention have been transferred to the Bureau of Radiation Protection, a part of the Commonwealth's Department of Environmental Resources. (Tr. 2348.)

71. The Bureau of Radiation Protection (BRP) has the responsibility of assessing an emergency at a nuclear facility and advising the lead State Agency the Pennsylvania Emergency Management Agency (PEMA) on protective actions that should be taken. It also serves as a primary source for providing technical guidance to limit radiological exposures of emer-

gency workers, and for providing assistance to State agencies and local governments on radiation exposure, detection, decontamination, and protective actions. (Commonwealth Ex. 8, p. 15; Reilly ff. Tr. 2434 at pp. 2-3.)

72. Since the Three Mile Island incident in March 1979, the funding level for BRP has increased from \$600,000 to \$990,000. (Henderson, ff. Tr. 2340 at p. 2; Reilly, Tr. p. 2485.)

73. Personnel and equipment available to BRP in the event of a nuclear emergency is adequate for the implementation of its responsibilities. (Reilly Testimony, Tr. p. 2496; ff. Tr. 2434 at p. 3; Swiren ff. Tr. 2519 at pp. 3-4.)

74. The BRP is capable of responding to an emergency on a twenty-four hour basis. (Reilly, ff. Tr. 2434 at p. 3.)

75. In recommending immediate protective actions, the BRP would rely on the Applicants' off-site and on-site data. (Reilly, ff. Tr. 2434 at p. 2; Testimony, Tr. p. 2452.)

76. During an emergency, the BRP will establish direct communications with the Applicants' facility and PEMA on dedicated phone lines. (Reilly Testimony, Tr. p. 2455, Henderson, ff. Tr. 2340 at p. 2.)

77. The BRP has the capability of establishing six monitoring teams at the Susquehanna facility within three hours of notification. (Reilly, ff. Tr. 2434 at p. 2; Tr. 2454. Also see Swiren, ff. Tr. 2519 at p. 3.)

78. Off-site monitoring stations, which are used to confirm radiological data, include seventeen BRP locations, thirty-five NRC and sixty locations by the Applicants. These are not used to decide immediate protective actions. (Commonwealth Ex. 2; Reilly Testimony, Tr. pp. 2450-2451.)

79. Radiological response training is required by NRC regulations and criteria for those who may be called to assist in emergencies.¹⁷

80. The responsibility for on-site training is exercised by the Applicants and for off-site by the State. (Belser *et al.*, ff. Tr. 2586 at p. 4; Cantone, ff. Tr. 2383 at p. 2.)

81. The Applicants provide training for police, fire, and ambulance personnel who may come on site during an emergency. Further training is available for hospital personnel and State and local officials who have an emergency management role. Training covers emergency planning overview, calculations and projection, protective actions, basic radiation theory, plant layout, contaminated injury and access control. (Ibid. pp. 2-5.)

82. Parts of the training program have been initiated and it is intended to have it completed before the end of 1981 and certainly prior to operation of the facility. Annual retraining is contemplated. (Cantone Testimony, Tr. pp. 2395-96.)

¹⁷ 10 CFR 50.47(b)(15); NUREG-0654, pp. 75-77.

83. Members of off-site responding agencies will receive dosimeters to record radiation exposure and protection equipment, including clothing, where required. Supplies of potassium iodide will be available to mitigate the consequences of radioactive iodine. (Cantone, ff. Tr. 2386 at p. 6.)

84. Fire, contaminated injury and full-scale emergency plan drills will test the training program periodically. (Ibid. p. 5.)

85. The Applicants' quality assurance organization will audit the emergency plan to assure that the response training program is implemented. (Cantone Testimony, Tr. p. 2417.)

86. The State's Disaster Operations Plan establishes responsibilities for development and implementation of training programs. (Commonwealth Ex. 8, Annex E, App. 10 and Section VII.)

87. Appendix 10 of the State's plan indicates the availability of training programs sponsored by Federal and State agencies. (Ibid. Annex E.)

88. The draft emergency plan of Luzerne County, one of the two counties in the plume exposure pathway EPZ, enumerates the number of persons that will participate in the State's training program. (Henderson, ff. Tr. 2358, at p. 3.)

89. Some funding for training programs is provided to the State by the Federal Emergency Management Agency (FEMA) and the State attempts to schedule its training courses in areas close to the region of the attendees. (Henderson Testimony, Tr. pp. 2364, 2366.)

90. The criteria of NUREG-0654 recommends that for radiation exposure control both self-reading and permanent record type dosimeters should be distributed to emergency workers. (Staff Ex. 7., K.3.A, p. 67.)

91. Although there is no requirement in NRC regulations, both State and local government plans call for three dosimeters to be distributed to emergency workers. (Belser *et al.*, ff. Tr. 2586 at p. 19; Swiren Testimony, Tr. pp. 2698-99.)

92. The State has identified a shortage of dosimeters statewide. (Belser Testimony, Tr. p. 2607; Swiren Testimony, Tr. p. 2679.)

93. In order to obtain the necessary number of dosimeters, the State will either have to purchase them or the Applicants will, or they will have to be obtained on a loan basis. Another alternative is to allocate the existing limited State supply to provide an approximate amount of coverage. (Swiren Testimony, Tr., pp. 2672-73.)

94. An adequate supply of dosimeters should be distributed prior to the existence of an emergency. (Ibid. pp. 2676-77.)

4. Unresolved Generic Safety Issue (Contention 7)

95. The contention was sponsored by the Environmental Coalition on Nuclear Power (ECNP) and states that:

7. The Nuclear Steam Supply Systems of Susquehanna 1 and 2 contain numerous generic design deficiencies, some of which may never be resolvable, and which, when reviewed together, render a picture of an unsafe nuclear installation, which may never be safe enough to operate. Specifically, (b) the cracking of stainless steel piping in BWR coolant water environments due to stress corrosion has yet to be prevented or avoided.

96. Only the Applicants and the NRC Staff presented direct cases on the contention.¹⁸

97. Intergranular stress corrosion cracking (IGSCC) generally occurs in areas immediately adjacent to welds attaching the piping to elbows or fittings. The location of the cracks indicates that the phenomenon is produced by the welding process. (Lemaire, ff. Tr. 1916, at para. 13.)

98. The incidence of IGSCC at BWRs has been low as only 267 out of approximately 34,000 weld heat-affected zones have experienced it in 400 reactor-years of experience. (Ibid., para. 11.) As a result of analytical, field and laboratory efforts by industry and the NRC Staff, the causes of, and solutions to, the IGSCC problem are well understood. (Ibid. paras. 7, 8; Litton, ff. Tr. 1927, at p. 2.)

99. In order for IGSCC to occur in a pure, high temperature water environment such as is used in Susquehanna, three concurrent conditions must be present: a susceptible material, a tensile stress in excess of the local yield stress, and the presence of a corrosive atmosphere or medium such as dissolved oxygen in the coolant. (Lemaire, ff. Tr. 1916, at paras. 14-21, 26-28; Litton, ff. Tr. 1927 at pp. 2-3; Litton Testimony, Tr. p. 1930.)

100. Based on an understanding of the causes of IGSCC, General Electric developed a program to identify and qualify remedies for the cracking. (Lemaire, ff. Tr. 1916, at para. 29.) Several methods qualified by General Electric's program for preventing or mitigating IGSCC, have been used at various locations at Susquehanna. (Ibid. paras. 32-42.)

101. In NUREG-0313, Rev. 1 (NRC Staff Ex. 6), the NRC Staff set forth the methods which it considers acceptable for reducing the suscepti-

¹⁸ The Applicants' witnesses were: Joseph C. Lemaire, a materials expert with the General Electric Co., and Walter J. Rhoades, a Supervisor of the Mechanical-Nuclear Group with Pennsylvania Power and Light Company. Their testimony analyzed the problem and procedures for remedying it at Susquehanna. The Staff Witness, Felix B. Litton, a Senior Materials Engineer with the NRC testified on Staff guidance to resolve the problem and actions taken thereto by the Applicants. No direct testimony was put on by any intervenor.

bility of BWRs to IGSCC. (Litton, ff. Tr. 1927, p. 3.) Applicants have followed the guidance of NUREG-0313 and undertaken an extensive program to reduce the potential for IGSCC. (Ibid, p. 3; Rhoades, ff. Tr. 1939, at para. 4; Bd. Ex. 3, p. 1.)

102. One method of avoiding IGSCC is solution heat treatment of piping after fabrication. This procedure eliminates sensitization and residual stress and makes the material immune to IGSCC. (Lemaire, ff. Tr. 1916, at para. 33.) At Susquehanna, the recirculation system riser piping shop welds have received solution heat treatment. (Rhoades, ff. Tr. 1939, at para. 7; Bd. Ex. 3, p. 2.)

103. Corrosion resistant cladding consisting of austenitic stainless steel weld metal containing more than 8% ferrite in the final fabricated condition is effective in preventing IGSCC. (Lemaire, ff. Tr. 1916, at para. 34.) At Susquehanna, low carbon, corrosion resistant cladding has been applied to field-welded portions of the recirculation system riser piping. (Rhoades, ff. Tr. 1939, at para. 8; Bd. Ex. 3, p. 2.)

104. Weld metal with a ferrite level of 5% or more is not susceptible to IGSCC initiation. (Lemaire, ff. Tr. 1916, at para. 39.) At Susquehanna, all weld metal and all Type 304 and Type 316 castings in the reactor pressure boundary have at least 5% ferrite content. (Rhoades, ff. Tr. 1939, at para. 9; Bd. Ex. 3, p. 3.)

105. A technique known as induction heating stress improvement ("IHSI") can be used to reduce greatly the residual tensile stress produced in the region adjacent to the weld by the welding process and increase resistance to IGSCC. (Lemaire, ff. Tr. 1916, at para. 38.) At Susquehanna, welds in the piping constituting the reactor coolant boundary not replaced by IGSCC resistant material will receive IHSI and/or augmented in-service inspection. (Rhoades, ff. Tr. 1939 at para. 11; Bd. Ex. 3, p. 4; Litton, ff. Tr. 1927 at p. 4.)

106. Use of low carbon stainless steel materials, such as limited carbon Type 304 stainless steel with less than or equal to 0.030% maximum carbon and Type 304L stainless steel (0.035% maximum carbon), will reduce the possibility of IGSCC. (Lemaire, ff. Tr. 1916, at paras. 40-42.) There is successful operating experience with these low carbon stainless steel materials. Low carbon stainless steel has been used in selected applications, and there are hundreds of welds in place made out of low carbon stainless steel without ever experiencing a cracking incident. (Lemaire Testimony, Tr. pp. 1923-24.) At Susquehanna, materials susceptible to IGSCC have been replaced, where practicable, with materials that are substantially less subject to IGSCC. Among others, the recirculation system discharge valve bypass lines, all piping in the head spray system, almost all piping in the instrument piping and bottom drain line, have been

replaced with Type 304L stainless steel or with limited carbon Type 304 stainless steel having a maximum carbon content of 0.03%. (Rhoades, ff. Tr. 1939, at para. 10; Litton, ff. Tr. 1927, at pp. 3-4; Bd. Ex. 3, p. 1.) Also, the control rod drive hydraulic return line, which was Type 304 stainless steel, was removed and the design modified. (Rhoades, ff. Tr. 1939, at para. 12; Bd. Ex. 3, p. 2.)

107. Another way to protect against IGSCC is to reduce the stress to which the piping is subjected. All pipe components at Susquehanna are designed in accordance with ASME Code requirements that stresses be kept below specified values. (Lemaire, ff. Tr. 1916, at para. 43.)

108. The margin against IGSCC can be increased by reducing the oxygen content of the coolant water during startup and shutdown conditions. (Ibid. para. 26.) At Susquehanna, the control rod drive pump intake has been relocated to allow use of CRD water with the lowest oxygen concentration available. (Bd. Ex. 3, p. 2.) During all other phases of operation/shutdown, oxygen levels are reduced at Susquehanna by use of a mechanical vacuum deaerator which is expected to maintain the oxygen content in reactor coolant water below 0.25 ppm. (Rhoades, ff. Tr. 1939, at para. 5; Bd. Ex. 3, p. 2.)

109. Finally, the material subject to IGSCC, austenitic stainless steel, is highly ductile and thus not susceptible to sudden fracture. Therefore, any cracks that develop as a result of IGSCC will most likely be detected prior to leaking or while the leakage rate is small. (Lemaire, ff. Tr. 1916, at para. 9.) This principle has been verified in the laboratory through detailed analysis and metallographic examination of crack samples. (Ibid. para. 10.) It has also been demonstrated in operating experience, for no pipe has ever suffered a severance at a BWR due to IGSCC. (Ibid. para. 9.)

110. A continuous on-line leak detection system has been implemented at Susquehanna. The system, which conforms with the requirements of NUREG-0313, consists of temperature, pressure and flow sensors with associated instrumentation and alarms. The system detects and annunciates leakages in the following systems: main steam lines, reactor water cleanup system, residual heat removal system, reactor core isolation cooling system, feedwater system, and high pressure coolant injection system. (Susquehanna Steam Electric Station Final Safety Analysis Report ("FSAR"), p. 5.2-40, ff. Tr. 1943; Rhoades, ff. Tr. 1939 at para. 13; Bd. Ex. 3, p. 4.)

111. The leak detection system at Susquehanna is capable of monitoring flow rates with an accuracy of 1 gallon per minute ("gpm"). Small leaks (5 gpm and less) in the reactor coolant piping are detected by temperature and pressure changes and drain pump activities. (FSAR

§5.2.5.1, pp. 5.2-40 to 5.2-42, ff. Tr. p. 1944.) Once unidentified leakage in an area increases by more than 1 gpm during a given hour, or if there is unidentified leakage of 5 gpm in a 24-hour period, the plant must be shut down to perform inspections and identify the leakage. (Rhoades Testimony, Tr. pp. 1940-41.)

112. In-service inspections are to be performed on reactor coolant pressure boundary welds at Susquehanna in accordance with the ASME Code and NUREG-0313. In some areas, the inspection frequency has been increased from what the Code requires in order to compensate for the inability to replace the sensitized stainless steel. (Ibid. at pp. 1941-42; Litton, ff. Tr. 1927 at p. 4.) This augmented in-service inspection program will provide a high likelihood of detecting cracks before leakage occurs. (Litton, ff. Tr. 1927 at p. 4; Litton Testimony, Tr. 1931.) The leak detection system at Susquehanna will further assure that any IGSCC that might occur will be detected and corrected before pipe rupture can take place. (Lemaire, ff. Tr. 1916, at para. 45.)

5. Decommissioning* (Contention 9)

113. This contention as approved and litigated states:

9. The Applicants have underestimated both the health costs and the monetary costs of decommissioning the Susquehanna facility. The monetary costs estimates are derived from an industry-sponsored study which is obviously biased, with cost estimates far below what the actual cost of decommissioning will be. Such cost will at least be equal to the cost of construction. Further, the statement by the Applicants that it is "generally agreed" that the decommissioning of a large nuclear power facility poses no new occupational or environmental hazards is erroneous. There are serious radiation hazards, particularly for workers. As a result:

- (a) These costs, when added to other monetary and health costs of the facility and the nuclear fuel cycle, tilt the cost-benefit balance against authorizing operation of the facility;
- (b) The Applicants are not financially qualified to assume the monetary costs of decommissioning.

114. Only the Applicants and the NRC Staff presented direct cases on this contention.¹⁹

* Effective March 30, 1982, the Commission has eliminated issues concerning financial qualifications including decommissioning costs from operating license proceedings. Accordingly, no further consideration can be provided to Contention 9(b) herein.

¹⁹ The Applicants' witnesses were: A.A. Weinstein, Mgr. of Engineering of S. M. Stoller Corp. who testified on methods and costs of decommissioning; and G. F. Vanderslice, V.P.

(CONTINUED)

115. At the end of the Susquehanna units' operating life, termination of their operating licenses will be requested by Applicants. Applicants will be required at such time to submit a plan to the Commission for decommissioning the units, i.e., decontaminating the facilities so that the level of any residual radioactivity remaining at the site is low enough to allow unrestricted use of the site. (FES, p. 8-26; Weinstein, ff. Tr. 1259, at p. 1; Weinstein Testimony, Tr. pp. 1265-66; Feldman Testimony, Tr. pp. 1347-48.)

116. Reactors decommissioned to date have used one of three decommissioning modes: (1) immediate dismantlement; (2) safe storage followed by deferred dismantlement; and (3) entombment. Immediate dismantlement is the most expensive mode of decommissioning large nuclear facilities. (Weinstein, ff. Tr. 1259, at p. 1; Feldman Testimony, Tr. 1347-48; FES, pp. 8-26 to 8-28.)

117. Considerable experience exists in decommissioning nuclear reactors. It is expected that even more experience will have accumulated in the next 30 to 40 years before the Susquehanna units are due for decommissioning. Decommissioning is a straightforward engineering operation which can be accomplished with a minimum of difficulty, and whose costs can be estimated with a fair degree of accuracy. (Weinstein, ff. Tr. 1259 at pp. 1-2 and Testimony, Tr. 1327-28.)

118. Under contract to the Commission, the Pacific Northwest Laboratory ("PNL") of Battelle Memorial Institute recently completed a comprehensive study of the methods and costs of decommissioning a reference BWR. PNL developed detailed work plans based on the reference plant design and expected levels of activation and contamination based on typical BWR experience. (Weinstein, ff. Tr. 1259, at p. 2; Feldman Testimony, Tr. p. 1363.) PNL developed cost estimates for each cost element as well as an overall estimate of the cost of decommissioning the facility for each of the three modes of decommissioning. (Weinstein, ff. Tr. 1259, at p. 2. Also see Tables 3, 5, 6, and 7, pp. 7, 31, 32, 35.)

119. The PNL study was based on the decommissioning of a plant similar in design and power output to the Susquehanna units. PNL's estimates of the costs of decommissioning represent a reasonable approximation of the anticipated cost of decommissioning the Susquehanna facility. (Weinstein, ff. Tr. 1259 at p. 5 and Testimony, Tr. pp. 1263, 1272, 1294, and 1320.)

and Comptroller of Pennsylvania Power and Light Co., who testified on the Applicants' financial plan for decommissioning. The staff's witnesses were: Dr. Carl Feldman who testified on radiation hazards; Dr. Raghav Prasad on costs of decommissioning compared to construction costs; and M. L. Karlowicz on the financial qualifications of the Applicants to handle decommissioning costs.

120. Applicants estimated the costs for immediate dismantlement of Susquehanna based on the PNL Study, adjusted to reflect design differences. This estimate came to \$89 million (1980 dollars) for one unit and \$176 million for both units done concurrently. The estimate was then adjusted by adding a 100% contingency to disposal charges, to account for the regulatory uncertainties in this area. With this added contingency, the cost of decommissioning both Susquehanna units by immediate dismantlement was given as \$191 million (1980 dollars). (Weinstein, ff. Tr. 1259, at pp. 5 and 28.)

121. The NRC Staff also estimated, on the basis of the PNL Study, the cost of immediate dismantlement of the Susquehanna units. The NRC Staff computed a total of \$157 million (1980 dollars) for both units. (FES, pp. 8-26; Prasad, ff. Tr. 1525, p. 3.) The NRC Staff has adopted Applicants' estimate of \$191 million as the more conservative. (Karlowski, ff. Tr. 1401, at pp. 2-3; SER, p. 20-4.)

122. Another estimate of the costs of decommissioning the Susquehanna units was prepared by extrapolating costs experienced in previous decommissionings, particularly the Elk River reactor. Applicants developed various scaling factors for the Elk River costs to take into account the differences between Elk River and Susquehanna. Applying the Elk River decommissioning costs and appropriate scaling methodology to the Susquehanna configuration, Applicants obtained estimated costs (in 1980 dollars) of \$108 million for the decommissioning of a single Susquehanna unit, and \$215 million for both units done concurrently. (Weinstein, ff. Tr. 1259, at pp. 2, 5 and 23, Table 4.)

123. The Elk River-based estimate was then adjusted to account for potential overestimation of the scaling factors. With those adjustments, the cost in 1980 dollars of decommissioning both Susquehanna units by immediate dismantlement on the basis of Elk River costs would be \$184 million, which is within 4% of the \$191 million PNL-based estimate. (Weinstein, ff. Tr. 1259, at pp. 28-29.)

124. Cost estimates for the other two methods of decommissioning were also developed by Applicants based on PNL's study. The total cost of accomplishing a deferred dismantlement of both Susquehanna units, taking into account the time value of the deferred expenditures, would be \$109 million (1980 dollars). (Ibid. pp. 29-33.) Similarly, the estimated cost of entombment of the Susquehanna units (assuming the reactor internals are left in place and surveillance continues for 100 years), considering the deferred expenditures for annual surveillance, would be \$131 million. (Ibid. pp. 33-36.)

125. Both occupational radiation exposures and exposures to the general public result from decommissioning. PNL's study of the decommissioning

of a large (1200 MWe) BWR estimated the occupational radiation doses that will be received by the workers engaged in decommissioning work, and by the general public, for the three decommissioning alternatives. (Feldman, Tr. ff. 1344, at pp. 2-3.) PNL's estimates of the total exposure for decommissioning activities were obtained by examining each decommissioning task, evaluating the radiation field associated with the task and the man-hours required to accomplish it, and determining the resulting doses. (Weinstein Testimony, Tr. p. 1262; Feldman Testimony, Tr. pp. 1351-55; Feldman, ff. Tr. 1344, at p. 4.)

126. Based on PNL's estimates, occupational worker exposures as analyzed by Staff and Applicants, respectively, for immediate dismantlement of both Susquehanna units would be 1,845 to 3,690 man-rem over a three to four year period. (Feldman, ff. Tr. 1344, at p. 3; Weinstein, ff. Tr. 1259, at pp. 36, 40-41.) For safe storage followed by deferred dismantlement, the dose for both units would be 385 to 770 man-rem over the two to three years of preparation for safe storage and 6 man-rem when dismantlement was accomplished. (Ibid. pp. 36, 40-41; Feldman, ff. Tr. 1344, at p. 3.) Finally, for the entombment case, 1,573 to 3,146 man-rem would be received by workers during the three to four years needed to entomb the units. (Weinstein, ff. Tr. 1259, at pp. 36, 40-41; Feldman, ff. Tr. 1344, at p. 3.)

127. The annual radiation doses that will be received by workers during the decommissioning of Susquehanna would be on the order of, or less than, those received under normal operation of the plant and within allowable Commission limits for worker exposure. This is true even if higher than anticipated levels of contamination exist in the facility at the time of decommissioning if proper decontamination procedures are utilized. (Weinstein Testimony, Tr. p. 1261; Feldman Testimony, Tr. 1359-60, Feldman, ff. Tr. 1344, at pp. 3-5.)

128. Sources of exposure to the general public during decommissioning arise from gaseous and liquid effluent releases, direct radiation from the plant, and direct radiation due to transportation of spent fuel and radioactive waste to reprocessing or burial facilities. For the maximum exposed individual, estimated 50-year radiation dose equivalents to the lung per unit are: 0.041 mrem for immediate dismantlement; 0.0031 mrem for safe storage; and less than 0.038 mrem for entombment. Population doses for a population of 3.5 million within a 50-mile radius of the site are 0.05 man-rem, 3×10^{-4} man-rem, and 0.04 man-rem, respectively, for immediate dismantlement, safe storage and entombment. (Weinstein, ff. Tr. 1259, at pp. 40-41.) Therefore, decommissioning large reactors, such as the Susquehanna units, should pose no serious radiation hazards to either radiation workers or the general public. (Feldman, ff. Tr. 1344, at pp. 2, 5; FES, p. 8-26.)

6. Storage Of Low-Level Radioactive Waste (Contention 11)

129. As the result of the Board's granting of a motion for summary disposition of that part of the original contention which related to on-site storage of spent fuel, only that section of the contention relating to on-site storage of low-level radioactive wastes was litigated in the evidentiary hearing. As modified, the contention states that:

11. The proposed project creates an unreasonable risk of harm to the health and safety of petitioners and their private property, and violates the Commission's standards for protection against radiation in 10 CFR §§20.1 and 20.105(a), in that the applicants have failed to provide adequately for safe on-site storage, for periods of up to 10 to 15 years, of low-level radioactive wastes.

130. Intervenor Marsh was the sole sponsor of this contention as it was admitted to the proceeding. She did not appear at the evidentiary hearing.²⁰

131. NRC regulations do not require a specific amount of space or capacity or the ability to store low-level radioactive waste (LLRW) for any specific period of time. NRC guidance to Applicants suggests that space to accommodate at least 30 days of waste at normal generation rates be provided and that the storage be indoors. Traditionally, the amount of space provided has been that which will enable a licensee to accumulate a full shipment for off-site disposal. (Staff Ex. 1 pp. 11-14, 11-15; Loysen, ff. Tr. 1655 at p. 2.) The Board considers therefore only whether Applicants' proposed LLRW storage mode presents an unreasonable risk of harm to the health and safety of the public.

132. Applicants intend to ship all low-level radioactive wastes generated at the Susquehanna facility to a commercial LLRW disposal site and have a contractual agreement with Hittman Nuclear and Development Corporation for transportation and disposal services. Because Applicants have no guarantee that off-site disposal capacity will be available when it is needed they have decided to construct an on-site interim LLRW Holding Facility. It is intended to be used only if off-site disposal becomes unavailable. (Keiser, ff. Tr. 1572 at pp. 1-2).

133. The storage capacity of the on-site LLRW Holding Facility will accommodate the LLRW generated during four years of operation of both

²⁰ The Applicants' witnesses were Messrs. Harold W. Keiser, PP&L's Superintendent of Plant for the Susquehanna facility and Richard J. Tosetti, Chief Nuclear Engineer for Nuclear Fuel Operations, Bechtel National, Inc. The Staff's witnesses were R. L. Bangart, Leader of the Systems Analysis Section in the Effluent Treatment Systems Branch, Office of Nuclear Reactor Regulation of the NRC and Peter Loysen, a Senior Chemical Engineer in the Advanced Fuel and Spent Fuel Licensing Branch, Division of Fuel Cycle and Material Safety of the NRC.

units. The building stands separate from the reactor facility and the LLRW is to be stored in solidified form. The Low-Level Radioactive Waste Policy Act as enacted by the U.S. Congress in 1980 and current actions of the Governor of Pennsylvania in response to that Act, leads to the conclusion that action is being taken to increase the off-site disposal capacity available. (Keiser testimony, Tr. pp. 1580, 1583, 1589-1590, 1594.)

134. The LLRWHF is a separate building located within the security fence approximately 1000 feet from the Turbine Building at a grade elevation which is 152 feet above the probable maximum flood that may be experienced at the Susquehanna site. It consists of a reinforced concrete storage vault within a steel-framed, metal-side structure. The LLRWHF meets the seismic requirements of the Uniform Building Code, and its vault is capable of withstanding tornado-force winds, although not necessarily tornado induced missiles. (Tosetti, ff. Tr. 1598 at pp. 1-2; Tosetti Testimony, Tr. p. 1612.)

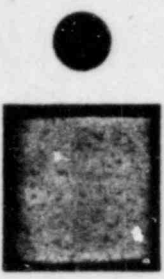
135. LLRW stored in the LLRWHF will be solidified process wastes and contaminated trash. Process wastes are solidified by incorporating material into a cement matrix, and dewatered; they are contained within steel liners approximately $\frac{1}{8}$ inches thick. The anticipated corrosion rate of the liners (0.001 to 0.003 inches per year) is a small fraction of the liner thickness, hence the storage of waste will not affect the integrity of the liners. The liners will be designed to 10 CFR Part 71 requirements and will not support combustion. (Tosetti, ff. Tr. 1598 at p. 4.)

136. The other kind of LLRW generated at Susquehanna consists of dry solids (trash) contaminated with radioactive materials. The solids will be packaged in 55-gallon steel drums and large (100 cubic feet) steel boxes. This waste is very low in radioactivity. (Ibid. p. 5; Bangart, ff. Tr. 1648 at p. 3.)

137. Each form of waste will be stored separately at the LLRWHF, with solidified process wastes being stored within the concrete vault. All waste material stored in the LLRWHF will be packaged in a form suitable for off-site shipment and permanent disposal. (Tosetti, ff. Tr. 1598 at pp. 3-5.)

138. The LLRWHF has a design life of 40 years and can store waste safely for at least that period of time. (Tosetti Testimony, Tr. pp. 1599, 1611.) However, such prolonged storage of waste should not be necessary. New off-site disposal capacity should begin to be available in about five years. (Loysen, ff. Tr. 1655, at p. 3.)

139. If off-site disposal capability is not available while the LLRWHF is being filled up, Applicants will have several years in which to address the problem. During that period of time, there will be activity both at the



national level to establish additional sites and by Applicants to remedy the problem, including (if necessary) construction of another interim holding facility on-site. (Keiser Testimony, Tr. pp. 1592, 1594.)

140. The LLRWHF will be occupied only during loading and unloading periods. The facility is designed to minimize exposure to operating personnel; this is accomplished by providing appropriate shielding and suitable administrative controls, so as to keep worker radiation exposure within the limits of 10 CFR Part 20 and 40 CFR Part 190. (Tosetti, ff. Tr. 1598 at pp. 6-7.)

141. An estimate of the radiation exposure at the Susquehanna site boundary assuming maximum radiation levels in the waste, a facility completely filled with waste, and continuous presence by an individual at the site boundary, was only 1.1 mrem per year, well within 10 CFR Part 20 permissible exposure limits. (Ibid. p. 8.)

142. A study of potential accidents at the LLRWHF demonstrated that resulting radiation levels were a small fraction of 10 CFR Part 100 guidelines. (Ibid. p. 8; Tosetti Testimony, Tr. pp. 1606-1608.)

7. Health Effects of Electric Fields (Contention 17)

143. The Board in its order of March 6, 1979, admitted Contention 17, as follows:

17. The Applicants' plans for transmitting electricity generated by the Susquehanna facility utilize ultra-high voltage (UHV) transmission lines, which produce noise pollution, cause electrical shock from flashovers, create television and radio interference, create strong electrostatic and electromagnetic fields that adversely affect living organisms along the UHV transmission right-of-way and beyond, and generate dangerous levels of ozone that will cause more injury to vegetation than any other pollutant and can also have harmful effects on human health. For that reason, the Applicants should be barred from transmitting electricity from the facility, if and when it becomes operational, over UHV lines and should be required to use lines in the range of 138,000-230,000 volts maximum. Alternatively, the Applicants should be required to place the UHV lines underground, using compressed gas as an insulator.

144. Applicants filed a motion for summary disposition of the part of this contention that dealt with ozone emissions and a subsequent motion for summary disposition of the remaining portions. The Board granted those motions except for the health effects of electric (electrostatic) fields on living organisms in the vicinity of a 500 kV transmission line. Since

that item was left open, a decision on the transmission line modes was also postponed.

145. Applicants' witness²¹ based his assessment on a calculated maximum electric field of 11 kV/m at ground level at the point of minimum clearance on the right-of-way of the Susquehanna lines and 2.28 kV/m at the edge of the right-of-way. Living organisms respond to many stimuli, but their effects are not considered hazardous unless they impair the organism's ability to function properly or the recovery capability of the organism. There are no substantiated effects of exposure to electric fields of the magnitude and frequency in the Applicants' transmission lines which can be considered hazardous. (Michaelson, ff. Tr. 1046 at pp. 2-4.)

146. The electric fields produced by the Susquehanna lines cannot produce sufficient heating of tissues or molecular polarization or deformation to cause significant biological effects. (Ibid. pp. 4-5.) The currents produced within the body are on the order of 0.1 to 1 milli-amperes/square meter, well below the level of perception. (Ibid. p. 6.)

147. While some writers have postulated that behavioral and central nervous system modifications result from exposure to high voltage electric fields, these are not amenable to explanation using traditional theoretical analysis. If they exist, they are caused by some unknown biophysical mechanism. (Ibid. p. 7.)

148. A study by Johns Hopkins University scientists of 11 long-line maintenance workers for 42 months on a 345 kV system showed no change in physical, mental, or emotional characteristics. (Ibid. pp. 8-9.) An investigation by Strumza of exposed (25 m from 200-400 kV) and unexposed (more than 125 m) populations showed no significant difference in medical visits and druggists bills. (Ibid. p. 9.) No adverse health symptoms were observed in a study by Roberge of 56 switchyard workers (735 kV) for years. (Ibid. p. 9.) In an East German study, 110 linemen (110-380 kV) were compared to a control group of electrical maintenance men (at less than 5 kV/m) with no difference reported in state of health. (Ibid. pp. 9-10.)

149. Some Soviet studies indicate biological effects on switchyard workers exposed to high voltage electric fields, such as headaches, fatigue, digestive disruptions and cardiovascular changes. There are methodological faults in these studies and extraneous factors could be involved. The

²¹ Applicant's witness was S. M. Michaelson; a Professor of the University of Rochester Medical Center, who testified on the health impact of electric fields on humans and animals. The Staff's witness, Gerald E. Gears; a Senior Land-Use Analyst and NRC's member on the Interagency Advisory Committee on Electric Field Effects, gave testimony on electric field research efforts and results. CAND's witness James Amory, a farmer with some technical background in mathematics and engineering, testified in support of the contention.

Soviets have 150,000 kilometer-years of 500 kV transmission line operation, producing fields of 12-15 kV/m near ground level, without identifying any biological effects from the lines' electric fields. (Ibid. pp. 10-12.)

150. Soviet standards limit electric fields to 12 kV/m at points where lines cross roads and 15 kV/m elsewhere along unpopulated sections of the line routes. (Ibid. pp. 12-13.)

151. In three experimental studies involving human subjects exposed to conditions equivalent to high voltage lines with a ground strength of 12 kV/m or higher electric fields, no detrimental effects were observed. (Ibid. pp. 14-16.)

152. Results of ongoing animal research projects, with studies of mice, rats, monkeys, and swine, have so far been consistent with previous reports in finding no significant effects which would adversely influence the health of animals exposed to low-frequency fields up to 100 kV/m. (Ibid. pp. 16-25.)

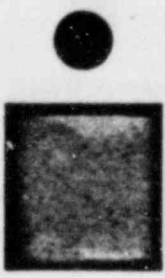
153. There is no reason to believe that people with neurological disorders would be more sensitive than others because there has been no decrement of performance in test animals at very high levels of exposure. (Michaelson testimony, Tr. p. 1117.)

154. Magnetic fields can be discounted as a cause of cancer. Electrostatic fields may provide nonhazardous stimuli to animals or people, but tests for hazardous conditions, such as cardiovascular and immunologic changes have been negative. It is conceded that negative results may not be as meaningful statistically as positive results. (Ibid. pp. 1138-1147, 1152.)

155. The testimony of CAND's witness was based on hearings before the New York State Public Service Commission (1976-1978). In the belief that there are potentially harmful human effects from electric fields if a 500 kV line is utilized, the witness proposed an expansion of the right-of-way so that maximum field strength at the edge would be limited to 0.1 kV/m, and a requirement that Applicants inform people living near the right-of-way of potential hazards with respect to biological effects. Proposing a limit on field strength based on a safety factor of 100, the witness cites several studies referred to in the New York PUC cases in support of his position. (Amory ff. Tr. 1206 at pp. 1-3 and testimony Tr. pp. 1211-12.)

156. During redirect examination, the Applicants' witness reviewed the studies mentioned by CAND and pointed out their lack of statistical significance, poor experimental design, lack of reproducibility, inapplicability or lack of hazard significance. (Michaelson testimony, Tr. pp. 1227-37.)

157. The FES contains the Staff's conclusion that there is no evidence to date that the operation of 500 kV power lines will have any significant



biological effects on humans. The Applicant will install a phasing arrangement and increase structure height at highway crossings, if necessary, to limit the electrostatic field strength at ground level to 7.5 kV/m. A worst case gradient will be no greater than 7.83 kV/m and at the edge of the right-of-way, 2.4 kV/m or less. Adverse health effects on switchyard workers have been reported, but not for transmission line workers exposed to gradients well above 7.5 kV/m. There is no evidence to date indicating hazardous effects to plants or animals from present levels of fields generated from existing transmission line technology. (Staff Ex. No. 4, p. 4-9 and App. C, p. C-7.)

158. The values for electric field strength gradients of 11 kV/m on the right-of-way and 2.28 kv/m at the edges are acceptable since the fields are not strong enough to cause excessive tissue heating. A small number of studies have observed physiological and/or behavioral effects that may indicate possible adverse health effects in people. These studies have been challenged, however, because of poor experimental design and inadequate treatment of results. (Gears, ff. Tr. 1379 at pp. 4-5.)

159. The Interagency Advisory Committee on Electric Field Effects is guiding ongoing research funded by the Department of Energy on transmission line effects. This research has produced statistically significant results in areas of neonatal development, endocrinology, hematology, neurophysiology, neurochemistry, urine volume and chemistry, sympathetic nervous system, and behavior in tests on mice and rats where exposed for 120 days at scaled field strengths of 4-20 kV/m. While some data indicate statistically significant results in animals, the effects are so subtle and small in magnitude that further research is needed to determine if these effects are biologically significant and will adversely affect the test organisms. The general population would receive a long-term exposure of less than 2 kV/m, which is below the 4-20 kV/m reported above to cause statistically significant effects in rats and mice. (Ibid. pp. 5-7.)

160. The Applicants' 500 kV lines would be permitted by the Russian general population guidelines. (Ibid. p. 8.)

161. No evidence exists to date that the operation of 500 kV power lines will have an adverse biological health effect on humans. If ongoing research concludes protective measures are warranted, a variety of actions are available including increasing right-of-way widths, limiting field strengths at the edge and using shield wires or retrofitting techniques. (Ibid p. 9.)

162. Results of research on electric fields' effects on growth and development of plants and animals indicate that neither adverse injuries nor abnormalities were apparent from a 50 kV/m field; however, some barely perceptible physical damage was observed in some plants at 25 kV/m and

above. No changes in the Applicants' transmission line design are warranted. (Ibid. pp. 9-10.)

163. The 11 kV/m estimated by Applicants is in the realm of a maximum limit for a 500-525 kV line. (Gears Testimony, Tr. pp. 1381-82.)

164. There is insufficient evidence to believe transmission lines would have an adverse health effect on people. The Staff cannot prove conclusively there are no effects from electric fields, but do show that there is a preponderance of evidence to date showing that there have been no effects. (Gears Testimony, Tr. pp. 1386-89 and 1395-96.)

8. State and County Emergency Planning (Contention 20)

165. This contention challenges a number of the provisions of the emergency plans of the Commonwealth of Pennsylvania and Luzerne County. It alleges the provisions do not meet the recommendations and guidance of NUREG-0654 or some acceptable alternative.²²

166. No operating license for a nuclear power reactor will be issued unless a finding is made by NRC that the state of off-site emergency plans provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The finding and determination that State and local emergency off-site plans are adequate and capable of being implemented is the responsibility of FEMA and these findings and determinations are reviewed by the NRC. Off-site emergency plans must meet NRC standards and criteria. (See 10 CFR 50.47(a)(1) and (2) and n. 1, and NUREG-0654 FEMA-REP-1, Rev. 1., Staff Ex. No. 7.)

167. Contention 20(1)(a):²³ The concept of operations in the emergency plan of Luzerne County (County) is set forth in detail and includes

²² **Contention 20:** "The emergency evacuation plans submitted by Luzerne County and the Commonwealth of Pennsylvania do not comply with the planning standards of 10 CFR Part 50.47(b) in that the recommendations and guidance of NUREG-0654 have not been satisfied as specified in Attachment A, nor has compliance been demonstrated through some other acceptable alternative means."

²³ 20(1)(a): NUREG-0654 REV. 1 (section A. 1, b.) recommends that each organization and suborganization having an operational role shall specify its concept of operations, and its relationship to the total effort. Luzerne County Civil Defense's local plan gives merely an outline of concept, leaving blank important information (page 6 of the Luzerne County plan) about telephone and dispatcher communications. Moreover, the Luzerne County plan (page 5; section 5) states that the "county conducts program of public education, training and exercise of emergency forces and posts route signs and evacuation." But the plan fails to mention when, where, and how the public education and exercises will take place. Nor does the plan mention where signs will be posted. The plan further states that the "radiological thyroid blocking chemicals are stocked." The plan fails to mention where and how the public will be informed of thyroid blocking chemicals or where they will be stored.

information on its communication capability. The plan includes specific information on public education and training programs and exercises, but not route signs, which are not specifically recommended by NUREG-0654. Provisions concerning thyroid blocking chemicals are included in the plan. (Commonwealth Ex. 9 and Annexes B, D, M, R, and S; Henderson, ff. Tr. 2546 at pp. 1-3; Belser *et al.*, ff. Tr. 2586 at pp. 6-8; Swiren, ff. Tr. 2671 at pp. 3-7.)

168. Contention 20(1)(b):²⁴ The Commonwealth (State) and County plans contain block diagrams that describe the interrelationships of organizations having an operational role. (Comm. Ex. 8, App. 3 and Ex. 9, App. 3; Henderson ff. Tr. 2546 at p. 4; Belser *et al.*, ff. Tr. 2586 at p. 8; Swiren, ff. Tr. 2671 at pp. 7-8.)

169. Contention 20(1)(c):²⁵ The County plan recognizes the overall responsibility of the County Commissioners and their appointment of a Director/Coordinator of Civil Defense to act for them in matters involving an emergency response. (Comm. Ex. 9, p. 5; Henderson, ff. Tr. 2546 at p. 5; Belser *et al.*, ff. Tr. 2586 at p. 9; Swiren, ff. Tr. 2671 at p. 8.)

170. Contention 20(2)(a):²⁶ The Luzerne County Chamber of Commerce is not mentioned or relied on in any way in the County emergency plan. (State Ex. 9, Annex C; Henderson, ff. Tr. 2546 at p. 6; Belser, *et al.*, ff. Tr. 2586 at pp. 9-10; Swiren, ff. Tr. 2671 at p. 9.)

171. Contention 20(2)(b):²⁷ The County plan contains a detailed public

²⁴ 20(1)(b): ... The state, and [Luzerne County plans] - do not meet the guidelines of NUREG-0654 REV. 1 (section A. 1. (c)) that requires each plan to illustrate these interrelationships [of organizations having an operational role] in a block diagram.

²⁵ 20(1)(c): NUREG-0654 (Section A. 1, d) recommends that each organization shall identify a specific individual by title who shall be in charge of the emergency response. The Luzerne County Civil Defense Plan states no such individual.

²⁶ 20(2)(a): NUREG-0654 (section A. 2, a) recommends that: "Each organization shall specify the functions and responsibilities for major elements and key individuals by title of emergency response, including the following: Alerting and Notification; Communication, Public Information; Accident Assessment; Public Health and Sanitation; Social Services; Fire and Rescue; Traffic Control. . . . Luzerne County Civil Defense plan (page 11) states "see Annex E" for communications and goes on to state (page 11) they will notify Luzerne County Chamber of Commerce to pass to business and industry in affected area." Plan does not state how Chamber of Commerce would assume this responsibility. There is no such organization called Luzerne County Chamber of Commerce. Moreover, the plan does not suggest what will happen if a nuclear incident occurs when the Chamber of Commerce is not there to pass to business and industry, i.e., if accident occurs after 5:00 P.M. when offices would be closed.

²⁷ 20(2)(b): *Public Information* in Luzerne County Civil Defense plan is merely an outline (page 17 of LCCD plan). It lists in 4 brief lines:

1. Develop media release (Plan does not state who will do this nor for what purpose)
2. Brief local media (Plan does not state what media will be briefed about)
3. Operate various control centers (What does this have to do with public information)
4. Monitor Media (Plan does not state what media will be monitored about)

information section in annex D. It provides for distribution of pre-emergency protective action brochures, prepared statements to be broadcast during an emergency over an Emergency Broadcast System and the establishment of a news media center to brief the media, with responsibility being assigned to the person or persons to handle briefings and releases on emergency matters. Additional public information procedures are being considered. (State Ex. 9, Annex D; Henderson, ff. Tr. 2546 at p. 7, Testimony pp. 2547-55; Belser *et al.* ff. Tr. 2586 at pp. 10-11, Testimony Tr. pp. 2605-06, 2616-18, 2628-33; Swiren, ff. Tr. 2671 at pp. 10-11).

172. Contention 20(2)(c):²⁸ Responsibility for public health at the County level is assigned in the plan to the medical/health group and radiological decontamination group and for sanitation to the engineering group. These groups will be represented at the emergency operating facility. Training, participation in drills and exercises and relocation plans for fire and rescue companies are also provided for in the County plan. (State Ex. 9, V p. 9, par. 5 and 7; Henderson, ff. Tr. 2546 at p. 8; Belser *et al.*, ff. Tr. 2586 at pp. 11-12; Swiren, ff. Tr. 2671 at pp. 12-13.)

173. Contention 20(2)(d):²⁹ The County plan assigns responsibility for traffic control to State and Municipal police. The plan references a State Police Radiological Response Plan for the Susquehanna facility. The number of police and equipment in each municipality within the plume exposure pathway EPZ is listed and access and traffic control points assigned to State police are also indicated. (State Ex. 9, Annex F and App. 3, Annex K and App. 1; Henderson, ff. Tr. 2546 at p. 9; Belser, *et al.*, ff. Tr. 2586 at pp. 12-13; Swiren, ff. Tr. 2671 at p. 14).

174. Contention 20(2)(e):³⁰ The County plan lists the number of ambulances available within the County, the hospital and nursing homes that can be evacuated and a list of hospitals in the surrounding area capable of providing radiation treatment. The dispatching of ambulance resources is under the direction of the County's Communication Center.

²⁸ 20(2)(c): *Public Health and Sanitation* is not mentioned in LCCD plan. *Fire and Rescue*: Utility plant (page 5-8) states there will be one drill per calendar quarter and (page 8-3) states local fire and rescue companies will be invited to participate in a training program. LCCD plan (page 13) merely outlines "Fire & Rescue Group" in 3 sentences, stating "units evacuating from affected area will report to facilities in Annex D." Annex D is not included in plan, nor is there any clear delineation of who the fire companies are.

²⁹ 20(2)(d): . . . *Traffic Control*. Luzerne County Civil Defense plan gives an outline of traffic control under "Police Group." It does not list what "units" are available for traffic control.

³⁰ 20(2)(e): . . . Luzerne County Civil Defense plan gives a mere outline of responsibilities of medical groups. (Page 15 of LCCD plan.) There are no names of medical organizations who would be involved in an evacuation. Under LCCD's general evacuation, it states they will evacuate Saint Stanislaus Home to _____ and evacuate invalids whose evacuation requires use of ambulance. The LCCD plan does not tell us who the ambulance associations are nor if they are equipped to handle such an emergency.

Evacuation places for ambulatory and nonambulatory persons are shown. The relocation site for St. Stanislaus Home has not been selected as yet. (Comm. Ex. 9, Annexes G and I; Henderson, ff. Tr. 2546 at p. 10; Belser *et al.*, ff. Tr. 2586 at pp. 13-14; Swiren, ff. Tr. 2671 at p. 15.)

175. Contention 20(2)(f):³¹ The plan contains a chart of primary and support responsibilities. (State Ex. 9, App. 2, p. 2-1; Henderson, ff. Tr. 2546 at p. 11, Belser *et al.* ff. Tr. 2586 at p. 16; Swiren, ff. Tr. 2671 at p. 14).

176. Contention 20(3)(a):³² There is no responsibility assigned in the County plan to the Chamber of Commerce. Primary notification or alerting is to be accomplished through the use of sirens which cover most of the plume exposure pathway EPZ. Municipal response plans, most of which are completed, are to contain door-to-door notification procedures. Separate letters of agreement between municipalities and the County are not planned. (State Ex. 9, Annex C; Henderson, ff. Tr. 2546 at pp. 12-13; Belser *et al.* ff. Tr. 2586 at pp. 14-15; Swiren ff. Tr. 2671 at pp. 17-18).

177. Contention 20(3)(b):³³ The County plan provides a procedure for notification and message verification and describes the information that will be communicated to the public during an emergency. The Chairman of the County Board of Commissioners or his designee is to be the spokesperson during an emergency and briefings are to be provided that person by PEMA's Information Officer. There is a provision for coordinating information and also updating information. (State Ex. 9, Annex C,

³¹ 20(2)(f): NUREG-0654 (section A. 2a) cites the description of these [emergency response] functions shall include a clear and concise summary such as a table of primary and support responsibilities. None of the above, from Communications to Emergency Medical — fulfills this recommendation.

³² 20(3)(a): NUREG-0654 REV. 1 "Notification Methods and Procedures" (page 43) recommends "the content of initial and follow-up messages to response organization and the public has been established and means to provide early notification and clear instruction to the populace." Luzerne County Civil Defense plan (page 6) cites under both selective evacuation and general evacuation that "County will notify Chamber of Commerce to pass on notification to business and industry." There is no clear outline of how this will be accomplished and no letters of agreement appear between Civil Defense and Chamber of Commerce. Cited under general evacuation (Luzerne County plan, page 6), political subdivisions will be responsible for door to door notification within political boundaries. There is no mention of how this notification would be executed within political subdivision(s) nor who would be responsible for such notification if a general evacuation is called. There are no letters of agreements with political subdivisions to assume that responsibility of notification.

³³ 20(3)(b): NUREG-0654 (section E. 1., page 43) recommends that procedures for notification include means for verification of messages. Luzerne County plan makes no mention of any verification of messages. Luzerne County plan does not meet the recommendations of NUREG-0654 (appendix 3 page 3-2) which states "plan should give a description of the information that would be communicated to the public under given circumstances, for continuing instruction on emergency actions to follow, and updating of information."

App. 5 and Annex D and App. 1-6; Henderson, ff. Tr. 2546 at p. 14; Belser *et al.* ff. Tr. 2586 at pp. 15-16; Swiren, ff. Tr. 2671 at pp. 18-20).

178. Contention 20(4)(a):³⁴ Both the State and County plans propose periodic dissemination of information to the public including information on radiation protection measures, and needs of the handicapped. The County plan provides for the advance release of public information, designates a spokesperson in the County and also provides for the coordination of the dissemination of information to the public through assignment of responsibilities, briefing procedures and establishment of messages to be broadcast over the emergency broadcast system. (State Ex. 9, Annex D, Ex. 8, App. 15; Henderson, ff. Tr. 2546 at pp. 15-17; Belser *et al.* ff. Tr. 2586 at pp. 16-18; Swiren, ff. Tr. 2671 at pp. 20-21.)

179. Contention 20(5)(a):³⁵ Both the State and County plans call for monitoring off-site to be performed by the BRP. (State Ex. 9, Annex M and Ex. 8, p. 28; Henderson, ff. Tr. 2546 at p. 18; Swiren, ff. Tr. 2671 at p. 27; Belser *et al.* ff. Tr. 2586 at p. 18).

180. Contention 20(5)(b):³⁶ The State plan provides for the number of sets of radiological monitoring equipment and reserves at its area offices. It prescribes that emergency equipment is to be inspected and operationally checked at least annually and provides for inventories to be taken after each use. (State Ex. 8, App. 8; Henderson, ff. Tr. 2546 at p. 19; Reilly, ff. Tr. 2434 at p. 4; Swiren, ff. Tr. 2671 at p. 23).

³⁴ 20(4)(a): NUREG-0654 (section G, 1, page 49) recommends that each organization shall provide a coordinated periodic dissemination of information to the public. It shall include:

- (a) education information on radiation
- (b) protection measures
- (c) special needs of the handicapped.

Neither the State plan nor the Luzerne County Civil Defense plan gives any mention to periodic dissemination of information to the Public. Luzerne County Civil Defense plan doesn't meet NUREG-0654 section G 2 (Requirement) to see that the public information program should include provision for written material that is likely to be available in a residence during an emergency. Nor does Luzerne County plan meet NUREG-0654 (section G.4.a.) recommendation designating a spokesperson who should have access to all necessary information. Luzerne County plan gives no provision for the planning standard of NUREG-0654 (Section G), which states "procedures for coordinated dissemination of information to the public are established." Luzerne County plan gives 4 brief lines to "Public Information."

³⁵ 20(5)(a): NUREG-0654 Rev. 1 (H 7, p. 54) states that "each organization, where appropriate, shall provide for off-site radiological monitoring equipment in the vicinity of the nuclear facility." The Luzerne County plan makes no provision for such equipment.

³⁶ 20(5)(b): NUREG-0654 REV. 1 (H 10, p. 54) recommends that "each organization shall make provisions to inspect, inventory and operationally check emergency equipment/instruments at least once each calendar quarter and after each use. There shall be sufficient reserves of instrument/equipment to replace those that are removed from emergency kits for calibration or repair." The State plan does not meet this recommendation since it does not mention inspection, inventory, or checking of such equipment, nor does it mention reserves. . . .

181. Contention 20(5)(c):³⁷ Neither the State nor County plan identifies emergency kits by general category. PEMA does maintain an inventory of all equipment that would be available in the event of an incident. The County has an inventory of radiological monitoring sets it has on hand. (State Ex. 9, App. 6, Annex M; Henderson, ff. Tr. 2546 at p. 20; Belser *et al.* ff. Tr. 2586 at p. 20; Swiren, ff. Tr. 2671 at pp. 23-24.)

182. Contention 20(6)(a):³⁸ Under State and County plans, field monitoring is to be performed by the BRP. The type of equipment that will be utilized and reference to the location of monitoring sites is included in Appendix 8 of the State plan. (State Ex. 8; Henderson, ff. Tr. 2546 at p. 21; Belser *et al.* ff. Tr. 2586 at pp. 20-21; Swiren, ff. Tr. 2671 at p. 25).

183. Contention 20(6)(b):³⁹ The State has the capability for detecting and measuring radioiodine concentrations at a greater capability than the guidance of NUREG-0654. (Henderson, ff. Tr. 2546 at p. 22; Reilly, ff. Tr. 2434 at p. 7; Swiren, ff. Tr. 2671 at pp. 25-26.)

184. Contention 20(6)(c):⁴⁰ The State plan refers in Appendix 8 to the procedures for determining contamination levels, dose rates and water and contamination levels and comparing those parameters to EPA Protective Action guides. Dose projections for specific isotopes are detailed in a

³⁷ 20(5)(c): NUREG-0654 REV. 1 (H 11, p. 54) recommends that "each plan shall, in an appendix, include identification of emergency kits by general category (protective equipment and emergency supplies)." The State plan and (Luzerne) County plan both fail to meet this recommendation since they do not include this information in an appendix or elsewhere.

³⁸ 20(6)(a): NUREG-0654 Rev. 1 (I 7, p. 57) recommends that "each organization shall describe the capability and resources for field monitoring within the plume exposure Emergency Planning Zone which are an intrinsic part of this concept of operations for the facility." The Luzerne County plan makes no provision for such monitoring. The State plan provides for such monitoring, but omits specifics such as type of equipment, number of fixed monitoring sites or their location. With respect to in-place surveillance, the State plan (DER, p. XIV-1) states that "Generally these include air samplers and TLD's" which is too vague to comply with the NUREG recommendations.

³⁹ 20(6)(b): Referring to the . . . state, NUREG-0654, REV. 1 (I 9, p. 58) states "each organization shall have a capability to detect and measure radioiodine concentrations in air in the plume exposure EPZ as low as 10^{-7} μ Ci/cc (microcuries per cubic centimeter) under field conditions." . . . (The) State (plan does not) mention whether (it has) this capability.

⁴⁰ 20(6)(c): NUREG-0654, REV. 1 (I 10, p. 58) recommends that the . . . State "establish means for relating the various measured parameters (e.g. contamination levels, water, and air activity levels) to dose rates for key isotopes" and provide "for estimating integrated dose from the projected and actual dose rates and for comparing these estimates with the protective action guides." The recommendation states that the "detailed provisions shall be described in separate procedures." (The plan) fail(s) to meet this recommendation by being too vague about the procedures to be used, failing to mention specific isotopes, and not referring to detailed provisions in separate procedures. The State plan (DER, p. XIII-2) says "estimates of direct population exposure from the passing cloud and from ground deposition are made from in place air samples (sic) and from energy compensated TLD's."

separate BRP procedure. The State plans to use the U.S. Department of Energy capability to track from the air and to maintain a computer record for periodic estimation of total population exposure. (State Ex. 8 and Ex. 4; Reilly, ff. Tr. 2434 at pp. 8-10; Henderson, ff. Tr. 2546 at p. 23; Swiren, ff. Tr. at pp. 26-27).

185. Contention 20(7)(a):⁴¹ As already stated, the plan does not rely on the Chamber of Commerce. Maps with monitoring locations have been prepared and due to size are referenced as to location in the State plan. A map with mobile air sampling locations is still in preparation. A list of bus contacts and some pickup points for persons without automobiles is included in the County plan. Availability of buses and additional pickup points await completion of written school and municipal plans. A map showing reception center locations is in the County plan and the map showing mass care centers is in the still under development. (State Ex. 9, Annex I, App. 4; Henderson ff. Tr. 2546 at pp. 24-25; Reilly, ff. Tr. 2434 at p. 11; Swiren, ff. Tr. 2671 at pp. 28-29.)

186. Contention 20(7)(b)⁴² and (7)(c):⁴³ The State plan provides for the stockpiling, distribution and administering of thyroid blocking agents and

⁴¹ 20(7)(a): The Luzerne County plan would not adequately protect the public in the plume exposure pathway EPZ, as required by NUREG-0654 Rev. 1 (J), in part because the County plan has in some cases assigned tasks to organizations that do not exist or are not aware of having been assigned such tasks:

1) The County plan states (pp. 6, 11, 12) that in the event of a decision to take cover or evacuate, the County will notify the "Luzerne County Chamber of Commerce" to pass notification to business and industry. No organization by this name exists.

2) The County plan states (p. 7-8) "individuals with no transportation may request same through local fire companies. Commercial buses will be dispatched to local fire stations in the affected area to transport these individuals." The County did not consult either the fire companies or bus companies before including this procedure in the plan, or inform them of having included it.

Maps are not provided by . . . the . . . County (or) State showing, "preselected radiological sampling and monitoring points, relocation centers in host areas, and shelter areas" as required by NUREG-0654, Rev. 1 (J 10a, p. 61).

⁴² 20(7)(b): In the State plan (PEMA, p. 10) assigning to the State Department of Health the responsibility to "Develop procedures for stockpiling, in adequate supply (distributing), and administering thyroid blocking agents and such other radiological health materials as may be required" does not meet the requirement either as it states that (1) thyroid blocking chemicals are to be stocked (p. 5), (2) the county medical officer will coordinate the distribution with the State Department of Health (p. 7), and (3) the county medical group will assist the State Department of Health to their distribution (p. 15) but gives no more specifics.

⁴³ 20(7)(c): Neither the State or (Luzerne) County plan meet the requirements of NUREG-0654, Rev. 1 (J 10f, p. 63) that "State and local organizations' plans shou'd include the method by which decisions by the State Health Department for administering radioprotective drugs to the general public are made during an emergency and the pre-determined conditions under which such drugs may be used by offsite emergency workers." Neither plan addresses these decision making issues at all.

for the predistribution of such agents and lists the organizations and quantities they are to receive. The Commission does not plan to issue these drugs to the general public. (State Ex. 8, App. 9; Ex. 9, Annex M; Henderson, ff. Tr. 2586 at p. 26; Reilly testimony, Tr. 2469-73; Belser *et al.* ff. Tr. 2596 at pp. 23-24; Swiren, ff. Tr. 2671 at pp. 30-32.)

187. Contention 20(7)(d):⁴⁴ The means of evacuating school children and those without transportation await the completion of written school plans. School pickup points and reception centers are identified in the County plan. (State Ex. 9, Annex N and Annex J; Swiren, Tr. 2674-76; Chesnut, Tr. 2691-94; Swiren ff. Tr. 2671 at pp. 33-34.)

188. Contention 20(7)(e):⁴⁵ The State plan places a responsibility on support counties to provide mass care facilities. The County plan identifies four support Counties and lists mass care facilities and their capabilities within Luzerne County. The County plans include mass care facilities for fifty (50) percent of those evacuating and assigns the number of individuals to be accommodated in each mass care County. Agreements have been executed with the County for the local Red Cross Chapters to operate the mass care facilities and agreements are being executed with the support Counties. (State Ex. 8, p. 29 and Ex. 9, Annexes L and T; Henderson, ff. Tr. 2546 at pp. 29-30; Belser *et al.* ff. Tr. 2586 at pp. 26-27; Swiren, ff. Tr. 2671 at pp. 34-35.)

⁴⁴ 20(7)(d): The State and (Luzerne) County plans meet the recommendation of NUREG-0654, Rev. 1 (J 10g p. 63) that they specify the "means of relocation." The County plan (pp. 7-8) states "individuals with no transportation may request same through local fire companies. Commercial buses will be dispatched to local fire stations", . . . [but does not] specify the logistics of the procedure. It states (p. 7) "schools will be evacuated by school authorities with school bus transportation to designated schools outside the 10-mile area," but does not name the schools outside the 10-mile EPZ, name the designated schools to which the children are to be evacuated, or specify whether the capacity of the schools' buses are sufficient to evacuate the students without making return trips.

⁴⁵ 20(7)(e): The State and (Luzerne) County plans do not meet the recommendation of NUREG-0654, Rev. 1 (J 10h, p. 63) that they include "relocation centers in host areas" since neither plan names specific relocation centers. The County plan (p. 7) states "Red Cross will open reception centers at _____, _____, and mass care centers in County to accommodate 18,000 persons." The capacity of 18,000 persons is inadequate since the population of the 10-mile EPZ is 47,171 (PEMA, Appendix 1a, p. 1). The plan does not state that the Red Cross is capable of staffing adequate relocation centers.

189. Contentions 20(7)(f),⁴⁶ (7)(g)⁴⁷ and (7)(h)⁴⁸: The Applicant has completed an evacuation time study which will be incorporated into the State and County plans. The study is based on a road network provided by State and local officials and traffic capacities under different time scenarios and climatic conditions. The study considers traffic impediments and traffic control points are identified which State Police will handle to overcome potential bottlenecks. The National Guard also will be used to help remove obstacles and control traffic if necessary and the State Department of Transportation has the basic responsibility for removing obstacles to traffic flow on main evacuation routes. (State Ex. 8, VIIA pp. 23-25; Henderson, ff. Tr. 2545 at pp. 31-33; Belser, *et al.*, ff. Tr. 2586 at pp. 27-29; Swiren, ff. Tr. 2671 at pp. 36-38).

190. Contention 20(7)(i).⁴⁹ The BRP is responsible for assessing the incident and recommending appropriate protective action to responsible State authorities. The basis for the choice of actions is set forth in the State plan and the time analysis results for evacuation as a possible choice of action will be incorporated into the State plan. (State Ex. 8, App. 8; Henderson ff. Tr. 2546 at p. 34; Reilly ff. Tr. 2434 at pp. 12-13 and Testimony, Tr. pp. 2460-64.)

⁴⁶ 20(7)(f): Neither the State nor the (Luzerne) County plan includes "projected traffic capacities of evacuation routes under emergency conditions" as required by NUREG-0654, Rev. 1 (J 10i, p. 63).

⁴⁷ 20(7)(g): Neither the State nor the (Luzerne) County plan includes "identification of and means for dealing with potential restrictions to the use of evacuation routes to include alternates" is assigned to the Department of Transportation, and DER, Bureau of Radiation Protection's plan states (p. VIII 4) "bad weather will also obviously influence the feasibility of evacuation, thereby making sheltering and other options attractive." The County plan only states (p. 7) that "based primarily on police and PennDot advice, modifications and detours will be made to evacuation routes as situations develop."

⁴⁸ 20(7)(h): Neither the State nor the (Luzerne) County plan includes "time estimates for evacuation of various sectors and distances based on a dynamic analysis (time-motion study under various conditions) for the plume exposure pathway emergency planning zone" as recommended by NUREG-0654, Rev. 1 (J 101, p. 63). The State plan only assigns to PEMA the function "continue to assess time estimates for protective action responses and update procedures with an objective of reducing actual response times to the extent possible" (PEMA, p. 12).

⁴⁹ 20(7)(i): The plans of the . . . State do not adequately meet the recommendation of NUREG-0654, Rev. 1 (J 10m, p. 64) that they contain "the bases for the choice of recommended protective actions from the plume exposure pathway during emergency conditions. This shall include expected local protection afforded in residential units or other shelter for direct and inhalation exposure, as well as evacuation time estimates."

191. Contention 20(7)(j):⁵⁰ Responsibility for registering and monitoring evacuees is provided for in State and County plans. (State Ex. 5 and Ex. 8, App. 16 and Ex. 9, Annexes L and M; Henderson, ff. Tr. 2546 at p. 35; Belser *et al.* ff. Tr. 2586 at pp. 29-30; Swiren, ff. Tr. 2671 at pp. 39-40).

192. Contention 20(7)(k):⁵¹ The State plan contains a procedure that provides for the collection and analysis of environmental samples and comparison with protective action guides for food, water and milk so that appropriate protective responses can be evaluated and recommended. The Pennsylvania Department of Agriculture revised its plan to include implementing protective measures in the ingestion pathway and this will be included in the State's plan. The BRP has maps of monitoring locations and the revision of the Department of Agriculture's plans include maintaining site specific maps in the ingestion exposure pathway EPZ with relevant information on livestock, food processors and water supply systems. Lists of names and locations of milk, food, and agricultural product processors are available for use. (State Ex. 6, and Ex. 8, App. 7 and 8;

⁵⁰ 20(7)(j): Neither the State nor the (Luzerne) County plan meets the recommendation of NUREG-0654, Rev. 1 (J 12, p. 65) that "each organization shall describe the means for registering and monitoring of evacuees at location centers in host areas." The State plan (PEMA, p. 10) only assigns to the State Department of Environmental Resources the responsibility to "provide for the monitoring of evacuees at relocation centers." The County plan mentions (p. 14) initiating a "human locator system for transients in area" but does not mention registering or monitoring other evacuees.

⁵¹ 20(7)(k): The State plan does not adequately specify protective actions for the ingestion exposure EPZ. In particular, it fails to meet the following recommendations of NUREG-0654, Rev. 1 (J 11, p. 64):

1) The recommendation that "the plan shall identify procedures for detecting contamination" is not met by the plan stating "collection and analysis of environmental materials will be useful in evaluating the ingestion pathway." (DER, p. XIV-2).

2) It is recommended that the plan "identify procedures . . . for imposing protective procedures such as impoundment, decontamination, processing, decay, product diversion, and preservation." The plan discusses the protective procedures mentioned, but fails to specify mechanisms for imposing and enforcing any of them. It states, "protocol for the implementation of any protective action involving dairy products or any agriculture product will require the evaluation of the circumstances with the appropriate agency of the Pennsylvania Department of Agriculture." (DER, p. IX-1).

3) For the 50-mile ingestion pathway EPZ (there is no mention of) "maps for recording survey and monitoring data, key land use data (e.g., farming), dairies, food processing plants, water sheds, water supply intake and treatment plants and reservoirs" except to state that "a map of dairy herd locations is given in the specific site plan" (DER, p. XIV-2), which is not included.

4) The plan does not include or mention "up-to-date lists of the name and location of all facilities which regularly process milk products and other large amounts of food or agricultural products originating in the ingestion pathway emergency planning zone, but located elsewhere."

Henderson, ff. Tr. 2546 at p. 36-39; Reilly Testimony, Tr. pp. 2474-76; Belser, *et al.*, ff. Tr. 2586 at pp. 30-31; Swiren, ff. Tr. 2671 at pp. 40-42).

193. Contention 20(8)(a-f):⁵² The State plan in Appendix 16 and County plan in Annex M provide procedures for radiation exposure control for emergency workers. They require reading times of dosimeters and the recording of dose information. Both plans establish procedures for limiting exposures and the County plan provides a specific method for authorizing work above an acceptable dose level. The State plan in Appendices 8 and 16 and the County in Appendix 1 to Annex M establish the same action level for requiring decontamination monitoring. Decontamination is a County responsibility but the State provides guidance and procedures in Appendix 16. The County plan for decontamination is in Annex M and will be carried out by trained personnel in mass care centers. Medical facilities for those requiring it are identified in Annex G. The recommendations of NUREG-0654 as they apply to Contentions 20(d-f) are not in issue since those provisions apply to the licensee (Applicants) alone. (State Ex. 8, App. 8 and 16, and Ex. 9, Annex M; Henderson, ff. Tr. 2546 at pp. 40-45; Belser, *et al.*, ff. Tr. 2586 at pp. 32-34; Swiren ff. Tr. 2671 at pp. 42-45).

194. Contention 20(9)(a-b):⁵³ Lists of hospitals capable of providing evaluation and medical support services for contaminated individuals are listed in State and County plans. Primary and support hospitals are named.

⁵² 20(8)(a-f) Section K - Radiological Exposure Control

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| (a) | 3.b. | No mention of how this should be done in . . . (the State or Luzerne County) plans. In State plans it is generally stated that the Department of Environmental Resources shall be in charge of radiological protective and health matters but nothing specific. |
| (b) | 4. | No such decision chain in any of the plans. |
| (c) | 5.a. | The DER, Bureau of Radiation Protection, is to provide guidance in all such matters, but there is no specific plan. No mention in . . . (Luzerne) County plans. |
| (d) | b. | Same as above. |
| (e) | 6.a.b.c. | No mention. |
| (f) | 7. | No mention. |

⁵³ 20(9)(a-b): The State and (Luzerne) County plans do not adequately make arrangements for medical services for contaminated injured individuals. Specifically, they do not meet the following recommendations of NUREG-0654, Rev. 1 (p. 69):

- (a) "L1) Each organization shall arrange for local and backup hospital services having the capability for evaluation of radiation exposure and uptake, including assurance that persons providing these services are adequately prepared to handle contaminated individuals.
- (b) L3) Each state shall develop lists indicating the location of public, private and military hospitals and other emergency medical facilities within the State or contiguous states considered capable of providing medical support for any contaminated individual.

and the bed capacity indicated. (State Ex. 8, App. 9 and Ex. 9, App. 3; Henderson, ff. Tr. 2546 at pp. 46-47; Belser, *et al.*, ff. Tr. 2586 at pp. 34-35; Swiren, ff. Tr. 2671 at pp. 45-46).

195. Contention 20(10)(a):⁵⁴ The County's plan in Annex P contains a detailed procedure for reentry and recovery operations which generally follows the same procedure as that used for evacuation. (State Ex. 9, Annex P, Henderson, ff. Tr. 2546 at p. 48; Belser, *et al.*, ff. Tr. 2586 at p. 35; Swiren, ff. Tr. 2671 at pp. 46-47).

196. Contention 20(10)(b):⁵⁵ The State plan provides for implementing a reentry and recovery operation. (State Ex. 8, App. 17; Henderson, ff. Tr. 2546 at p. 49; Belser, *et al.*, ff. Tr. 2586 at pp. 35-36; Swiren, ff. Tr. 2671 at pp. 47-48).

197. Contention 20(11)(a-b):⁵⁶ The County plan provides for drills and exercises and the State plan provides for night-time exercises, unannounced exercises and exercises under various weather conditions. (State Ex. 9, Annex S and Ex. 8; App. 14; Henderson, ff. Tr. 2546 at pp. 50-51; Belser, *et al.*, ff. Tr. 2586 at p. 36; Swiren, ff. Tr. 2671 at pp. 48-49).

⁵⁴ 20(10)(a): The Luzerne County plan fails to adequately meet the reentry and recovery planning recommendations of NUREG-0654, Rev. 1 (M, p. 70). Beyond stating that Pennsylvania Department of Environmental Resources Bureau of Radiological Health "will establish and disseminate appropriate reentry criteria" (p. 18), the only other reference to reentry and recovery in the County plan (p. 7) "reentry to evacuated areas will be denied to all but residents who will be accompanied by mobile patrol. Pa. driver's license will be used as identification, and police cordon blocking entry to evacuated area will make maximum use of local police to facilitate identification of area residents" and (p. 19) "reentry will be based on advise (sic) of BRH, DER. Evacuated area will be denied to individuals not holding Pa. driver's license showing them to be a resident of the area. Residents of the area will be allowed entry accompanied by mobile patrol only with the exception granted by Chief Police Group Luzerne County CD. Emergency services of the area for a period of time before reentry to the general public is authorized."

⁵⁵ 20(10)(b): The plans of the . . . State do not (meet) the NUREG-0654, Rev. 1, recommendation (M 3, p. 70) that "each . . . State plan shall specify means for informing members of the response organizations that a recovery operation is to be initiated, and of any changes in the organizational structure that may occur."

⁵⁶ 20(11)(a): NUREG-0654 Rev. 1 recommends (N, p. 71) that "periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted." The Luzerne County plan fails to meet this recommendation, as it makes no mention of exercises or drills, except to list an annex entitled "Training and exercises," which is not included.

20(11)(b): NUREG-0654 Rev. 1 (N 1b) recommends that "each organization should make provisions to start an exercise between 6:00 p.m. and midnight and another between midnight and 6:00 a.m. once ever 6 years." The plans of the . . . State fail to make this provision. NUREG-0654 Rev. 1 (N 1b, p. 71) "exercise should be conducted under various weather conditions." The plans of the State both fail to specify this. NUREG-0654 Rev. 1 (N 1b) states "some exercises should be unannounced." The state plan makes no mention of having some unannounced exercises. . . .

198. Contentions 20(11)(c-e):⁵⁷ The State plan calls for quarterly testing of communications between Federal emergency response organizations and States within the ingestion exposure pathway EPZ. The State plan calls for an annual testing of communications between the nuclear facility, State and local emergency operation centers and field assessment teams. Communication drills also contain a message content understanding requirement. (State Ex. 8, App. 14; Henderson, ff. Tr. 2546 at pp. 52-54; Belser, *et al.*, ff. Tr. 2586 at pp. 36-37; Swiren, ff. Tr. 2671 at pp. 49-50)

199. Contentions 20(12)(a-d):⁵⁸ The State and County plans provide for radiological response training for emergency response personnel. The State's plan does not mention retraining but it is referred to in the County plan. (State Ex. 8, App. 10 and Ex. 9, Annex R; Henderson, ff. Tr. 2546 at p. 55; Belser, *et al.*, ff. Tr. 2586 at pp. 38-41; Swiren, ff. Tr. 2671 at pp. 50-51).

200. Contentions 20(13)(a-i):⁵⁹ The County plan provides training of those responsible for the planning effort, for the individuals responsible for training and for the designation of an emergency planning coordinator with

⁵⁷ 20(11)(c): The state plan (PEMA, Rev. 6/80) states (p. 14-1) that "communication with federal emergency response organizations and states within the ingestion pathway shall be tested annually," whereas NUREG-0654, Rev. 1 (N 2a) recommends this is to be done quarterly.

20(11)(d): NUREG-0654 Rev. 1 (N 2a, p. 72) states that "communications between the nuclear facility, state and local emergency operations centers, and field assessment teams shall be tested annually." . . . (T)he state plan . . . (does not) mention the involvement of field assessment teams in exercises or drills.

20(11)(e): NUREG-0654 Rev. 1 (N 2a, p. 72) states "communication drills shall also include the aspect of understanding the content of (messages)." . . . (T)he state's plan . . . (does not) mention including this aspect in drills.

⁵⁸ 20(12)(a-d): *Section O - Radiological Emergency Response Training*

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| (a) | 1. | State plan just gives general objectives in Appendix 10. In the (Luzerne) County plan, Annex M is listed "Training and Exercises" but there is no Annex M (see p. 21). |
| (b) | 1.b | Same as above for state and county plans. |
| (c) | 4.a-j | Same as above for state and county plans. |
| (d) | 5. | Same as above for state and county plans. |

⁵⁹ 20(13): *Section P - Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans*

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| (a) | 1. | (Luzerne) County plans same as in Section O. |
| (b) | 2. | (Luzerne) County plans do not mention. |
| (c) | 3. | (Luzerne) County plans do not mention. |
| (d) | 4. | State plan fails to mention that they will "certify it to be current on an annual basis." |
| (e) | 5. | (N)o mention in state plan. |
| (f) | 6. | (N)o mention in state plan. |
| (g) | 7. | (N)o mention in state plan. |
| (h) | 8. | (N)o mention in state plan. |
| (i) | 9. | (N)o mention of this in . . . (state or Luzerne County) plans. |

responsibility for developing, updating and coordinating emergency plans with State and utility plans. The State has assigned responsibility for maintaining and updating the State plan and for distributing changes to the State plan. It lists only some of the implementing procedures required to implement the plan and contains an appendix which however does not reference the sections of the plan to be implemented by each procedure. The plan does contain a specific table of contents with a cross reference to NUREG-0654. The recommendations of the planning standards and criteria of P. 9 of NUREG-0654 do not apply to Contention 20(13)(i) since the guidance of that section is only for the licensee, and not the State or County. (State Ex. 9, Para. V.A. p. 5 and Annex R and Ex. 8, para. VI B and C, p. 8 and para X, p. 30 and App. 18; Henderson, ff. Tr. 2546 at pp. 56-64; Belser, *et al.*, ff. Tr. 2586 at pp. 41-44; Swiren, ff. Tr. 2671 at pp. 51-54).

9. Scram Discharge Volume Break (Contention 21)

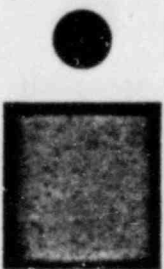
201. This contention, sponsored by intervenors SEA and CAND, reads as follows:

21. There is a potentially dangerous flaw in the Applicants' reactor in the design of the primary cooling system inasmuch as radioactive water from a break in the scram discharge volume subsystem can disable the major safety systems including the residual heat removal system, the reactor core isolation cooling system, the core sprays and the high pressure coolant injection pumps in a brief period of time.

202. Only the Applicants and NRC Staff presented direct cases on this contention.⁶⁰

203. The SDV is part of the Control Rod Drive ("CRD") system. The CRD system at Susquehanna is used to implement a reactor scram by inserting control rods into the reactor core. Upon actuation of the scram signal, water from the volume above each of 185 CRD pistons is discharged into a CRD withdrawal line, goes through a scram exhaust valve,

⁶⁰ Applicants' witness was Mr. Thomas M. Crimmins, Jr., Manager, Nuclear Plant Engineering, for Pennsylvania Power and Light Company, who directs engineering and design activities and systems and safety analyses for the Susquehanna Steam Electric Station, Units 1 and 2. The NRC Staff's witness was Mr. Kenneth T. Eccleston, a Project Manager in the Division of Licensing, Office of Nuclear Reactor Regulation, who was responsible for coordinating the final review of the safety concerns associated with pipe breaks in the BWR scram system and the issuance of NUREG-0803, Generic Safety Evaluation Report Regarding Integrity of BWR Scram System Piping.




and is ultimately collected in one of the two SDVs. (Crimmins, ff. Tr. 1685, at pp. 2-3).

204. The scram exhaust valves are normally closed, and hence, the system downstream is normally dry and not pressurized. They open upon receipt of the scram signal and remain open until the scram signal is reset. As the scram exhaust valves open, water is discharged through the CRD withdrawal lines into the SDVs. Each SDV has vent and drain valves, both of which are normally open but close upon receipt of a scram signal. The SDVs partially fill with the water discharged during the scram; when the scram system is reset by the operator, the scram exhaust valves close and the SDV vent and drain valves open, draining the contents of the SDV into the reactor building sump. The SDV then drains and returns to atmospheric pressure, ready for reuse in the next scram. (Ibid. pp. 3-4).

205. In an NRC Staff study on pipe breaks in BWR scram systems (NUREG-0785), a sequence of events was postulated in which a pipe break in the SDV could result in loss of all emergency core cooling systems ("ECCS"). This result assumed that the fluid discharged from the SDV break would flow to the reactor building basement through a variety of paths, including floor drains, stairways and hatchways above the ECCS equipment. The ECCS failure was assumed to be caused by cascading of water onto the ECCS pump motor assemblies or due to general flooding of the ECCS pump rooms, which are located in the reactor building basement. (Ibid. pp. 1-2.)

206. An evaluation of the problem on a generic basis was provided recently by the NRC Staff in NUREG-0803 which identified three general areas of concern with respect to SDV piping breaks: (1) integrity of the SDV piping; (2) emergency procedures to successfully mitigate a leak or break in the SDV or elsewhere in the secondary containment; (3) environmental qualification of equipment needed to detect and mitigate the consequences of an SDV break. The guidance proposed a series of site-specific responses. Applicants have committed to comply with the recommendation NUREG-0803, and are committed to have submitted a detailed response by December 29, 1981. (Bd. Ex. 1, p. 1; Crimmins Testimony, Tr. p. 1758; Eccleston Testimony, Tr. 1776; Eccleston, ff. Tr. 1772, at pp. 3, 5.)

207. The initiating event, a break in the SDV piping, has a very low probability of occurrence. The SDVs are designed to high material quality and fabrication standards, and are subjected to in-service inspection in accordance with ASME code requirements. (Crimmins, ff. Tr. 1685, at pp. 3-4). The SDVs at Susquehanna are highly resistant to cracking, fatigue, corrosion, brittle fracture and other anticipated mechanical failure mechanisms. (Ibid. pp. 3-4; Staff Exhibit No. 5, pp. 3-3 to 3-6).



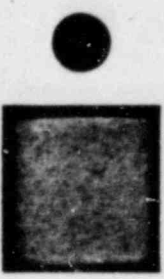
208. Assuming an SDV break does take place, if the scram is reset through operator action, no adverse consequences will occur because resetting terminates the flow of liquid to the SDV and hence the release of water to the reactor building sump. Under certain conditions (e.g., drywell high pressure, main steamline high radiation), the scram signal cannot be quickly cleared by the operator and further measures will be required to mitigate an SDV break. However, experience to date indicates that inability to reset the scram is unlikely to occur. (Crimmins Testimony, Tr. pp. 1767-68; Staff Ex. No. 5, pp. 4-9 and 4-10; Crimmins, ff. Tr. 1685 at p. 5).

209. If scram resetting does not take place, it becomes necessary to identify and isolate the leak and, if required, depressurize the system. An SDV leak or break at Susquehanna would be detected and brought to the attention of the operators by the leak detection system. Indication of a leak would be given by one or more of the following: area radiation monitor alarms, reactor building sump level alarm, reactor building exhaust vent high radiation alarms, loss of reactor building ventilation alarms, ECCS and reactor core isolation cooling system ("RCIC") pump room level alarms, control rod drive high temperature alarm, reactor building differential pressure indicator, and control rod position indicator. (Crimmins, ff. Tr. p. 1685, at pp. 4-5; Staff Ex. No. 5, pp. 4-3, 4-4; Crimmins Testimony, Tr. pp. 1761-62).

210. While some of these alarms and indicators may not establish unambiguously that an SDV break exists, taken in combination (as they are most likely to occur in the event of a significant leak) they would provide an unmistakable warning that a leak was originating from the SDV. This would be sufficient to produce remedial actions by the operators. (Crimmins Testimony, Tr. pp. 1695, 1763-64; Eccleston, Tr. 1787, 1815; Staff Ex. No. 5, pp. 4-4 to 4-7).

211. If the scram cannot be reset, operating procedures include depressurizing the system and proceeding to isolate the leak manually. The aim of depressurizing the reactor system is to reduce the rate of leakage and minimize inventory losses and radioactive releases to the containment environment. (Crimmins, ff. Tr. 1685, at p. 5; Crimmins Testimony, Tr. pp. 1699, 1762; Staff Ex. No. 5, p. 4-10).

212. By the time depressurization is completed, personnel would be able to enter the reactor building to isolate the SDV manually. A radiological field of some strength will exist in the building as a result of the leak, but appropriately equipped personnel will be able to enter the building and manually close the isolation valves without receiving doses in excess of 10 CFR Part 20 limits. (Crimmins Testimony, Tr. pp. 1707, 1756; Eccleston Testimony Tr. 1793-95, 1818.)



213. While corrective actions are being taken to eliminate the leak from the SDV break, the operators' prime goal will be maintaining adequate core cooling. As long as the reactor remains pressurized, the preferred method for providing core cooling is through the main feedwater pumps, the condensate pumps and the condenser. All of these systems are located in the turbine building and are physically isolated from the location of the break, hence, they would not be subject to flooding. (Crimmins, ff. Tr. 1685, at pp. 4-5.)

214. Following depressurization, the residual heat removal ("RHR") system provides low-pressure injection. The RHR pumps are located in the basement of the reactor building and theoretically could be subject to flooding; however, there are RHR service water pumps located in the emergency service water pumphouse, physically isolated from the reactor building and therefore not subject to flooding. Thus, if all other sources of makeup water (including the RHR system) were depleted or unavailable, the RHR service water pumps could deliver water from the 25 million gallon spray pond. (Ibid. pp. 4-5; Crimmins Testimony, Tr. pp. 1764-65.)

215. Both the main feedwater pumps and the RHR service water pumps are controlled remotely from the control room. Together, they provide adequate, independent, and physically remote capability to preserve core cooling following an SDV break. (Crimmins, Testimony, ff. Tr. 1685, p. 5.)

216. Other systems capable of maintaining adequate core cooling are the high pressure coolant injection system ("HPCI") and the RCIC system, both of which provide independent core cooling capability at high pressure. After depressurization, in addition to the RHR system, the low pressure core spray ("LPCS") system can provide adequate core cooling capability. (Crimmins, ff. Tr. 1685, at pp. 4-6; Staff Ex. No. 5, pp. 413 to 4-15.)

217. The HPCI system pump, the RCIC system pump, the four RHR system pumps, and the four LPCS pumps are all located in the reactor building basement at Susquehanna. Any of these 10 pumps can provide sufficient coolant to make up for the inventory loss following an SDV break. (Crimmins, ff. Tr. 1685 at pp. 4-6; Staff Ex. No. 5, pp. 4-14, 4-15).

218. At Susquehanna, all of the above systems, including their respective pumps, are located in compartments which are watertight with respect to each other. In addition, the stairwells are also provided with watertight doors which isolate them from the equipment. Therefore, even if flooding of the reactor building basement occurs, it would be a localized event that will not disable all safety systems located in the basement. (Crimmins, ff. Tr. 1685, at p. 4.)

219. If, in spite of the watertight condition of the reactor building basement rooms and stairwells at Susquehanna, general area flooding were to occur, it would take several hours to flood the basement to a one-foot depth, even assuming that leak tightness is defeated, the reactor building sump pumps are inoperative, and no leakage reduction results from depressurization. (Crimmins, ff. Tr. 1685, at p. 6; Eccleston testimony, Tr. pp. 1829-30.)

220. All motors driving emergency core cooling system pumps at Susquehanna are six feet above the basement floor. Therefore, the level of flooding that would result from an SDV break, even under very conservative assumptions, would not result in loss of those motors until many hours from the onset of the accident, if at all. (Crimmins, ff. Tr. 1685 at p. 6; Eccleston Testimony, Tr. p. 1829; Crimmins Testimony, Tr. p. 1702.)

IV. CONCLUSIONS OF LAW

221. The Board has considered all of the evidence submitted by the parties and the entire record of this proceeding. Based on the findings of fact set forth herein, which are supported by reliable, probative and substantial evidence in the record, this Board, having decided all matters in controversy, concludes that, pursuant to 10 CFR 2.760a and 10 CFR 50.57, the Director of Nuclear Reactor Regulation should be authorized to issue to the Applicants, upon making requisite findings with respect to matters not embraced in this Initial Decision, licenses that authorize operation of the Susquehanna Steam Electric Station, Units 1 and 2.

ORDER

222. Wherefore, it is ordered that the Director of Nuclear Reactor Regulation is authorized, upon making requisite findings with respect to matters not embraced in this Initial Decision, in accordance with the Commission's regulations, and upon making the findings required in paragraph 223, 2 and 3, to issue to Applicants, operating licenses for a term of not more than forty (40) years, authorizing operation of the Susquehanna Steam Electric Station, Units 1 and 2, at steady-state power levels not to exceed 3293 megawatts thermal. Such licenses may be in such form and content as is appropriate in light of such findings, provided that such licenses are consistent with the conclusions of the Licensing Board herein.

223. The aforementioned operating licenses shall contain the following conditions:

1. The licenses will be subject to the ultimate outcome of the consolidated radon proceeding currently underway before the Appeal Boards in Docket Nos. 50-277, 50-278, 50-320, 50-354, and 50-355.

2. The licenses will be subject to a finding by the Director of Nuclear Reactor Regulation, in consultation with the Federal Emergency Management Agency, that all school districts within the plume exposure pathway emergency planning zone for the Susquehanna Steam Electric Station have completed written emergency plans to respond to fixed nuclear facility accidents.

3. The licenses will be subject to a finding by the Director of Nuclear Reactor Regulation, in consultation with the Federal Emergency Management Agency, that all municipalities within the plume exposure pathway emergency planning zone have completed their emergency response plans on transportation resources and program.

224. It is further ordered that this Initial Decision shall constitute the final action of the Commission forty-five (45) days after the issuance thereof, subject to any review pursuant to 10 CFR 2.760, 2.762, 2.764, 2.785, and 2.786.

225. Exceptions to this Initial Decision may be filed within ten (10) days after its service. A brief in support of the exceptions shall be filed within thirty (30) days thereafter and forty (40) days in the case of the Staff. Within thirty (30) days of the filing and service of the brief of the Appellant, and forty (40) days in the case of the Staff, any other party may file a brief in support of, or in opposition to, the exceptions.

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Paul W. Purdom
ADMINISTRATIVE JUDGE

Glenn O. Bright
ADMINISTRATIVE JUDGE

James P. Gleason, Chairman
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland,
this 12th day of April, 1982.

APPENDIX

I. Exhibits received into evidence:

Staff No. 1 — Safety Evaluation Report, Susquehanna, Units 1 and 2, NUREG-0776.

Staff No. 2 — Safety Evaluation Report Supplement 1, NUREG-0776.

Staff No. 3 — Safety Evaluation Report Supplement 2, NUREG-0776.

Staff No. 4 — Final Environmental Statement, Susquehanna, Units 1 and 2, NUREG-0564.

Staff No. 5 — Generic Safety Evaluation Report, BWR Scram System Piping, NUREG-0803.

Staff No. 6 — Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping, NUREG-0313, Rev. 1.

Staff No. 7 — Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power plants, NUREG-0654, FEMA-REP-1, Rev. 1.

Commonwealth No. 1 — State Bureau of Radiation Protection Plan for Nuclear Power Generating Station Incidents, Revision 3.

Commonwealth No. 2 — Susquehanna Steam Nuclear Power Plant Sampling Locations.

Commonwealth No. 3 — Field Airborne Iodine Sampling Procedure.

Commonwealth No. 4 — Estimation of Radiological Consequences of Airborne Radioactive Material for Ground Level Sources.

Commonwealth No. 5 — Pennsylvania Emergency Management Directive No. 32, Development of a Mass Care Operational Program.

Commonwealth No. 6 — Ingestion Exposure Pathway Emergency Planning Zone, Appendix 11.

Commonwealth No. 7 — Schools and Colleges Emergency Plans, Appendix 11.

Commonwealth No. 8 — Commonwealth of Pennsylvania Disaster Operations Plan, Annex E, Fixed Nuclear Facility Incidents.

Commonwealth No. 9 — Draft Luzerne County Radiological Emergency Response Plan for Incidents at the Susquehanna Steam Electric Station, Berwick, Pennsylvania, August 1981.

Board No. 1 — Letter to Staff, dated September 17, 1981, committing Applicants' compliance with NUREG-0803 by December 29, 1981.

Board No. 2 — Letter to Staff, dated June 30, 1981, containing Applicants' response to NRC generic letter 81-03 and NUREG-0313.

Board No. 3 — Letter to Staff, dated September 15, 1981, containing Applicants' response to NRC generic letter 81-03 and NUREG-0313.

2. Professional Qualifications of Witnesses received into evidence:

Applicant		Staff		Commonwealth		CANDs	
Witness	Transcript page	Witness	Transcript page	Witness	Transcript page	Witness	Transcript page
Michaelson	1043	Feldman	1344	Reil/	2434	Amory	1206
Weinstein	1259	Karlowicz	1401	Lamison	2586		
Keiser	1570	Prasad	1525	Belser	2586		
Tosetti	1596		2196	Comey	2586		
Vanderslice	1619	Bangart	1648	Hippert	2586		
Crimmins	1684	Loysen	1655				
Englehart	1849	Eccleston	1772				
Lemaire	1915	Fisher	1880				
Rhoades	1938	Branagan	1894				
McNair	1948	Struckmeyer	1894				
Hecht	2049	Litton	1927				
Henderson	2309	Chesnut	2517				
Cantone	2382	Swiren	2519				
McCandless	2248	Gears	1379				
Carroll	2308						

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

James P. Gleason, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland
April 30, 1982

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Marshall E. Miller, Chairman
Gustave A. Linenberger, Jr.
Dr. Cadet H. Hand, Jr.

In the Matter of

Docket No. 50-537

**UNITED STATES DEPARTMENT OF
ENERGY
PROJECT MANAGEMENT
CORPORATION
TENNESSEE VALLEY AUTHORITY
(Clinch River Breeder Reactor Plant)**

April 14, 1982

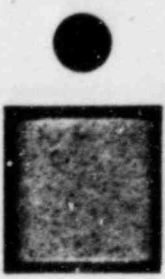
The Licensing Board confirms its rulings made during a conference of counsel for the parties and sets forth a list of contentions admitted for hearing.

ORDER FOLLOWING CONFERENCE WITH PARTIES

A conference with counsel was held pursuant to notice in this proceeding on April 5-6, 1982 at Bethesda, Maryland. Counsel representing the United States Department of Energy, Project Management Corporation and Tennessee Valley Authority (Applicants), the Staff, Natural Resources Defense Council and Sierra Club (Intervenors), and the State of Tennessee participated in the conference.

The Board considered and heard arguments on the Revised Statement of Contentions and Bases filed by the Intervenors on March 5, 1982. Responses and objections had been filed subsequently by Applicants and Staff. The Board also considered and ruled upon all motions regarding discovery then pending.

All parties agreed that the evidentiary hearing commencing August 24, 1982 would concern only LWA-1 issues (Tr. 425, 445). The Staff stated that it was on schedule for the June 22 issuance of the environmental



update report and for the July 9 issuance of the site suitability safety issues report. The Staff also stated that since LWA-2 safety matters will not be covered by the site suitability report, there is an improved chance that the document will be issued in late June, 1982 (Tr. 246-247).

Applicants and Intervenors agreed that the time for responses to requests for admissions would be the same as the time provided under the regulations regarding replies or answers to interrogatories, namely 14 days, plus one day allowance for expedited delivery of responses (Tr. 66-67).

Admissibility of Contentions

The Board determined the admissibility of the Intervenors' proposed contentions, which were set forth in their Revised Statement of Contentions and Bases. These proposed contentions included contentions as originally admitted in 1976, revised contentions, and new contentions. All Admitted and Renumbered Contentions are set forth in Appendix 1, thereto, and they are incorporated herein by reference. In considering these contentions at the conference, they were referred to as numbered in the Revised Statement of Contentions and Bases. They were renumbered if admitted.¹

Contention 1

Contention 1 asserted that the application is illegal because as a matter of law the LWA procedure is inapplicable to first-of-a-kind reactors such as the CRBR.

The Board denied Contention 1. The Board believes that as a matter of law, the LWA procedures do apply to the CRBR proceeding. Further, the denial of this contention as a pleading will not prejudice Intervenors because the applicability of LWA regulations can be challenged by proposed conclusions of law after a factual record has been developed at the evidentiary hearing. The contention as framed presents an ultimate legal question for the Board following the taking of evidence, rather than a factual issue or pleading (Tr. 98).

Contention 2

Contention 2, concerning the envelope of design basis accidents (DBAs) as including the core disruptive accident (CDA), was admitted. It was renumbered Admitted Contention 1 (Tr. 125).

¹ Discussion of contentions commences at Tr. 75.

Contention 3

Contention 3, concerning the adequacy of the analyses of CDAs by Applicants and Staff, was admitted. It was renumbered Admitted Contention 2. The Board overruled objections by Applicants and Staff, holding that language added by the Intervenor to the previously admitted (1976) contention only added to the clarity of the contention and did not expand its scope (Tr 135).

Contention 4

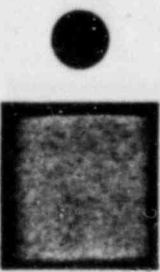
Contention 4, alleging that neither Applicants nor Staff has given sufficient attention to CRBR accidents other than the DBAs, was admitted. It was renumbered Admitted Contention 3. The Board overruled objections by Applicants and Staff to the addition of subsection (d), which concerns the factor of human error in accident analysis, finding there was sufficient specificity and nexus to the "lessons learned from TMI" to be considered by the Board (Tr. 142).

Contention 5

Contention 5, alleging that neither Applicants nor Staff adequately analyze the health and safety consequences of acts of sabotage, terrorism or theft directed against the CRBR or supporting facilities nor adequately analyze preventive programs, was admitted. It was renumbered Admitted Contention 4 (Tr. 148).

Contention 6

Contention 6, which questions the suitability of the site selected for the CRBR and suggests that an alternative site would be preferable, was admitted as revised to include reference to the Y-12 plant and references to population considerations (Tr. 149). It was renumbered Admitted Contention 5. The Board overruled objections by the Applicants and Staff to the addition of the reference to the Y-12 plant, finding that the Y-12 plant raises significant concerns involving public health and safety, in the context of alternative sites being preferable. The Board further noted that the inquiry into this Y-12 plant will not be qualitatively different from the inquiry into the other facilities mentioned in the original contention (Tr.



184). The Board overruled objections by the Applicants and Staff to the addition of references to "population density," "population characteristics" and "population disadvantages" on the grounds that consideration of population factors was reasonably within the scope of the contention as previously admitted in 1976 (Tr. 162).

Contention 9

Contention 9, which alleges that the SER and the FES do not include an adequate analysis of the environmental impact of the fuel cycle associated with the CRBR, was admitted. It was renumbered Admitted Contention 6 (TR. 210).

Contention 10

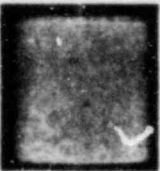
Contention 10, which alleges that neither Applicants nor Staff has adequately analyzed alternatives to the CRBR, was admitted. It was renumbered Admitted Contention 7. Subparagraph (a)(5) was renumbered as subparagraph (a)(3); subparagraph (d) was renumbered as subparagraph (b); and subparagraph (g) was renumbered as subparagraph (c) (Tr. 213).

Contention 14

Contention 14, which alleges that neither the unavoidable adverse environmental effects nor the costs associated with the decommissioning of the CRBR have been adequately analyzed by Applicants and Staff in the NEPA cost/benefit analysis, was admitted. It was renumbered Admitted Contention 8 (Tr. 233).

Contention 16

Contention 16, which alleges that neither Applicants nor Staff has given adequate attention to the presence of radioactive sediments already present in the Clinch River, was denied because the contention was untimely and the showing necessary for an untimely filing of a new contention was not made. The information necessary to set forth this contention was available to Intervenor in 1977 and the contention could and should have been pleaded at that time. The rules for filing an untimely contention (10 CFR §2.714) require a showing of good cause which, in this case, has not been shown (Tr. 271).



In determining whether to admit an untimely contention, the Board must consider the five factors set forth in 10 CFR §2.714(a)(1).²

Good cause for failure to file this contention has not been shown. The ER in 1976 addressed the monitoring of the Clinch River sediments, and for that reason NRDC was put on notice to this issue. The fact that a later document "triggered" NRDC to reexamine the 1976 ER does not suffice to meet the good cause factor.

A failure to show good cause for late filing means that the petitioner carries a heavier burden with respect to the other four factors. With respect to factors (ii) and (iii), the Board believes that the requirement that the ER contain a preconstruction radiological monitoring program, a construction radiological monitoring program and an operational radiological monitoring program and the requirement that the cost/benefit analysis in the FES consider the radiological effects of the facility and alternatives weigh against admittance of the contention. The substance of Intervenor's contention, concern regarding radioactive sediments existing in the Clinch River, will be addressed in these documents. Although the Intervenor's interest will not be represented by existing parties (factor iv), the Board does not believe this factor should be given much weight in light of the fact that the ER and FES must consider the radioactive sediments in the river.

Finally, with respect to factor (v), admittance of this contention would delay the proceeding by adding further areas of discovery and litigation to an already tight schedule.

Contention 17

Contention 17, which questions the availability of fuel for the CRBR, was denied as a matter of law. This contention concerns a policy or programmatic issue which, in accordance with the guidelines set forth by the Commission in its earlier decision,³ is outside the permissible scope of this proceeding. The contention involves questions of DOE policy and future actions which go wholly beyond the proper issues relevant to this particular plant⁴ (Tr. 283-4).

² (i) Good cause, if any, for failure to file on time.

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


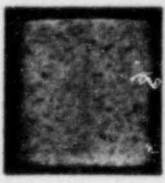
(iii) The extent to which the petitioner's participation will be expected to assist in developing a sound record.

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

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

³ CLI-76-13, 4 NRC 67, 78, 83-6, 92 (1976).

⁴ *Id.*, at 89.

Contention 18

Contention 18, which addresses the adequacy of the Applicants' quality assurance program, was amended to strike the following language appearing at the end of the first paragraph: "or that such program would protect the public health and safety adequately even if it complies with NRC requirements." The Board granted the amendment, but denied Intervenors' request to file the contention at this time. Quality assurance is an important matter that might be pleaded at the construction permit stage, rather than at the LWA stage. The denial of Contention 18 at this time will not bar Intervenors from filing a contention at the construction permit stage which addresses these matters with the specificity, bases and good cause which the Board feels is now lacking (Tr. 293).

Contention 19

Contention 19, which addresses the adequacy of Applicants' plans for coping with emergencies, was admitted by the Board and renumbered Admitted Contention 9 after the Board struck the following language at the end of the first paragraph:

"or that such plans would protect the public health and safety adequately even if they comply with NRC requirements."

However, the Board determined that this contention was premature for action at the LWA-1 phase, and therefore ordered that discovery and other actions by the parties with respect to this contention be deferred until after the evidentiary hearing and partial initial decision (Tr. 306).

Contention 20

Contention 20, concerning CRBR accidents beyond the design basis, was withdrawn by Intervenors after the Board indicated that the issues raised by Contention 20 are cognizable under previously Admitted (1976) Contentions 1, 2 and 3 (Tr. 330-331).

Contention 21

Contention 21, challenging the adequacy of Applicants' proposed system for classifying and categorizing postulated DBA's, was withdrawn by

Intervenors after the Board indicated that the issues raised by Contention 21 are cognizable under previously Admitted (1976) Contentions 1, 2, and 3 (Tr. 339).

Contention 22

Contention 22, alleging that neither Applicants nor Staff has demonstrated that the design of the containment reduce the doses during accidents to a level that is as low as reasonably achievable, was denied as a matter of law. The Board held that the ALARA regulations do not apply to accidents, but only to normal reactor operations. If at some future time the Commission changes the regulations, Intervenors may then be entitled to raise the question. The Board is bound by the existing regulations, and ALARA principles do not apply in the manner sought to be established by Intervenors (Tr. 341-342).

Contention 23

Contention 23, alleging that neither Applicants nor Staff has demonstrated that the facility will be provided with systems necessary to establish and maintain containment integrity capable of performing their functions during and after being exposed to certain specified environmental conditions, was admitted. It was renumbered Admitted Contention 10. However, all discovery and other actions relating to Contention 10 are deferred until after the IWA-1 evidentiary hearing and partial initial decision (Tr. 344).

Contention 24

Contention 24, alleging that neither Applicants nor Staff has shown that the CRBR can be constructed at the proposed location without undue risk to the health and safety of the public, was withdrawn by Intervenors after the Board indicated that the substance of Contention 24 is cognizable under Admitted Contention 2 (Tr. 346).

Contention 8

Contention 8, concerning the health and safety consequences which may occur if the CRBR merely complies with current NRC standards for

radiation protection of the public health, was admitted as modified. All parties agreed to a change in the language appearing in the second line of 8(d)(1) from "once in a lifetime organ dose" to "10 CFR §100.11 organ dose." The contention was renumbered Admitted Contention 11 (Tr. 362-363).

Agreements Regarding Discovery

All parties agreed to the following schedule for discovery prior to the LWA-1:

All parties will serve their first round of discovery, encompassing all requests relating to old contentions, by April 15, 1982, and will answer these requests by April 30, 1982, the date specified in the Board's Prehearing Order of February 11, 1982 (Tr. 367). In addition, all responses to discovery filed in the 1975-1977 period will be updated and served by April 30, 1982 (Tr. 368).

During the second round of discovery running from April 30 to June 18, 1982, the parties will proceed with follow-up discovery on questions relating to old contentions, and will conduct initial discovery with respect to new contentions. The discovery relating to new contentions will include new parts to old contentions, and will involve two rounds of discovery — a first set of questions seeking to elicit basic information and then any follow-up that is necessary (Tr. 368-369). Intervenors agreed to conduct discovery during the follow-up period on a contention-by-contention basis with respect to Applicants. Therefore, Applicants will receive all follow-up questions relating to each contention at the same time.

In addition, Intervenors agreed to try to develop a schedule for the follow-up discovery. This schedule would not necessarily bind Intervenors, but would set targets to allow the Applicants to plan for responses to discovery (Tr. 370).

Intervenors agreed to provide Staff with all the follow-up discovery requests at once, as Staff preferred. Staff agreed to answer interrogatories during this period, April 30 to June 18, 1982, on a 14-day turnaround basis. In addition, Intervenors need not go to the Board in the first instance for permission to conduct discovery on the Staff (Tr. 370).

All parties agreed that during the follow-up period, there may be a mix of discovery (Tr. 370). Parties may proceed by deposition rather than by interrogatory with respect to all matters, or utilize requests for admissions where such procedure is more efficient (Tr. 370-371).

Finally, all parties reserved the right to object to particular discovery requests on substantive grounds, *i.e.*, they may raise legal objections to

specific questions but not to this overall approach (Tr. 371). In addition, Staff reserved its right to object to a request on the grounds appearing in 10 CFR §2.720(h)(2)(ii) — that the answer is not necessary to the decision in this case or that the information is obtainable elsewhere. Staff agreed to give Intervenors 10 days notice if it intends to object or seek a protective order on those grounds (Tr. 380-381).

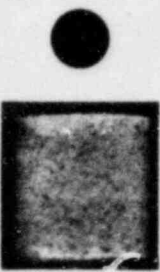
Motions

Applicants' March 29, 1982 Motion For A Protective Order

The Board considered and heard arguments on Applicants' Motion for a Protective Order, dated March 29, 1982 with regard to NRDC's (1) Sixteenth Set of Interrogatories, (2) Ninth Request for Admissions, and (3) Fifth Request for Production of Documents, all of which were served on March 18.⁵ The Board denied a protective order with respect to the discovery requests for information relating to Applicants' and EPA's position with regard to proposed occupational exposure limits. The Board granted NRDC's discovery request subject to the understanding that we will not permit a challenge to the occupational dose limit values set forth in 10 CFR Part 20. This is discovery going to certain effects in an accident sequence under 10 CFR §100.11. To the extent that the information NRDC seeks is illuminative as to a proper way to approach the question of exposures to actinides, we feel that this discovery is appropriate (Tr. 399-400).

All discovery requests regarding fuel availability were considered moot because the contention regarding fuel availability, old Contention 17, was not admitted. Intervenors withdrew voluntarily the following requests for admissions: 11, 13, 14, 20 and 22-24 because they related to old Contention 22, concerning the application of the ALARA principle to accidents, which was denied by the Board. The Board ordered Intervenors to strike the corresponding requests to the Staff. The Board ruled that Applicants shall answer the remaining requests concerning the ALARA principle because those requests are relevant to Admitted Contention 11(a), which also concerns the ALARA principle (Tr. 410).

⁵ The Board's ruling on objections to discovery request applies to Staff as well as to Applicants where Staff has made the same objection as Applicants to a discovery request (Tr. 400-401).

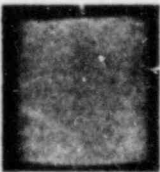


Finally, the Board ruled that Interrogatories 4 and 5, appearing at pages 7 and 8 of the Sixteenth Set of Interrogatories, and the request for production of documents at pages 1 and 2 of the Fifth Request for Production of Documents, which relate to Admitted Contention 4, need not be answered. These interrogatories and requests concern the adequacy of safeguards at DOE, DOD and NRC licensed facilities and are beyond the scope of the purpose for which Contention 4 was admitted — a NEPA cost/benefit analysis (Tr. 413).

Applicants' April 2, 1982 Motion For A Protective Order

The Board considered and heard arguments on Applicants' April 2, 1982 Motion for a Protective Order in regard to NRDC's Seventeenth Set of Interrogatories and Request to Produce to the Applicants. NRDC's Twenty-Third Set of Interrogatories to the Staff contained the corresponding interrogatories to the Staff. The Board sustained objections to the series of interrogatories addressed to safeguards in these sets of interrogatories. It is the Board's belief that this series of interrogatories goes well beyond the scope of permissible discovery with regard to safeguards. Applicants shall answer Interrogatories 1 and 19 of their set of interrogatories and Staff shall answer Interrogatories 1 and 20 of their corresponding set of interrogatories. No objection was raised as to these interrogatories (Tr. 421-432).

Objections To NRDC's Twenty-Second Set Of Interrogatories To The Staff And Motion For A Protective Order Of April 2, 1982



Staff's objections to NRDC's Twenty-Second Set of Interrogatories to the Staff were resolved by the parties. Those interrogatories which were identical to interrogatories disallowed against the Applicant were disallowed against the Staff (Interrogatories 4(a) through (e) and 5(a) and (b) under old Contention 5, Admitted Contention 4, and Interrogatories 7 and 8 under old Contention 8, Admitted Contention 11) (Tr. 431-432). The Staff withdrew objections to Interrogatories 3, 4, 5 and 9 because they were of the same nature as 7 and 8, which had been resolved by the Board. The Staff withdrew its objections to old Contention 24 based upon the understanding that the substance of Contention 24 was subsumed by Admitted Contention 2. The Staff withdrew objections to Interrogatories 10-12 based upon its understanding that such interrogatories became appropriate when Contention 8(d) was admitted as Contention 11(d) (Tr.

431-432). The Staff took a similar approach with respect to old Contention 23, Admitted Contention 10. The Staff and Intervenors agreed that interrogatories relating to Contention 10 are conceivably relevant to parts of Admitted Contentions 1, 2 and 3 (Tr. 430). Since the Board deferred discovery with respect to Contention 10 until after the LWA-1 evidentiary hearing and partial initial decision, a ruling as to which interrogatories will also be deferred will be delineated by the Board at the conference to be held on Tuesday, April 20, 1982, in Bethesda, Maryland.

Final Matters

All parties agreed that Contentions 4, 5, 6, 7, 8, and 11(a)-(d) were litigable at the LWA-1 stage and that 11(a) be deferred until the CP stage. The Board ruled that Contentions 9 and 10 were deferred for litigation and discovery until after the LWA-1 evidentiary hearing and partial initial decision (Tr. 435-437, 440-442). The parties were unable to resolve their differences at this conference as to which matters relating to Contentions 1, 2 and 3 were discoverable at the LWA-1 phase.

The Board and counsel for all parties will reconvene on Tuesday, April 20, 1982, Bethesda, Maryland for the purpose of ruling upon which matters will be addressed in ongoing discovery relating to Contentions 1, 2 and 3, and which will be deferred until after the LWA-1 evidentiary hearing and partial initial decision. The Board advised counsel to file more than two days in advance of the conference all written material which they wish to have considered at the conference (Tr. 465).

If any discrepancies exist between statements made by the Board at the conference and this Order, this Order shall be controlling.⁶

It is so ORDERED.

**FOR THE ATOMIC SAFETY AND
LICENSING BOARD**

**Marshall E. Miller, Chairman
ADMINISTRATIVE JUDGE**

Dated at Bethesda, Maryland
this 14th day of April, 1982.

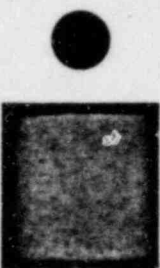
⁶ Dr. Cadet H. Hand, Jr. was unable to attend this conference because of teaching commitments at the University of California (Berkeley), but he requested the Board to proceed by a quorum. Judge Hand studied the Transcript and participated in the preparation of this Order, in which he concurs.

**APPENDIX I
ADMITTED AND RENUMBERED CONTENTIONS**


1. The envelope of DBAs should include the CDA.
 - a) Neither Applicants nor Staff have demonstrated through reliable data that the probability of anticipated transients without scram or other CDA initiators is sufficiently low to enable CDAs to be excluded from the envelope of DBAs.
 - b) Neither Applicants nor Staff have established that Applicants' "reliability program" even if implemented is capable of eliminating CDAs as DBAs.
 - (1) The methodology described in the PSAR places reliance upon fault tree and event tree analysis. Applicants have not established that it is possible to obtain sufficient failure mode data pertinent to CRBR systems to validly employ these techniques in predicting the probability of CDAs.
 - (2) Applicants' projected data base to be used in the reliability program is inadequate. Applicants have not established that the projected data base encompasses all credible failure modes and human elements.
 - (3) Even if all of the data described in Applicants' projected data base is obtained, Applicants have not established that CDAs have a sufficiently low probability that they may be excluded from the CRBR design bases.
 - (4) Applicants have not established that the test program used for their reliability program will be completed prior to Applicants' projected date for completion of construction of the CRBR.
2. The analyses of CDAs and their consequences by Applicants and Staff are inadequate for purposes of licensing the CRBR, performing the NEPA cost/benefit analysis, or demonstrating that the radiological source term for CRBRP would result in potential hazards not exceeded by those from any accident considered credible, as required by 10 CFR §100.1(a), fn. 1.
 - a) The radiological source term analysis used in CRBRP site suitability should be derived through a mechanistic analysis. Neither Applicants nor Staff have based the radiological source term on such an analysis.
 - b) The radiological source term analysis should be based on the assumption that CDAs (failure to scram with substantial core disruption) are credible accidents within the DBA envelope, should place an upper bound on the explosive potential of a

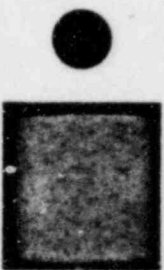
CDA, and should then derive a conservative estimate of the fission product release from such an accident. Neither Applicants nor Staff have performed such an analysis.


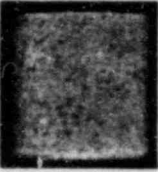
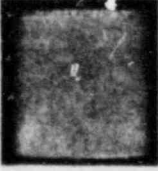
- c) The radiological source term analysis has not adequately considered either the release of fission products and core materials, e.g. halogens, iodine and plutonium, or the environmental conditions in the reactor containment building created by the release of substantial quantities of sodium. Neither Applicants nor Staff have established the maximum credible sodium release following a CDA or included the environmental conditions caused by such a sodium release as part of the radiological source term pathway analysis.
 - d) Neither Applicants nor Staff have demonstrated that the design of the containment is adequate to reduce calculated offsite doses to an acceptable level.
 - e) As set forth in Contention 8(d), neither Applicants nor Staff have adequately calculated the guideline values for radiation doses from postulated CRBRP releases.
 - f) Applicants have not established that the computer models (including computer codes) referenced in Applicants' CDA safety analysis reports, including the PSAR, and referenced in the Staff CDA safety analyses are valid. The models and computer codes used in the PSAR and the Staff safety analyses of CDAs and their consequences have not been adequately documented, verified or validated by comparison with applicable experimental data. Applicants' and Staff's safety analyses do not establish that the models accurately represent the physical phenomena and principles which control the response of CRBR to CDAs.
 - g) Neither Applicants nor Staff have established that the input data and assumptions for the computer models and codes are adequately documented or verified.
 - h) Since neither Applicants nor Staff have established that the models, computer codes, input data and assumptions are adequately documented, verified and validated, they have also been unable to establish the energetics of a CDA and thus have also not established the adequacy of the containment of the source term for post accident radiological analysis.
3. Neither Applicants nor Staff have given sufficient attention to CRBR accidents other than the DBAs for the following reasons:
- a) Neither Applicants nor Staff have done an adequate, comprehensive analysis comparable to the Reactor Safety Study



("Rasmussen Report") that could identify other CRBR accident possibilities of greater frequency or consequence than the accident scenarios analyzed by Applicants and Staff.

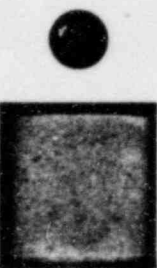
- b) Neither Applicants' nor Staff's analyses of potential accident initiators, sequences, and events are sufficiently comprehensive to assure that analysis of the DBAs will envelope the entire spectrum of credible accident initiators, sequences, and events.
 - c) Accidents associated with core meltthrough following loss of core geometry and sodium-concrete interactions have not been adequately analyzed.
 - d) Neither Applicants nor Staff have adequately identified and analyzed the ways in which human error can initiate, exacerbate, or interfere with the mitigation of CRBR accidents.
4. Neither Applicants nor Staff adequately analyze the health and safety consequences of acts of sabotage, terrorism or theft directed against the CRBR or supporting facilities nor do they adequately analyze the programs to prevent such acts or disadvantages of any measures to be used to prevent such acts.
- a) Small quantities of plutonium can be converted into a nuclear bomb or plutonium dispersion device which if used could cause widespread death and destruction.
 - b) Plutonium in an easily usable form will be available in substantial quantities at the CRBR and at supporting fuel cycle facilities.
 - c) Analyses conducted by the Federal Government of the potential threat from terrorists, saboteurs and thieves demonstrate several credible scenarios which could result in plutonium diversion or releases of radiation (both purposeful and accidental) and against which no adequate safeguards have been proposed by Applicants or Staff.
 - d) Acts of sabotage or terrorism could be the initiating cause for CDAs or other severe CRBR accidents and the probability of such acts occurring has not been analyzed in predicting the probability of a CDA.
5. Neither Applicants nor Staff have established that the site selected for the CRBR provides adequate protection for public health and safety, the environment, national security, and national energy supplies; and an alternative site would be preferable for the following reasons:
- a) The site meteorology and population density are less favorable than most sites used for LWRs.
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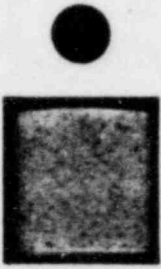
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- (1) The wind speed and inversion conditions at the Clinch River site are less favorable than most sites used for light-water reactors.
 - (2) The population density of the CRBR site is less favorable than that of several alternative sites.
 - (3) Alternative sites with more favorable meteorology and population characteristics have not been adequately identified and analyzed by Applicants and Staff. The analysis of alternative sites in the ER and the Staff Site Suitability Report gave insufficient weight to the meteorological and population disadvantages of the Clinch River site and did not attempt to identify a site or sites with more favorable characteristics.
- b) Since the gaseous diffusion plant, other proposed energy fuel cycle facilities, the Y-12 plant and the Oak Ridge National Laboratory are in close proximity to the site an accident at the CRBR could result in the long term evacuation of those facilities. Long term evacuation of those facilities would result in unacceptable risks to the national security and the national energy supply.
6. The ER and FES do not include an adequate analysis of the environmental impact of the fuel cycle associated with the CRBR for the following reasons:
- a) The ER and FES estimate the environmental impacts of the fuel cycle based upon a scale-down of analyses presented in the LMFBR Program Environmental Statement and Supplement for a model LMFBR and fuel cycle. The analyses of the environmental impacts of the model LMFBR and fuel cycle in the LMFBR Program Statement and Supplement are based upon a series of faulty assumptions.
 - b) The impacts of the actual fuel cycle associated with CRBR will differ from the model LMFBR and fuel cycle analyzed in the LMFBR Program Environmental Statement and Supplement. The analysis of fuel cycle impacts must be done for the particular circumstances applicable to the CRBR. The analyses of fuel cycle impacts in the ER and FES are inadequate since:
 - (1) The impact of reprocessing of spent fuel and plutonium separation required for the CRBR is not included or is inadequately assessed;
 - (2) The impact of transportation of plutonium required for the CRBR is not included, or is inadequately assessed;

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- (3) The impact of disposal of wastes from the CRBR spent fuel is not included, or is inadequately assessed;
 - (4) The impact of an act of sabotage, terrorism or theft directed against the plutonium in the CRBR fuel cycle, including the plant, is not included or is inadequately assessed, nor is the impact of various measures intended to be used to prevent sabotage, theft or diversion.
7. Neither Applicants nor Staff have adequately analyzed the alternatives to the CRBR for the following reasons:
- a) Neither Applicants nor Staff have adequately demonstrated that the CRBR as now planned will achieve the objectives established for it in the LMFBR Program Impact Statement and Supplement.
 - (1) It has not been established how the CRBR will achieve the objectives there listed in a timely fashion.
 - (2) In order to do this it must be shown that the specific design of the CRBR, particularly core design and engineering safety features, is sufficiently similar to a practical commercial size LMFBR that building and operating the CRBR will demonstrate anything relevant with respect to an economic, reliable and licensable LMFBR.
 - (3) The CRBR is not reasonably likely to demonstrate the reliability, maintainability, economic feasibility, technical performance, environmental acceptability or safety of a relevant commercial LMFBR central station electric plant.
 - b) No adequate analysis has been made by Applicants or Staff to determine whether the informational requirements of the LMFBR program or of a demonstration-scale facility might be substantially better satisfied by alternative design features such as are embodied in certain foreign breeder reactors.
 - c) Alternative sites with more favorable environmental and safety features were not analyzed adequately and insufficient weight was given to environmental and safety values in site selection.
 - (1) Alternatives which were inadequately analyzed include Hanford Reservation, Idaho Reservation (INEL), Nevada Test Site, the TVA Hartsville and Yellow Creek sites, co-location with an LMFBR fuel reprocessing plant (e.g., the Development Reprocessing Plant), an LMFBR fuel fabricating plant, and underground sites.
8. The unavoidable adverse environmental effects associated with the decommissioning of the CRBR have not been adequately analyzed, and the costs (both internalized economic costs and external social

costs) associated with the decommissioned CRBR are not adequately assessed in the NEPA benefit-cost balancing of the CRBR.

- a) There is no analysis of decommissioning in the Applicants' Environmental Report;
 - b) Environmental Impact Statements (EIS) related to LWRs prepared by NRC have been inadequate due in part to recently discovered omissions (see below), and the FES for the CRBR is no different;
 - c) A recent report "Decommissioning Nuclear Reactors" by S. Harwood; May, K.; Resnikoff, M.; Schlenger, B.; and Tames, P. (New York Public Interest Research Group (N.Y. PIRG), unpublished, January, 1976) indicates that (with the exception of the Elk River reactor) the isolation period following decommissioning of power reactors has been based on the time required for Co-60 to decay to safe levels. Harwood, et al. (p. 2) believe the previous analyses are in error because they have underestimated the significance of radionuclide, Ni-59. The time period for Ni-59 to decay to safe levels is estimated by Harwood, et al. (p. 2) for LWR to be at least 1.5 million years. The economic and societal implications of this 1.5 million year decay period are at present unknown.
 - d) Petitioner believes the NRC must systematically analyze all neutron activation products that may be produced in the proposed CRBR to determine the potential isolation period, following decommissioning, and then provide a comprehensive analysis of the costs (both economic and societal) of decommissioning.
9. Neither Applicants nor Staff have demonstrated that Applicants' plans for coping with emergencies are adequate to meet NRC requirements.
- a) The PSAR contains insufficient information regarding Applicants' ability to identify the seriousness and potential scope of radiological consequences of emergency situations within and outside the site boundary, including capabilities for dose projection using real-time meteorological information and for dispatch of radiological monitoring teams within the Emergency Planning Zones.
 - b) Applicants and Staff have failed to account properly for local emergency response needs and capabilities in establishing boundaries for the plume exposure pathway and ingestion pathway EPZs for the CRBR.

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- c) The PSAR contains insufficient analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, nor does it note major impediments to the evacuation or taking of protective actions.
 - d) The PSAR contains insufficient information to ensure the compatibility of proposed emergency plans for both onsite areas and the EPZs, with facility design features, site layout, and site location.
 - e) The PSAR contains insufficient information concerning the procedures by which protective actions will be carried out, including authorization, notification, and instruction procedures for evacuations.
 - f) Applicants' proposed emergency plans fail to take into account the special measures necessary to cope with a CDA, including the need for increased protective, evacuation and monitoring measures, reduced response time and special protective action levels.
 - g) Applicants and Staff have failed to provide adequate assurance that the proposed emergency plans will meet the requirements and standards of 10 CFR §50.47(b).
10. Neither Applicants nor Staff have demonstrated that the facility will be provided with systems necessary to establish and maintain safe cold shutdown and maintain containment integrity that are capable of performing their functions during and after being exposed to the environmental conditions.
- a) associated with postulated accidents, as required by General Design Criterion 4, 10 CFR Part 50, Appendix A; or
 - b) created by sodium fires or the burning (or local detonation) of hydrogen.
11. The health and safety consequences to the public and plant employees which may occur if the CRBR merely complies with current NRC standards for radiation protection of the public health and safety have not been adequately analyzed by Applicants or Staff.
- a) Neither Applicants nor Staff have shown that exposures to the public and plant employees will be as low as practicable (reasonably achievable).
 - b) Neither Applicants nor Staff have adequately assessed the genetic effects from radiation exposure including genetic effects to the general population from plant employee exposure.

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- c) Neither Applicants nor Staff have adequately assessed the induction of cancer from the exposure of plant employees and the public.
- d) Guideline values for permissible organ doses used by Applicants and Staff have not been shown to have a valid basis.
- (1) The approach utilized by Applicants and Staff in establishing 10 CFR §100.11 organ dose equivalent limits corresponding to a whole body dose of 25 rems is inappropriate because it fails to consider important organs, e.g., the liver, and because it fails to consider new knowledge, e.g., recommendations of the ICRP in Reports 26 and 30.
 - (2) Neither Applicants nor Staff have given adequate consideration to the plutonium "hot particle" hypothesis advanced by Arthur R. Tamplin and Thomas B. Cochran, or to the Karl Z. Morgan hypothesis described in "Suggested Reduction of Permissible Exposure to Plutonium and Other Transuranium Elements," *Journal of American Industrial Hygiene* (August 1975).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Peter B. Bloch, Chairman
Dr. Oscar H. Paris
Mr. Frederick J. Shon

In the Matter of

Docket No. 50-155
(Spent Fuel Pool Amendment)

CONSUMERS POWER COMPANY
(Big Rock Point Plant)

April 20, 1982

After the close of discovery, the Board rules that several subcontentions dealing with emergency planning have a basis and should be admitted for hearing. Previously, a broad emergency planning contention had been admitted for purposes of discovery, subject to a requirement that intervenors show further "specificity" before the hearing. The Board found that with respect to several subcontentions the intervenors had met the requirement.

RULES OF PRACTICE: SPECIFICITY

When a broad emergency planning contention is admitted for purposes of discovery, subject to a requirement that "specificity" be provided prior to a hearing, "specificity" should be interpreted in light of 10 CFR §2.714(b), as meaning that the intervenors must specify their basis for subcontentions admitted for hearing. Whether or not basis has been provided will be determined in light of the complete record, including the opportunity provided during discovery to uncover a basis and including an examination of applicant's response to each subcontention.

EMERGENCY PLANS: REACTORS GENERATING LESS THAN 250 MW THERMAL

10 CFR §50.47(c)(2) authorizes the reduction in size of emergency planning zones and ingestion pathways for nuclear power reactors generating less than 250 MW thermal. However, this authorization is on a case-by-case basis, requiring that the Commission determine whether a proposed license amendment, such as the expansion of a spent fuel pool, would affect the appropriateness of continued use of smaller-than-normal emergency zones.

EMERGENCY PLANS: IMPROBABLE EVENTS

Although the relative risk imposed by a plant may be considered in the case-by-case determination of whether smaller-than-normal emergency zones may be employed, it is generally the case that emergency planning is undertaken to guard against unlikely events. Since no one can estimate the combined likelihood of individually unlikely events, the Commission has required emergency plans as part of its defense-in-depth concept.

EMERGENCY PLANS: INCREASED RISK ASSOCIATED WITH LICENSE AMENDMENT

If a power reactor represents an increased risk to health and safety as the result of a proposed license amendment, then the adequacy of emergency plans to deal with that risk may be examined in a hearing. There is no requirement that there be some special feature of the proposed amendment which affects previously adopted emergency plans.

EMERGENCY PLANS: EARLY EVACUATION OF WOMEN AND CHILDREN

Appendix E requires that "protective measures be taken . . . within each EPZ to protect health and safety in the event of an accident." This general requirement permits a board to consider whether an applicant should be required to plan for the early evacuation of children and pregnant women during an emergency.

MEMORANDUM AND ORDER
(Motion to Strike Emergency Planning Contention)

This decision addresses a dispute among the parties concerning the proper status of the Christa-Maria, Joanne Bier, and Jim Mills (Christa-Maria) Contention 9, dealing with emergency planning (contention). This contention was admitted to discovery, subject to the requirement that the intervenor "should have to specify before the hearing the specific changes required in the emergency plan because of the increased fuel storage." LBP-80-4, 11 NRC 117 (1980) at 126.

At the outset, we confront a dispute concerning the meaning of the Board's requirement that specificity be provided before the hearing. Intervenor relies on the Board's language that "the Board accepts the contention" *Id.*, and construes this requirement to mean that its contention was admitted to the hearing but that prior to the hearing it needs to "specify" the changes in planning which the pool expansion are alleged to require, thus putting Consumers Power Company (applicant) on greater notice of what it would need to refute. Applicant opposes this interpretation of the Board's ruling by reference to 10 CFR §2.714(b), which requires that "the bases for each contention [be] set forth with reasonable specificity."

The Nuclear Regulatory Commission's staff (staff) first states that it interprets the Board's order as requiring that intervenors "provide the specificity necessary to put the parties on notice as to what they must oppose or defend against." NRC Staff Response to Licensee's Motion to Strike (Staff Response) at 4. Staff then states that:

The whole thrust of the Board's order with respect to Contention 9 was to allow discovery in the area of emergency planning in order that the contention could be made more specific. This would mean that Intervenor should refer to particular provisions of the Big Rock emergency plan, or to particular assumptions used in the formulation of the Big Rock plan and demonstrate that a change is necessary in these provisions or assumptions to account for the increased fuel to be stored on site.

Id. at 4-5.

We appreciate the difficulty the parties have had in interpreting the Board's order. Although the Board made no finding concerning the basis for Contention 9, its words indicated that it considered the contention admitted into the proceeding, and neither applicant nor staff sought to clarify the meaning of the order through a motion for reconsideration. On the other hand, the Board required that "specificity" be supplied before the hearing. One meaning of "specificity" is the meaning found in 10 CFR


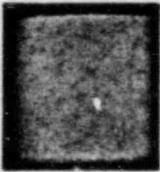
§2.714(b), which requires that "the bases for each contention [be] set forth with reasonable specificity." This is the most reasonable interpretation and is the meaning the Board intended.

The intervenors have attempted to provide the specificity required by the Board. In their first filing they attempted to list "arguments for the Board required nexus" and "discussion." Testimony of Christa-Maria, Joanne Bier, Jim Mills, Shirley John, and John O'Neill, January 25, 1982 (testimony), *passim*. Our reading of these sections persuades us that intervenors understood that they were being required to do two things: (1) clarify in what way the expansion of the spent fuel pool would require modification of the emergency plans for Big Rock, and (2) provide some basis for believing that there is a nexus between the expansion of the pool and the allegedly required modifications. In addition, we believe that intervenors reflected a sound interpretation of the Board's meaning. The requirement of "specificity" should be interpreted both in light of §2.714 and in light of the procedural context. In this case, the procedural context was the completion of discovery. At that stage of the proceeding, intervenors already have had an opportunity to assemble evidence. With evidence in their possession, they should be able to specify changes in the emergency plan together with their informed basis for believing that the changes are necessary. We believe that this interpretation of the Board's requirement is the correct one, and we shall apply that interpretation in this memorandum.

I. SPECIFIED CHANGES IN THE EMERGENCY PLAN

First, we have examined Christa-Maria's filings to determine which changes in the emergency plan have been specified to be in contest. Those changes follow:

- (1) The increased inventory of the fuel pool requires that the emergency plan be based on an inhalation pathway of 10 miles rather than 5 miles and on a 50 mile rather than a 30 mile ingestion pathway. Testimony at 4-5.
- (2) The Public Information pamphlet, which does not adequately inform people about radiation hazards, especially to children and pregnant women, should be improved. Testimony at 6, citing Brian Grimes, "director of the division of Emergency Preparedness." It also fails to educate the public properly about gamma ray radiation. Intervenors Specification of Changes, March 9, 1982 (Specification) at 3. In addition, the public, local officials and school officials should be more completely educated in problems of radiation exposure. *Id.* at 5.

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- (3) The Public Information pamphlet has not been properly distributed and should therefore be redistributed. Testimony at 8.
 - (4) Applicant should be required to assist persons without vehicles to leave the area. Testimony at 9.
 - (5) A current list of invalids should be kept so that they can be assisted in time of emergency. *Id.*
 - (6) Radiation monitoring is not sufficiently accurate. Specification at 3.
 - (7) Some of the people relied on in the emergency plan do not exist and there is poor coordination among those who do exist. *Id.*
 - (8) The public should be notified at the beginning of radiation releases rather than waiting for the situation to become critical; and evacuation should begin at an earlier time and at lower radiation doses. *Id.* at 4; Intervenor's Specification at 4.
 - (9) There should be separate plans for winter and summer. Testimony at 4.
 - (10) Communications deficiencies should be cured. *Id.* at 5.
 - (11) Children and pregnant women should be evacuated at much lower levels of radiation than in the current planning for the general public.

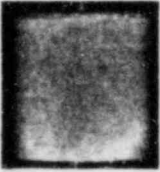
For the sake of convenience, we will refer to these items as subcontentions.

II. BASIS FOR SUBCONTENTIONS

Having decided which subcontentions were filed by Christa-Maria, we must now review each to see whether its basis has been set forth with reasonable specificity. We will discuss each subcontention in the order in which we have just listed them.

A. Subcontention (1): Size of Emergency Planning Zones

1. Christa-Maria's Allegations



Christa-Maria alleges that there are methods by which the entire contents of the enlarged fuel pool can be dispersed and that, consequently, it is not appropriate to apply planning zone areas for nuclear power facilities with less than 250 MWt capacity. Testimony at 4. They argue, first, that the number of fuel elements in the pool is being increased from 193 to 441. *Id.* at 2. Second, that this fuel is being added to a pool in which a substantial quantity of the stored fuel is plutonium enriched and therefore of increased toxicity. *Id.* at 1, 4. Third, that:

Breach of containment is a possibility that cannot be ruled out forever just because all rules, regulations and safety measures are designed to prevent this occurrence. Murphy's Law does exist, as do natural occurrences and the real possibility at Big Rock of the impact of an aircraft. None of the above can be fully regulated At least not to the 100% effect that is deemed necessary to protect the public

[Style changed for clarity.] *Id.* at 4-5. Christa-Maria also contends that the contents of the pool could be released from a hydrogen-steam explosion, such as might accompany a supercriticality incident. Specification at 2.

For its basis for this subcontention, Christa-Maria cites the following passage from page 4 of a December 6, 1972 Memo of James Shea, U.S. Atomic Energy Commission Docket No. 50-155:

The increased quantity of plutonium in the Big Rock Point core introduces the possibility that core neutronics are affected unfavorably or that the increased toxicity of plutonium results in an unacceptable increase in radiation doses to the public during normal or post accident conditions.

Cited on Specification at 2. (Although this passage deals with plutonium in the core, Christa-Maria offers it for its implications concerning plutonium in the fuel pool.)

Christa-Maria also states that the plant is not properly shielded for gamma radiation, which creates a problem with respect to the use of the standard evacuation zones. *Id.* at 2-3.

2. Arguments Opposing Basis

Applicant and Staff concur in the opinion that Christa-Maria has merely made a general attack on the overall adequacy of the emergency plan and has not shown that there is any assumption used in determining the Big Rock emergency planning zone which is rendered inaccurate because of the expansion. Applicant's Reply at 6; Staff's Response at 5. Applicant adds that the Big Rock emergency plan is based on Appendix E to 10 CFR Part 50 which applicant describes as assuming "accident conditions involving reactor core melt consequences." Applicant's Reply at 6. More particularly, applicant asserts that it informed Christa-Maria, in response to its Interrogatory 9-2, that the maximum release of radioactivity assumed for emergency planning purposes is a full core meltdown. *Id.* at 6. Applicant also stated that its response to Interrogatory 9-6 stated that "the emergency planning assumption of a complete meltdown and loss of containment integrity overwhelms any contribution made by the spent fuel." *Id.* at 7.

Applicant also argues that the fuel pool enlargement will not add any additional plutonium enriched fuel to the pool. It states that no additional MOX fuels will be discharged to the spent fuel pool after February 1982. *Id.* at 8.

To determine the credibility of applicant's assertion that the release from "a complete meltdown and loss of containment integrity overwhelms any contribution made by spent fuel", we examined applicant's answer to Christa-Maria Interrogatory 9-6. Answers of Consumer's Power Company, May 21, 1980 at 8. The authority for that statement is cited by applicant but is not discussed. We examined the two memoranda cited, RAE 83-79 and JLB 6-80. These memoranda appear to analyze the comparative radiation coming from an expanded fuel pool during a complete loss of water from the pool. RAE 83-79 at 1. They do not purport to analyze possible releases resulting from the crash of an airplane, from a super-criticality incident which might be accompanied by a zirconium cladding fire or from a cask drop incident resulting in a zirconium cladding fire. Nor do they purport to analyze possible accidents involving a combination of fuel pool and core releases. See Intervenor's Supplemental Response, April 13, 1982 at 3.

3. Conclusion

Our starting point for reviewing the competing factual and legal claims is 10 CFR §50.47(c)(2). Although only Christa-Maria mentioned the applicability of this regulation to the question before us, we think it important to cite the section in its entirety:

Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a nuclear power reactor shall be determined in relation to local emergency needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on case-by-case basis . . . for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.

This section makes it possible to treat a plant such as Big Rock, generating less than 250 MW thermal, on a "case-by-case" basis. However, our record does not show that the staff has ever made a case-by-case determination concerning the effect of the fuel pool expansion on the size of the emergency planning zones. See Safety Evaluation by the Office of

Nuclear Reactor Regulation Relating to the Modification of the Spent Fuel Storage Pool, May 15, 1982 (which does not discuss emergency planning at all). (Applicant cites a finding in the Environmental Impact Assessment that offsite radiological impacts would be environmentally insignificant, but we do not interpret that finding to extend to emergency events. Motion of Consumers Power Company to Strike, February 19, 1982 (Motion to Strike) at 9.) We find that a case-by-case evaluation of this spent fuel pool expansion is particularly necessary because of the use of restricted planning zones. Compare *Commonwealth Edison Company* (Zion Station, Units 1 and 2), LBP-80-7, 11 NRC 245 (1980) at 285.

Furthermore, we find that Christa-Maria has made plausible arguments concerning both the presence of an increased inventory of radioactive products and the mechanisms for dispersal. Applicant has not answered those arguments. Consequently, we conclude that Christa-Maria's arguments need to be evaluated and considered in making the required case-by-case determination. We therefore conclude that this subcontention has a basis and must be considered at the hearing.

We understand that our ruling will not please either applicant or staff. Both are likely to feel that the methods by which the fuel pool might be dispersed are too unlikely to deserve serious treatment. However, we consider the possibility of occurrence of improbable incidents such as these to be the reason the Commission has promulgated the emergency planning requirements, and it is not our role to question the wisdom of that policy choice. The need for emergency plans arises in an Alice-in-Wonderland World, where events occur which probabilistic risk assessment tells us to be highly unlikely. But what is unlikely? A piece of boilerplate in a steam generator at the Ginna plant caused a steam generator rupture. Sulphuric acid appears to have found its way into the primary coolant system at TMI-1. A dropped light bulb caused a transient at Rancho Seco. TMI-2 occurred as a result of a sequence of improbable events. Indeed, Murphy's Law is alive and well in reactors, justifying the Commission's continuing implementation of defense-in-depth concepts. Since no one can estimate the combined occurrence of highly improbable events, the Commission may be correct in promulgating a rule requiring emergency planning for such events.

B. Subcontention (2): Radiation Hazards Information and Training

1. Christa-Maria's Allegations

This contention rests on two legs. First, the argument, which we have just accepted as litigable, that the spent fuel pool expansion causes a greater risk in times of emergency. Second, the argument that Brian

Grimes, apparently the county (see Testimony at 9) director of the division of Emergency Preparedness, has found that the public information pamphlet distributed by Big Rock is weak in providing useful information about radiation hazards. Testimony at 6; Specification at 3.

2. Opposing Arguments

Applicant and staff contend that Christa-Maria has failed to show a connection between alleged deficiencies in its information pamphlet or in the training of its emergency pursuant and the *expansion* of the fuel pool. Applicant's Reply at 9; Staff's Response at 5.

3. Conclusions

10 CFR Part 50, Appendix E, IV.D.2. requires yearly dissemination to the public of "general information as to the nature and effects of radiation" 10 CFR §50.47(b)(15) requires radiological emergency response training for those who may be called to assist in an emergency.

We find that Christa-Maria has argued that the expansion of the fuel pool increases the risks which might lead to activation of emergency plans. Under that circumstance, we reject the argument that it does not matter whether the plans are adequate now because there is no *special* feature of the pool enlargement that calls for an improved plan. It is enough for Christa-Maria to show that the expansion contributes to a risk and that the reactor with its expanded pool has not been adequately protected against that increased risk. That the reactor may heretofore have been inadequately protected is not a sufficient defense against the allegation that it is not now adequately protected. (This conclusion has a widespread effect on other subcontentions and shall be called the "increased risk conclusion".)

We differentiate two branches of this subcontention. The first branch, concerning dissemination of information, has a basis in the statement of Brian Grimes. However, no basis is provided for the more specific charge that gamma ray exposure will be exacerbated by the expansion of the fuel pool and that there is a need to improve education about gamma rays. Nevertheless, the general contention concerning inadequate education is supported by a basis and gamma ray education arguments are admissible if they are shown to be linked to the overall contention about inadequate education. The second branch of this subcontention, relating to inadequate training, has a basis in the affidavit of the intervenors. See Testimony at 9.

Consequently, we accept this entire subcontention, modified to delete any explicit mention of gamma radiation.

C. Subcontention (3): Distribution of Public Information Pamphlet

Intervenors have alleged, without any citation to the record or to other authority, that applicant's public information pamphlet has not been distributed pursuant to regulations but has been "just laid out at several key places for people to take." Testimony at 8. However, this allegation is contained in an affidavit and applicant apparently has not contradicted this assertion of fact. Since Appendix E requires distribution of the pamphlet, as we have already discussed, it should be properly distributed and this unrebutted testimony of Christa-Maria establishes a basis for this subcontention. Furthermore, our acceptance of the increased risk conclusion requires us to find that this subcontention has a nexus to the pending application for amendment and that it should be admitted.

D. Subcontention (4): Assistance for People Without Vehicles

Intervenors state that applicant has refused to assist people without vehicles to leave the area in times of emergency. Testimony at 9. We do not find applicant contradicting this assertion. Furthermore, we find that there is a question under the regulations as to whether the requirements of 10 CFR §50.47(b)(8) for "adequate emergency facilities" can be met without providing transportation of some type for those without it. Having already accepted the increased risk conclusion, we must therefore also admit this subcontention.

E. Subcontention (5): Current List of Invalids

Intervenors state that the Sheriff keeps a list of invalids who would need assistance in an emergency but that the list is inadequate because it depends on voluntary action of the invalids to be on the list. Testimony at 9. For reasons parallel to those applying to contention (4), this subcontention also must be accepted.

F. Subcontention (6): Inadequate Radiation Monitoring

Intervenors have stated in their affidavit that compliance with technical requirements, such as installation of monitoring equipment, etc., has been continually deferred by the utility or is being reduced. Testimony at 8. They expanded on this in the subsequent Christa-Maria Specification at 3, by stating that monitoring depends on extrapolation with insufficient accuracy. These factual allegations have not been contradicted. See Applicant's Reply at 8-9. Furthermore, 10 CFR §50.47(b)(9) requires adequate monitoring. Having accepted the increased risk conclusion, we must therefore admit this subcontention.

G. Subcontention (7): Personnel Specification and Coordination

Intervenors' affidavit stated that there are insufficient personnel to insure proper control in case of an accident. Testimony at 8; Specification at 3. There is no specific contradiction of this subcontention, which apparently falls within 10 CFR §50.47(b)(3), (5) and (6) and may fall within other subsections as well. Consequently, we must also accept this subcontention.

H. Subcontention (8): Earlier Public Notification

Intervenors allege that expansion of the fuel pool would release higher amounts of radiation and at a faster rate. Testimony at 5. They assert that this requires that the public be notified earlier about the need to leave. Specification at 4. However, intervenors do not even state the current criteria for notification of the public and do not indicate why those specific criteria are deficient. Hence, they have not established a sufficient basis for this subcontention and it shall not be admitted.

I. Subcontention (9): Separate Plans for Winter and Summer

Intervenors have specified that there should be separate emergency plans for winter and summer, accommodating the difficulties of winter weather and the complications caused by large numbers of summer visitors. Specification at 4. Applicant recognizes that this assertion has been made but does not provide any specific factual reason for rejecting it. Applicant's Reply at 9. Hence, based on our acceptance of the increased risk conclusion, we must admit this subcontention.

J. Subcontention (10): Communications deficiencies

Intervenors have generally "specified" communications deficiencies. Specification at 5. This will not do. It provides inadequate notice of what is contended and appears to be without basis. (We carefully reread the Testimony without finding a basis.) Consequently, this subcontention must not be admitted.

K. Subcontention (11): Children and Pregnant Women

Intervenors allege that children and pregnant women are more susceptible to radiation and that provision should be made for them to leave early during an emergency. Specification at 3. Applicant does not assert that its plan makes such provision or that such a provision would not be helpful. Applicant's Reply at 9. It does assert that the Appendix E does not require

such a provision and that the subcontention therefore is in controvention of the regulations. *Id.*

We disagree with Applicant's interpretation of Appendix E, particularly with respect to section II.C. That section requires a description of "protective measures to be taken . . . within each EPZ to protect health and safety in the event of an accident." We interpret intervenors to be alleging that a specific protective measure must be included in the plan because it is required for the reasonable protection of the public. This particular suggestion also derives practical support from the TMI-2 experience, in which women and children were evacuated. Consequently, we find that this subcontention falls within the scope of the regulations and that pursuant to our incremental risk conclusion, this subcontention must be accepted.

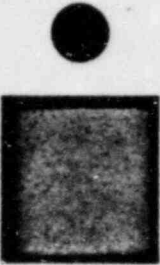
ORDER

For all the foregoing reasons and based on consideration of the entire record in this matter, it is this 20th day of April, 1982.

ORDERED

Christa Maria's Contention 9, previously admitted to discovery, is limited to the following subcontentions:

- (1) The increased inventory of the fuel pool requires that the emergency plan be based on an inhalation pathway of 10 miles rather than 5 miles and on a 50 mile rather than a 30 mile ingestion pathway.
- (2) Consumer Power Company (applicant) should improve its public information pamphlet to more adequately inform people about radiation hazards, particularly to children and pregnant women. In addition, the public, local officials and school officials should be more completely educated in problems of radiation exposure.
- (3) Applicant's public information pamphlet has not been properly distributed and should therefore be redistributed.
- (4) Applicant should be required to assist persons without vehicles to leave the area during an emergency evacuation.
- (5) A current list of invalids should be kept so that they can be assisted in time of emergency.
- (6) Applicant should comply with regulations requiring adequate radiation monitoring.

- 
- (7) Applicant's emergency plan should be revised so that it relies only on people who exist and have been properly identified and so that there will be adequate coordination among responsible personnel.
 - (8) Applicant should have separate emergency plans appropriate for summer and winter.
 - (9) Appropriate emergency plans should be made for children and pregnant women to evacuate at appropriate levels of radiation, considering their special susceptibility.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Peter B. Bloch, Chairman
ADMINISTRATIVE JUDGE

Oscar H. Paris,
ADMINISTRATIVE JUDGE

Frederick J. Shon
ADMINISTRATIVE JUDGE

Bethesda, Maryland

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Peter B. Bloch, Chairman
Jerry R. Kline
Hugh C. Paxton

In the Matter of

Docket Nos. 50-266-OLA
50-301-OLA

**WISCONSIN ELECTRIC POWER
COMPANY**

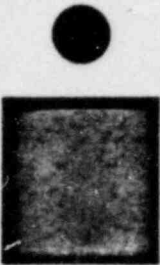
**(Point Beach Nuclear Plant,
Units 1 and 2)**

April 22, 1982

The Board rules that applicant must disclose to the intervenor the names and addresses of temporary employees of its contractor, hired to work on steam generator tube-sleeving demonstration project and applicant also must disclose information on the performance of plugs that had been inserted into degraded tubes. However, the Board also rules that questions related to reactor pressure vessel embrittlement are not relevant to a tube-sleeving proposal and that those questions need not be answered.

**RULES OF PRACTICE: INTERROGATORIES (PRIVACY OF
EMPLOYEES)**

The names and addresses of temporary employees who have worked on a tube sleeving project are relevant to intervenor's quest for information about quality assurance in a tube-sleeving demonstration project. Since applicants have not given any specific reason to fear that intervenors will harass these individuals, their names should be disclosed so that intervenors may seek their voluntary cooperation in providing information to them.



RULES OF PRACTICE: MOTION TO COMPEL

Information about the performance of plugs inserted into steam generator tubes may be relevant to the performance of sleeves which may be inserted into similar tubes or, in some cases, into the previously plugged tubes. Consequently, interrogatories about plugs must be answered in a license amendment proceeding involving the sleeving of steam generator tubes.

RULES OF PRACTICE: RELEVANCE OF INTERROGATORIES

Interrogatories concerning possible embrittlement of a reactor pressure vessel are not relevant to whether a tube sleeving proposal is safe and such questions need not be answered in a license amendment proceeding concerning a proposal to sleeve steam generator tubes.

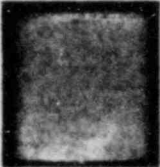
TECHNICAL ISSUES CONSIDERED:

Reactor pressure vessel embrittlement; steam generator tube sleeving; plugging steam generator tubes; pressure vessel embrittlement.

**MEMORANDUM AND ORDER
(Concerning a Motion to Compel)**

This motion addresses whether Wisconsin Electric Power Company (applicant) has an obligation to respond to certain interrogatories served on it by Wisconsin's Environmental Decade (Decade) on February 10, 1982. Decade's Motion to Compel was filed on March 28, 1982 and responded to by applicant on April 12, 1982. Then, on April 16, 1982, Decade filed a brief reply. The Nuclear Regulatory Commission's staff has declined to participate in this procedural dispute.

The disputed interrogatories address the following areas of concern: (1) the interrelationship between possible deterioration (embrittlement) of the reactor's pressure vessel due to irradiation and the safety of the proposed tube sleeving project; (2) the names, addresses and positions of workers temporarily employed on the tube sleeving project; and (3) information about leaking plugs. We have considered each of these categories of information separately. For reasons stated below, we have decided to order that applicant answer questions in the second and third categories but that it need not answer questions in the first category.



I. APPLICABLE PRINCIPLES

The principles applicable to motions to compel were discussed in a scholarly opinion by a Licensing Board whose chairman was the Hon. Max Paglin. *Boston Edison Company, et al. (Pilgrim Nuclear Generating Station, Unit 2)*, LBP-75-30, 1 NRC 579. The following passage is particularly helpful:

It has been uniformly recognized that the discovery rules are to be accorded a liberal treatment so that parties may obtain the fullest possible knowledge of issues and facts before trial, and that the inquiries are limited only by the requirement that they be reasonably relevant to a sensible investigation.

However, the authorities have also held that, as a rule of necessity, there must be limitations on the concept of relevancy so as ". . . to keep the inquiry from going to absurd and oppressive grounds."

[Footnote omitted.] *Id.* at 582; *Pennsylvania Power and Light Company and Allegheny Electric Cooperative, Inc. (Susquehanna Steam Electric Station, Units 1 and 2)*, ALAB-613, 12 NRC 317 (1980) at 322.

With respect to interrogatories concerning embrittlement, we face a tough question about whether embrittlement of the reactor vessel is relevant to an application for an amendment to authorize the sleeving of steam generator tubes. On this issue, we find the appeal board decision in *Consumers Power Company (Big Rock Point Nuclear Plant)*, ALAB-636, 13 NRC 312 (1981) helpful. In that case, intervenors argued that unless the fuel pool expansion were permitted the plant would have to cease operation; they therefore sought to raise environmental questions about whether the plant should be permitted to operate. However, the appeal board rejected that argument, finding that:

The federal action sought here is approval of a license amendment to expand the capacity of the Big Rock Point spent fuel pool by the addition of extra racks for the fuel assemblies; it is *not* approval to alter any other aspect of the facility or the term of the license.

Id. at 323. Similarly, applicant requests permission to sleeve corroded steam generator tubes but not to alter any other aspect of the facility or the term of the license. Although we are now ruling on safety issues rather than environmental issues, the principles of *Big Rock* are still applicable. Our proceeding is directed at the safety of the proposed amendment and not to the general safety of the *Point Beach* unit. Although intervenors are correct in arguing that the Commission has a general responsibility for the

safety of operating nuclear plants, this Board's jurisdiction is limited to issues legitimately before it and is not plenary. See Decade's Motion to Compel at 9.

II. EMBRITTLEMENT INTERROGATORIES

Decade is concerned that irradiation of the walls of the reactor pressure vessel have embrittled it, making it more susceptible to a rupture, possibly as the result of pressurized thermal shock. As Decade points out, a pressure vessel rupture would cause a very serious condition. In addition to creating a direct risk of an unrecoverable loss-of-coolant accident, a rupture could cause the coincident rupture of weakened steam generator tubes, leading to steam binding that would further interfere with attempts to reflood the reactor. *Id.* at 4.

At an earlier stage of this proceeding, we ruled on a similar but not identical question. At that stage, we required Decade to show cause why a sleeving demonstration program, involving permission to sleeve six steam generator tubes, should not be licensed. *Wisconsin Electric Power Company (Point Beach Nuclear Plant, Units 1 and 2)*, LBP-31-55, 14 NRC 1017 (1981). In the course of that proceeding, Decade contended that a possible embrittlement problem was grounds for not licensing the tube sleeving demonstration project. We rejected that argument, finding that Decade had failed to establish a basis for relating embrittlement to the safety of the tube sleeving demonstration project. *Id.* at 1026, citing Tr. 598.

Now we face a somewhat different question: whether discovery should be permitted either because the information sought is in controversy and would be admissible at a hearing or because "the information sought appears reasonably calculated to lead to the discovery of admissible evidence." 10 CFR §2.740(b)(1) and (2). It is this latter standard, concerning what can be "reasonably calculated" that differentiates the instant question from the question we previously decided. Compare Licensee's Response at 3-5. (We reject applicant's argument that we already ruled on this question at Tr. 736. Instead, we find that Tr. 736-739 makes it clear that we refrained from ruling at that time, awaiting the results of discussions among the parties.)

However, our review of Decade's filings fails to discover any showing of how the *sleeving* program would cause problems in the reactor pressure vessel or how discovery of information about embrittlement, or steps to remedy embrittlement, would lead in any way to information reflecting unfavorably on the safety of *sleeving*. Indeed, Decade seems to have things somewhat reversed. It seems to be arguing that if the sleeving program would weaken steam generator tubes then reactor vessel problems of

embrittlement and thermal shock would make this weakened condition dangerous. It also argues that a failure of steam generator tubes would cause special problems at Point Beach if the reactor core should be reconfigured in response to embrittlement problems, thereby increasing the cooling requirements in the center of the core during a loss of coolant accident.

For the purpose of analyzing the relevance of these arguments, let us assume that Decade can prove its underlying premise, that steam generator tubes would be weakened by sleeving and would be dangerous. If Decade demonstrates the truth of that premise, then it will have drawn the tube sleeving project into serious question. However, the validity of Decade's case depends on its proving the tube weakening may occur and does not depend on whether the reactor vessel is embrittled. Evidence of embrittlement would not contribute to the proof that sleeving weakened the tubes and is therefore dangerous. Further proof that the vessel is embrittled would be unnecessary icing on the cake, unessential to obtaining relief from a sleeving project that had been shown to be unsafe.

Our ruling will not, of course, resolve Decade's concerns about embrittlement. However, our jurisdiction is limited to the particular licensing amendment before us and to safety and environmental issues that have been admitted for consideration. To the extent that our authority is insufficient, Decade must look elsewhere for a remedy. It may, for example, investigate the possible applicability of a petition to the Director of the Office of Nuclear Reactor Regulation under 10 CFR §2.206. See, e.g. *Southern California Edison Company (San Onofre Nuclear Generating Station, Unit 1)*, DD-81-19, 14 NRC 1041 (1981).

III. NAMES OF TEMPORARY EMPLOYEES

Decade seeks to discover:

The names, last known addresses, and job titles of all persons who were employed by the Licensee or its contractors or sub-contractors to perform the fall 1981 demonstration sleeving program at Point Beach Nuclear Plant Unit 1.

Applicant objects to this form of discovery, stating that "the only reason it has the names of channel head workers (who were not Licensee's employees) is because of [required] personnel radiation exposure records." It relies on the government policy expressed in the Freedom of Information Act, 10 CFR §§9.5(a)(6) and 9.6, for the proposition that "personnel and medical files and similar files" need not be released. Licensee's Response at 8. It also argues, without submitting any supporting evidence, that disclosure of the requested information would expose more than 50 people and their families "to potential annoyance, embarrassment, intimidation, oppression,

and reprisals, such as harassing and threatening phone calls and vandalism." *Ibid.* It asserts that these results would flow from the specially sensitive nature of the nuclear industry.

Decade assures us, however, that it would conduct a select number of structured interviews that would be voluntary and polite and therefore nonintrusive. Decade's Motion to Compel at 10. Furthermore, Decade points out that it seeks to find out about the performance of transient workers hired to perform "the delicate installation of sleeves." *Id.* at 10. It considers this information sufficiently important that it is willing to agree to rely on an independent investigator appointed by the Commission to assemble the facts. *Id.* at 11.

We think the merits of this issue are clear. Decade has not shown that there were any quality assurance problems in the tube sleeving demonstration program. However, its interrogatories are directly related to its contention that transient workers are unreliable for those tasks. Hence, it is entitled to inquire further.

Since the requested records are not agency records and applicant is not an agency, the Freedom of Information Act is merely suggestive. All Decade is asking is the right to obtain the names of these workers for the purpose of asking their voluntary cooperation in obtaining relevant information. We have no reason to assume that these workers would object to being asked or that they would refuse voluntary cooperation in supplying information of potential importance to the health and safety of the public. Nor do we have any reason to believe that either Decade or the public would harass these individuals or that their identities would be released to the public.

Decade's motion to compel an answer to its interrogatory 11 shall be granted.

IV. LEAKING PLUGS

Decade made the following discovery request:

Please list all leaking plugs observed at Point Beach Nuclear Plant by unit, steam generator, row, column, and date observed.

State any and all studies, analyses or consideration of any kind given to leaking plugs.

Decade's First Interrogatories at 7-8. Applicant has not answered these interrogatories because it asserts that leaking plugs are "in no way related to the sleeving of steam generator tubes, and is thus totally outside the scope of this proceeding." Licensee's Response at 12.

Decade believes its interrogatories are relevant because of a Staff conclusion allegedly reached in a Safety Evaluation Report on Point Beach Unit 1. That report, said to have been dated November 30, 1979, allegedly

found that "the extent of the in-leakage *through tube ruptures* at Point Beach Nuclear Plant would be less than that needed to prevent reflood." Decade's Motion to Compel at 12.

Although we find Decade's explanation to be without merit because it is unrelated to the safety of tube sleeving (in a similar fashion to the lack of relevance of the embrittlement questions), we find that its interrogatories merit a response. Plugs are inserted into Point Beach tubes through mechanical and other means. The performance of those plugs may have direct relevance to the performance of sleeves inserted into identical tubes through arguably analogous processes. This data is relevant to the admitted contention, that:

Wisconsin Electric Power Company has not demonstrated that its sleeving program for the Point Beach Nuclear Plant, Units 1 and 2, can be conducted without endangering the health and safety of the public and will be conducted in compliance with the Commission's regulations.

Point Beach, LBP-81-45, 14 NRC 853 (1981) at 860. (For motions Decade may subsequently make, the contention has been restricted. *Point Beach*, LBP-82-19A, 15 NRC 623 (1982).) Furthermore, since some previously plugged tubes will be sleeved, the history of those previously plugged tubes could have a bearing on the sleeving process. We note as well that data on plugged tubes could be relevant to Decade's original contentions on a possibly corrosive environment in the annulus formed in the tube by sleeving.

Consequently, we will require applicant to respond to interrogatories 15 and 16.

ORDER

For all the foregoing reasons and based on consideration of the entire record in this matter it is this 22nd day of April, 1982.

ORDERED

Wisconsin Electric Power Company's (applicant) objections to the Wisconsin Environmental Decade's (Decade) February 10, 1982 Interrogatories # 11, 15 and 16 are found to be without merit but its objections to Interrogatories #1, 2, 3 and 4 are sustained. Hence, applicant shall respond

promptly to Interrogatories #11, 15 and 16. They are excused from responding to Interrogatories #1, 2, 3 and 4.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Peter B. Bloch, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

**Louis J. Carter, Chairman
Dr. Oscar H. Paris
Frederick J. Shon**

in the Matter of

Docket Nos. 50-247-SP
50-286-SP

**CONSOLIDATED EDISON
COMPANY OF NEW YORK
(Indian Point, Unit No. 2)**

**POWER AUTHORITY OF THE
STATE OF NEW YORK
(Indian Point, Unit No. 3)**

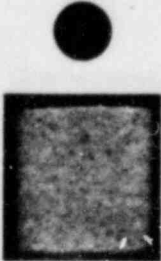
April 23, 1982

The Licensing Board sets forth the final formulation of all contentions to be litigated in this investigative proceeding along with the final intervenor assignments with respect to those contentions, and a schedule for discovery and hearing.

**MEMORANDUM AND ORDER
(Formulating Contentions, Assigning
Intervenors, and Setting Schedule)**

**CONTENTIONS AND
INTERVENOR ASSIGNMENTS**

At the Second Special Prehearing Conference held in White Plains, New York, on April 13 and 14, 1982, we heard argument from the Licensees, the NRC Staff, and the Intervenors with regard to the contentions formulated and intervenor responsibilities assigned by the Board in its



Memorandum and Order issued April 9, 1982. Upon consideration of the various and often conflicting points raised by the parties with respect to the contentions, we have determined that some contentions should be modified by the Board and others left standing as originally formulated. We have also considered proposals and argument for changes in the assignment of intervenor responsibilities and have determined what changes in assignment should be made.

The bases for the contentions formulated by the Board and set forth below rest in the bases and subparts of the subsumed intervenor contentions. We have deliberately avoided specifying detailed factual bases in our formulation of contentions because this is an investigative proceeding. Our responsibility, as we see it, is to bring to light *all* factual information which may assist materially in answering the Commission's questions. We are mindful of the Commission's instructions to conduct a focused proceeding, but we believe that we should not limit this investigation by imposing inflexible legal standards. To assure that the necessary focus is maintained, we intend to closely monitor discovery, testimony, and cross examination, to determine its relevance and materiality. Irrelevant or frivolous questions and tactics will not be tolerated in this proceeding.

In order to provide the parties and participants to this proceeding with a single document that conveniently lists the Commission's Questions (from the Commission's January 8, CLI-81-1, 13 NRC 1, and September 18, 1981, CLI-81-23, 14 NRC 610, Orders), the final formulation of all contentions to be litigated in this investigative proceeding, and the final intervenor assignments with respect to those contentions, we are repeating herein unmodified contentions as well as those contentions which we have modified. Unchanged intervenor assignments and the Commission's Questions are repeated, also. The discussion is organized on the basis of the six Commission Questions, and parties are identified in the Appendix.

Commission Question 1:

1. What risk may be posed by serious accidents at Indian Point 2 and 3, including accidents not considered in the plants' design basis, pending and after any improvements described in (2) and (4) below? Although not requiring the preparation of an Environmental Impact Statement, the Commission intends that the review with respect to this question be conducted consistent with the guidance provided the staff in the Statement of Interim Policy on "Nuclear Power Plant Accident Considerations under the Na-

tional Environmental Policy Act of 1969;" 44 FR 40101 (June 13, 1980).⁵

⁵In particular, that policy statement indicates that:

Attention shall be given both to the probability of occurrences of releases and to the environmental consequences of such releases;

The reviews "shall include a reasoned consideration of the environmental risks (impacts) attributable to accidents at the particular facility or facilities . . .";

"Approximately equal attention should be given to the probability of occurrence of releases and to the probability of occurrence of the environmental consequences . . ."; and

Such studies "will take into account significant site and plant-specific features . . ."

Thus, a description of a release scenario must include a discussion of the probability of such a release for the specific Indian Point plants.

Contention 1.1

We have determined that Contention 1.1 should be modified, but there need be no change in intervenor assignment. As accepted for litigation, Contention 1.1 states as follows:

- 1.1 The accident consequences that would be suffered by the public, even allowing for emergency planning measures, and their associated probabilities combine to produce high safety risks or risks of environmental damage including: prompt fatalities, early fatalities, early and latent illnesses, fatal and non-fatal cancers, thyroid nodules, genetic effects, and contamination of buildings, soils, waters, agricultural lands, recreational lands, and wildlife areas.

This contention is based on the following intervenor contentions:

UCS/NYPIRG I(B)(5), III(B), III(D), IV(A)

FOE/Audubon I, II

Parents I

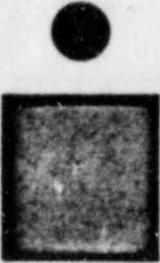
Lead Intervenor: **UCS/NYPIRG**

Contributing Intervenors: **FOE/Audubon** with respect to effects on buildings, soils, waters, agricultural lands, recreational lands, and wildlife areas.

Parents with respect to the special susceptibility of children to radiation.

Commission Question 2:

2. What improvements in the level of safety will result from measures required or referenced in the Director's Order to the licensee,



dated February 11, 1980? (A contention by a party that one or more specific safety measures, in addition to those identified or referenced by the Director, should be required as a condition of operation would be within the scope of this inquiry if, according to the Licensing Board, admission of the contentions seems likely to be important to resolving whether (a) there exists a significant risk to public health and safety, notwithstanding the Director's measures, and (b) the additional proposed measures would result in a significant reduction in that risk.)

Contention 2.1

We have determined that Contention 2.1 need not be modified, nor is a change in intervenor assignment required. As accepted for litigation, Contention 2.1 reads as follows:

2.1 The following additional specific safety measures should be required as conditions of operation:

- a) A filtered vented containment system for each unit must be installed.
- b) License conditions must be imposed to prohibit power operations with less than a fully operable complement of safety-grade and/or safety-related equipment.
- c) A "core-catcher" must be installed at each unit to provide additional protective action time in the event of a "melt-through" accident in which the reactor pressure vessel is breached by molten fuel.
- d) A separate containment structure must be provided into which excess pressure from accidents and transients can be relieved without necessitating releases to the environment, thereby reducing the risk of containment failure by overpressurization.

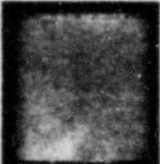
This contention is based on the following intervenor contentions:

UCS/NYPIRG III(A)d., f., g., h.

Lead Intervenor: UCS/NYPIRG

Contributing Intervenors: None

Contention 2.2



WBCA, the intervenor from whose contentions the Board formulated Contention 2.2, argued that an important element had been omitted by the

Board's formulation of the contention. WBCA directed attention to language in its filing of January 11, 1982, relating to inadequate quality control and operational errors. Tr. 625-27. Upon consideration of this pleading, and all objections thereto, we have determined that Contention 2.2 should be modified by the addition of subcontention (d). As accepted for litigation, Contention 2.2 reads as follows:

2.2 The following additional specific safety measures should be required as conditions of operation:

- a) The cooling system at the plants should be changed so that it no longer uses brackish Hudson River water. This change is needed to combat safety-related corrosion problems.
- b) A solution to the radiation embrittlement problem in the units' reactor pressure vessels must be found and implemented.
- c) A solution to the problem of steam generator tube deterioration must be found and implemented.
- d) A complete review of both plants must be undertaken to discover and correct flaws resulting from poor quality control in construction and in operation.

This contention is based on the following intervenor contentions:

WBCA 2 (filing of January 11, 1982)

Lead Intervenor: WBCA

Contributing Intervenors: None.

Commission Question 3:

3. What is the current status and degree of conformance with NRC/FEMA guidelines of state and local emergency planning within a 10-mile radius of the site and, of the extent that it is relevant to risks posed by the two plants, beyond a 10-mile radius? In this context, an effort should be made to establish what the minimum number of hours warning for an effective evacuation of a 10-mile quadrant at Indian Point would be. The FEMA position should be taken as a rebuttable presumption for this estimate.

Contention 3.1

We have determined that Contention 3.1 needs only minor editorial corrections. RSCE pointed out that they should be listed as contributing intervenors. Tr. 673-4. The Board agreed. As accepted for litigation, Contention 3.1 reads as follows:

3.1 Emergency planning for Indian Point Units 2 and 3 is inadequate in that the present plans do not meet any of the sixteen mandatory standards set forth in 10 CFR 50.47(b), nor do they meet the standards set forth in Appendix E to 10 CFR Part 50.

This contention is based on the following intervenor contentions:

USC/NYPIRG I(A)

WESPAC 1, 2, 3

RCSE (2), (3), (5)

Lead Intervenor: UCS/NYPIRG

Contributing Intervenor: WESPAC with respect to New York State Radiological Emergency Plan and deficiencies therein relating to notification, communications, training, drills, equipment, and procedures. RCSE with respect to whether plans comply with 10 CFR 50.47(b)(6) and (7) and NUREG-0654.

Contention 3.2

We have determined that Contention 3.2 needs additional specificity. With regard to intervenor contributions to the litigation of the contention, Parents requested that their contribution be expanded to include those entrusted with the care of children. Tr. 668-674. WBCA argued that it had raised the issue of whether it was reasonable to assume that the plant operators would remain at their posts during an emergency. Tr. 680-682. We have decided that these requested changes should be made in the intervenor assignments. Contention 3.2 as accepted for litigation, and the revised intervenor assignments, are as follows:

3.2 Emergency planning for Indian Point Units 2 and 3 is inadequate in that the plans make erroneous assumptions about the response¹ of the public and of utility employees during radiological emergencies.

This contention is based on the following intervenor contentions:

UCS/NYPIRG I(B)(1)

WESPAC 4

Parents III

WBCA, filing dated January 11, 1982

¹ Human response here refers to responsive actions by persons, as opposed to psychological stress response, which we deal with later.

Lead Intervenor: **UCS/NYPIRG**

Contributing Intervenor: **WESPAC** with respect to problems of local traffic flows.

Parents with respect to the special problems of the response of children and those entrusted with their care during emergencies.

WBCA with respect to the behavior of the utility companies' employees during emergencies.

Contention 3.3

We have determined that Contention 3.3 needs only minor editorial change, and no change need be made in assignment of intervenors. As accepted for litigation, Contention 3.3 reads as follows:

3.3 The present estimates of evacuation times, based on NUREG-0654 and studies by CONSAD Research Corporation and by Parsons, Brinckerhoff, Quade & Douglas, Inc., are unreliable. They are based on unproven assumptions, utilize unverified methodologies, and do not reflect to the actual emergency plans.

This contention is based on the following intervenor contention:

UCS/NYPIRG I(B)(2)

WBCA 3

RCSE (1)

Lead Intervenor: **UCS/NYPIRG**

Contributing Intervenor: **WBCA** with respect to applicability of FEMA estimates from NUREG-0654.

RCSE with respect to the Rockland County Radiological Emergency Response Plan.

Contention 3.4

WESPAC argued that its contention number 2 said essentially the same thing as the Board's contention 3.4 and requested designation under this contention as a contributing intervenor. That request was granted at the Second Special Prehearing Conference. Tr. 678. The contention itself needs only editorial modification. As accepted for litigation, Contention 3.4 reads as follows:

3.4 The Licensees cannot be depended upon to notify the proper authorities of an emergency promptly and accurately enough to assure effective response.

This contention is based on the following intervenor contention:

RCSE (1)

WESPAC 2

Lead Intervenor: **RCSE**

Contributing Intervenor: **WESPAC**

Contention 3.5

The Board has determined that this contention is related more directly to Commission Question 4 than to Question 3. It is therefore listed herein as Contention 4.6. There will be no Contention 3.5.

Contention 3.6

WESPAC argued that its contention 3, basis D, should be subsumed under Board Contention 3.6 and requested contributing intervenor status. The Board agreed. Tr. 678. Contention 3.6 as admitted for litigation and the extent of WESPAC's contribution are as follows:

3.6 The emergency plans and proposed protective action do not adequately take into account the full range of accident scenarios and meteorological conditions for Indian Point Units 2 and 3.

This contention is based on the following intervenor contentions:

UCS/NYPFIRG I(B)(3)

WESPAC 3, basis D

Lead Intervenor: **UCS/NYPFIRG**

Contributing Intervenor: **WESPAC** with respect to the impracticality of conducting effective drills covering all likely conditions.

Contention 3.7

We have determined that this contention need not be modified. *Parents*, however, requested that basis (15) of their contention I be added to the

others listed in our Order of April 9, 1982. The Board agreed. As accepted for litigation Contention 3.7 reads as follows:

3.7 The problems of evacuating children from threatened areas have not been adequately addressed in the present emergency plans.

This contention is based on the following intervenor contention:

Parents I, bases (4), (5), (6), (7), (15)

Lead Intervenor: **Parents**

Contributing Intervenor: None

Contention 3.8

The Board has determined that Contention 3.8 would more appropriately be considered with respect to Commission Question 4. It is therefore listed herein, as modified, under the number 4.7. There will be no Contention 3.8.

Contention 3.9

The Board has determined that Contention 3.9 need not be modified. As accepted for litigation, Contention 3.9 reads as follows:

3.9 The road system in the vicinity of the Indian Point plant is inadequate for timely evacuation.

This contention is based on the following intervenor contentions:

WESPAC 5

WBCA 1, 5

Co-lead Intervenor: **WESPAC** with respect to Westchester County

WBCA with respect to Rockland County

Contributing Intervenor: None

Commission Question 4:

4. What improvements in the level of emergency planning can be expected in the near future, and on what time schedule, and are there other specific offsite emergency procedures that are feasible and should be taken to protect the public?

Contention 4.1

Upon consideration of the argument heard at the Second Special Prehearing Conference, the Board has determined that Contention 4.1 should be modified. Tr. 743 ff. In addition, Parents requested a minor change with respect to the responsibility assigned to it. Contention 4.1 as accepted for litigation reads as follows:

- 4.1 The plume exposure pathway EPZ should be expanded from its present 10-mile radius in order to meet local emergency response needs and capabilities.²

This contention is based on the following intervenor contentions:

UCS/NYPIRG II(A), II(B), III(C)

Parents II, basis (7)

Lead Intervenor: UCS/NYPIRG

Contributing Intervenor: **Parents** with respect to children, those responsible for the care of children, and child care institutions and their locations.

Contention 4.2

We have determined that no modification of Contention 4.2 is necessary, nor is any change in intervenor assignments needed. As accepted for litigation, Contention 4.2 reads as follows:

- 4.2 The following specific, feasible off-site procedures should be taken to protect the public:
- a) Potassium iodide should be provided in an appropriate form for all residents in the EPZ.
 - b) Adequate sheltering capability should be provided for all residents in the EPZ.

² The Board has considered the argument by Licensees that this contention is a challenge to NRC regulations and therefore should be disallowed. See Tr. 769 ff. We reiterate our belief, stated in fn 4 of our April 9, 1982 Order, that this contention does not, in fact, challenge 10 CFR §50.47 and Appendix E, but is in accordance with it. Further, we reconfirm our conviction that we are authorized by fn. 4, as revised, in the Commission's Orders of January 8 and September 18, 1981 to accept contentions addressed to the Commission's Questions, if those contentions seem likely to be important in resolving the Commission's Questions, even though the contentions may urge requirements for Indian Point beyond the Regulations. Con Edison's citation of the transcript of the Commission's September 11, 1981 meeting illustrates the reason for the provision under 10 CFR §9.103 that statements of Commissioners in open meetings may not be pleaded or cited in any proceeding under Part 2 except as the Commission may direct.

- c) License conditions should prohibit power operation of Units 2 and 3 when the roadway network becomes degraded because of adverse weather conditions.
- d) The roadway network should be upgraded to permit successful evacuation of all residents in the EPZ before the plume arrival time.

This contention is based on the following intervenor contentions:

UCS/NYPIRG III(A)

RSCE (4)

Lead Intervenor: **UCS/NYPIRG**

Contributing Intervenor: **RCSE** with respect to the adequacy of sheltering as a protective action.

Contention 4.3

FOE/Audubon pointed out that the basis accepted by the Board in its Contention I needed to be expanded to be understandable, and the Board agrees. Tr. 707-8. In addition, WESPAC requested that it be added as a contributing intervenor with respect to upgrading roads in Westchester County. Tr. 791. As accepted for litigation, Contention 4.3 reads as follows:

4.3 There are no feasible offsite emergency procedures which can adequately protect the public.

This contention is based on the following intervenor contentions:

FOE/Audubon I

WBCA question number 4 in the filing of January 11, 1982

WESPAC 5

Lead Intervenor: **FOE/Audubon**

Contributing Intervenor: **WBCA** with respect to the impossibility of upgrading the road network in Rockland County.
WESPAC with respect to the impossibility of upgrading the road network in Westchester County.

Contention 4.4

We have determined that Contention 4.4 need not be modified, but some changes in intervenor assignment should be made. WBCA indicated

its interest in co-lead status with WESPAC, with the two intervenors taking responsibility for Rockland and Westchester Counties, respectively. Tr. 809 ff. UCS/NYPIRG pointed out its interest in contributing to this Board contention, as reflected in certain UCS/NYPIRG contentions. Tr. 746-7. As accepted for litigation, Contention 4.4 reads as follows:

4.4 The emergency plans should be upgraded by taking account of special groups with special needs in emergencies. In particular, provision must be made for evacuating persons who are dependent upon others for their mobility.

This contention is based on the following intervenor contentions:

WESPAC 6

Parents I, basis (22); II, basis (7)

UCS/NYPIRG IB(2), IA basis (7)

Co-lead Intervenors: **WESPAC** with respect to Westchester County.

WBCA with respect to Rockland County.

Contributing Intervenors: **Parents** with respect to special problems associated with children and those responsible for the safety of children.

UCS/NYPIRG with respect to non-English speaking residents, the hearing-impaired, persons with learning disabilities, and "latch-key" children.

Contention 4.5

We have decided to substitute the word "risk" for the word "consequences" in Contention 4.5, to make it more responsive to the wishes of the Commission as expressed in its Order of January 8, 1981 (CLI-81-1, 13 NRC 1). No change in intervenor assignment is required. The contention, as accepted for litigation, reads as follows:

4.5 Specific steps must be taken by NRC, State, and local officials to promote a public awareness that nuclear power plant accidents with substantial offsite risks are possible at Indian Point.

This contention is based on the following intervenor contention:

UCS/NYPIRG I(B)(7)

Lead Intervenors: **UCS/NYPIRG**

Contributing Intervenors: None

Contention 4.6 (formerly Contention 3.5)

We have determined that no modification of this contention is required, but Parents will be added as a contributing intervenor with respect to exposure level for children. Tr. 699. As accepted for litigation Contention 4.6 reads as follows:

4.6 A maximum acceptable level of radiation exposure for the public must be established before any objective basis will exist for adequate emergency planning.

This contention is based on the following intervenor contention:

UCS/NYPIRG I(B)(6)

Lead Intervenor: **UCS/NYPIRG**

Contributing Intervenors: **Parents** with respect to a maximum acceptable radiation exposure level for children.

Contention 4.7 (formerly Contention 3.8)

Several intervenors argued that the Board had formulated this contention too narrowly, and we agree. The contention has been modified accordingly, and new intervenor assignments have been made as appropriate. See Tr. 673 ff, 802 ff. As accepted for litigation Contention 4.7 reads as follows:

4.7 The present emergency planning brochures and present means of alerting and informing the population of an emergency do not give adequate attention to problems associated with persons who are deaf, blind, too young to understand the instructions, or who do not speak English.

Lead Intervenors: **Parents**

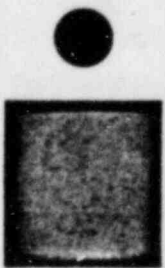
Contributing Intervenors: **WESPAC** with respect to present means of alerting and informing the population of an emergency.

WBCA with respect to surveying to determine whether the brochure has been read and understood.

RCSE in general.

Commission Question 5:

5. Based on the foregoing, how do the risks posed by Indian Point Units 2 and 3 compare with the range of risks posed by other



nuclear power plants licensed to operate by the Commission? (The Board should limit its inquiry to generic examination of the range of risks and not go into any site-specific examination other than for Indian Point itself, except to the extent raised by the Task Force.)

Contention 5.1

We have determined that no change is required in either the wording or there intervenor assignment of Contention 5.1. As accepted for litigation the contention reads as follows:

- 5.1 The risks associated with Indian Point Units 2 and 3 are greater than those associated with many other operating nuclear power plants. These greater risks result from the design and operating conditions of the plants.

This contention is based on the following intervenor allegation:

WBCA letter of December 2, 1981

Lead Intervenor: **WBCA**

Contributing Intervenor: None

Board Question on Commission Question 5

The Board Question on Commission Question 5 has been re-worded to make the question understandable standing alone. The Board Question now reads as follows:

What bearing does the fact that Indian Point has the highest population within 10, 30, and 50 miles of any nuclear plant site in the United States have on the relative risk of Indian Point compared to other plants?

The staff shall address this question. Other parties are invited to address it also.

Commission Question 6:

6. What would be the energy, environmental, economic or other consequences of a shutdown of Indian Point Unit 2 and/or Unit 3?

Contention 6.1

6.1 An economic consequence of the shutdown of Indian Point Units 2 and 3 would be a economic benefit accruing to Rockland County through the sale of replacement power.

This contention is based on the following intervenor contention:

WBCA question 6, filing of January 12, 1982

Lead Intervenor: **WBCA**

Contributing Intervenor: None

Contention 6.2

We have determined that no change need be made in the wording of Contention 6.2, given the understanding provided in the footnote. Nor need there be any change in intervenor assignment. As accepted for litigation the contention reads as follows:

6.2 The physical and psychological³ environment of children will be improved by permanently shutting down the Indian Point Nuclear Power Station.

This contention is based on the following intervenor contention:

Parents IV

Lead Intervenor: **Parents**

Contributing Intervenor: None

Contention 6.3

We have determined that this contention was made sufficiently specific in the pleading of GNYCE dated April 9 and served on the Board April 12, 1982,⁴ and during the Second Special Prehearing Conference.

³ The litigation of psychological aspects of this contention will be held in abeyance pending issuance of an opinion by the court in *PANE v NRC*, Docket No. 81-1131, D.C. Court of Appeals, and any NRC policies or regulations issued as a result of that decision. The reference to physical environment here relates to radiation released offsite by Indian Point Units 2 and 3, radiation spills during transportation of radioactive waste from the plants, and radioactive effluents released into the Hudson River. Tr. 912-13.

⁴ GNYCE responded adequately to our instructions in the Memorandum and Order dated April 9, 1982, and is hereby admitted to intervenor status.

We formulate Contention 6.3 as follows:

- 6.3 Considering the savings in operating expense which would result from shutting down Indian Point Units 2 and 3, and allowing for the ways in which cogeneration and conservation can mitigate the costs of replacement power, the net costs of shutdown are small; in fact, they are smaller than previous studies by UCS, GAO, or Rand suggest, and are entirely acceptable.

Lead Intervenor: GNYCE

Contributing Intervenor: UCS/NYPIRG

TREATMENT OF MATTERS NOT IN CONTENTIONS

The Board expects the Licensees and the NRC Staff to submit evidence in response to the Commission's six Questions sufficient, in these parties' opinions, to insure that the Board has before it the full and complete information necessary to give accurate answers and recommendations to the Commissioners. Licensees and Staff must not limit their evidence so as to merely respond to contentions.

Other parties shall submit such evidence as they deem relevant to support their contentions and may submit such other evidence as they deem necessary to answer the Commission's Questions.

DISCOVERY AND HEARING SCHEDULE

We have reviewed the discovery and hearing schedules suggested by the parties at the Second Special Prehearing Conference and considered the arguments related thereto. We have determined that the hearing schedule proposed by the NRC Staff and supported by several intervenors should be accepted, for the reasons advanced by those parties. We agree that the absence of a FEMA witness between July 8 and August 9, 1982, makes it essential for us to hear testimony on Questions 3 and 4 in June. We also agree with the intervenors that the recent issuance of the Licensees' 12-volume "Indian Point Probabilistic Safety Study" makes it desirable that testimony on risk analysis be delayed to give the parties, the Staff, and the Board more time to study the report.

We are setting forth the initial discovery schedule in order to get formal discovery underway at once. Additional discovery scheduling will be ordered by the Board as the proceeding progresses. We again advise all parties that we expect discovery to proceed smoothly and expeditiously with an absolute minimum of legal maneuvering. Interrogatories shall be

direct and to the point, aimed at obtaining useful information with minimal effort, and in no way designed to harass. Interrogatories shall be answered promptly and fully, answers being complete yet succinct. Motions for protective orders must be held to a minimum, if made at all.

The initial discovery schedule and the hearing schedule for this proceeding shall be as follows:

April 15	Informal discovery began.
April 26	Formal discovery begins.
May 3	All interrogatories on matters under Commission Questions 3 and 4 filed. ⁵
May 31	Discovery closes on matters under Questions 3 and 4.
June 7	Testimony on matters under Questions 3 and 4 filed.
June 14	Cross-examination plans for Questions 3 and 4 filed.
June 17-18	Prehearing Conference pursuant to 10 CFR §2.752.
June 22-25	Evidentiary hearing.
July 2	Testimony on Commission Question 6 filed.
July 6-9	Evidentiary hearing.
July 12	Cross-examination plans on Question 6 filed.
July 16	Testimony on Commission Questions 1, 2, and 5 filed.
July 19-23	Evidentiary hearing.
July 26	Cross-examination plans on Questions 1, 2, and 5 filed.
July 26-August 6	Evidentiary hearing.

Upon consideration of the foregoing and the entire record in this matter, it is this 23rd day of April, 1982

ORDERED

1. That the contentions set forth herein shall be litigated in this proceeding.

2. The lead and contributing intervenors assigned to each contention shall be responsible for preparing and presenting the intervenors' case on that contention. Generally the lead intervenor shall present evidence and conduct cross-examination, but the lead intervenor may, at its option,

⁵ Discovery on matters to be heard later than the week of June 22 shall continue. At the Prehearing Conference scheduled for June 17 and 18 we shall ask the parties to suggest exact dates for discovery milestones on matters related to other Commission Questions.

designate a contributing intervenor to act in its stead with respect to the sub-issue assigned to the contributing intervenor.

3. The intervenors may use two cross-examiners per witness or group of witnesses, but cross-examination must not be duplicative.

4. The NRC Staff may use two cross-examiners per witness or group of witnesses but must not be duplicative in cross-examination.

5. The Licensees and Staff shall provide the Board with all information that may be required to accurately answer the Commission's six Questions, irrespective of whether all such information is needed to respond to contentions.

6. This is an interlocutory order, subject to infrequently granted discretionary interlocutory review pursuant to 10 CFR §2.718(i), and is not appealable except to the extent specified in paragraph 7.

7. To the extent that this Order grants the petition for leave to intervene of GNYCE, it is appealable to the Commission within ten (10) days after service of this order, pursuant to 10 CFR §2.714a(c).

**THE ATOMIC SAFETY AND
LICENSING BOARD**

Louis J. Carter, Chairman
ADMINISTRATIVE JUDGE

Oscar H. Paris
ADMINISTRATIVE JUDGE

Frederick J. Shon
ADMINISTRATIVE JUDGE

Bethesda, Maryland

APPENDIX

**PARTIES AND PARTICIPANTS TO THE INDIAN POINT UNITS 2
AND 3 SPECIAL INVESTIGATIVE PROCEEDING:**

Abbreviation or Acronym	Name of Party or Participant
Con Edison Power Authority Staff	Consolidated Edison Company of New York Power Authority of the State of New York NRC Staff
Brodsky	Honorable Richard L. Brodsky
FOE	Friends of the Earth
GNYCE	Greater New York Council on Energy
Audubon	New York City Audubon Society
Parents	Parents Concerned About Indian Point
RCSE	Rockland Citizens for Safe Energy
UCS/NYPIRG	Union of Concerned Scientists and New York Public Interest Research Group
WBCA	West Branch Conservation Association
WESPAC	Westchester Peoples Action Coalition
Attorney General Energy Office County	Attorney General of the State of New York New York Energy Office County of Westchester
MTA	Metropolitan Transportation Authority
NYC Council	Council of the City of New York
Port Authority	Port Authority of New York and New Jersey
Rockland	County of Rockland
State Assembly	New York State Assembly and Its Special Committee on Nuclear Power Safety
Village	Village of Buchanan

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Ivan W. Smith, Chairman
Dr. Walter H. Jordan
Dr. Linda W. Little

In the Matter of

Docket No. 50-289
(Restart)

**METROPOLITAN EDISON
COMPANY**
**(Three Mile Island Nuclear
Station, Unit No. 1)**

April 26, 1982

Licensing Board denies intervenors' motions to reopen evidentiary record after conducting preliminary hearing to determine whether previously issued initial decision would be materially affected by the proffered evidence.

RULES OF PRACTICE: MOTION TO REOPEN RECORD

A motion to reopen the evidentiary record because of previously undiscovered conclusions of an NRC Staff inspection group must establish the existence of differing technical bases for the conclusions. The conclusions alone would be an insufficient evidentiary proffer to justify reopening of the record.

**MEMORANDUM AND ORDER
DENYING MOTIONS TO REOPEN RECORD**

Intervenors Steven Sholly and Union of Concerned Scientists (UCS) have filed motions to reopen the record for consideration of various issues discussed in the so-called "Martin Report".¹ This report, which came to

¹ Recommendations of TMI-2 IE Investigation Team (Operational Aspects), September 1979.

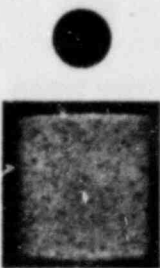
light only after the evidentiary hearing, contains recommendations consistent with some of the intervenors' contentions. The Board was not able to rule on the motions without additional information. Our efforts to obtain such information at minimum expense and delay are reflected in our memoranda of October 13, 1981, February 11, 1982 and March 2, 1982. There is no need to repeat what is recorded in those memoranda. Here it suffices to say that ultimately the Board found it necessary to hold a preliminary hearing to develop a record adequate for ruling on the motions. After the preliminary hearing, at our request, the intervenors restated their motions. Intervenor Sholly's restated motion abandons all but one of his issues in this area. Also, the Licensee and Staff filed answers to the restated motions. Now, having held that hearing, having heard the testimony of most of the Martin Report team, and having carefully reviewed the restated motions and answers thereto, we deny the motions to reopen the record.

Reopening the record is, of course, an extraordinary action. To prevail, UCS and Sholly have the burden of demonstrating that their motions are timely, that the issues they seek to litigate are significant, and that the information they seek to add to the record would change the results reached in the Board's Partial Initial Decision. *Kansas Gas and Electric Company* (Wolf Creek Generating Station, Unit No. 1), ALAB-462, 7 NRC 320, 338 (1978). Since the Board already has found the motions to be timely,² we are concerned only with the safety significance and materiality of the Martin Report information relied on by intervenors.

In order to deal with issues of significance and materiality, the Board from the beginning has sought a specification of the technical bases of the pertinent Martin team recommendations. Early in the development of this matter the intervenors also appeared to attach some importance to the technical bases of the Martin team recommendations.³ More recently, however, the intervenors have emphasized the idea that the Martin team recommendations should be given more weight than earlier Staff testimony simply because the Martin team members had a different, and presumably better, perspective due to their allegedly greater familiarity with the TMI-2 accident and reactor operations generally. The issue, as now framed by the intervenors, seems to be one of comparing the credibility of the Martin Report authors with the credibility of the Staff's witnesses in the

² Memorandum of February 9, 1982 Telephone Conference Regarding Intervenors' Motions to Reopen Evidentiary Record, February 11, 1982, at 2.

³ See, e.g., "What is important to the restart proceeding is the technical reasoning behind the recommendations because they are at variance with the otherwise monolithic Staff Line." Union of Concerned Scientists Reply to Staff and Licensee Opposition to UCS Motion to Reopen the Record, October 30, 1981, at 13.



hearing. Because we had sensed that they were going in this direction, we cautioned the intervenors even before the preliminary hearing that it would be "virtually impossible" to justify reopening the record on the basis of bare conclusions at variance with conclusions reached by earlier staff witnesses.⁴

Now that the intervenors have had an ample opportunity to explore the technical bases of the Martin team recommendations, we find little, if any, new and material facts or analyses to justify a reopening of the record. UCS itself admits as much, albeit guardedly, by saying in its final brief that it "never claimed nor believed that the authors of the Martin Report had knowledge of some hitherto secret fact not available to other diligent staff members." Comments, March 26, 1982, at 3. And in this connection we must note, in addition, that the intervenors have essentially ignored our requests for a specification of any allegedly new technical bases discovered through the preliminary hearing. Tr. 27,187, 27,190.

In principle we have never disagreed with the intervenors' contention that a technical basis for a conclusion could be found in, say, the witness' superior perspective or qualifications. Now, however, we must focus on whether as a practical matter the particular perspective and qualifications of the Martin team witnesses give their particular conclusions such "technical bases" as to warrant a reopening of the record. And although we are persuaded that the Martin team members do bring different and relevant perspectives and qualifications to the issues, in no case do we find these factors, by themselves, sufficient to warrant reopening the record.⁵

As a final matter, we turn to the single remaining issue raised by intervenor Sholly's motion to reopen. This issue has to do with the need for an audio or video recording system in the control room. In our Partial Initial Decision we resolved this matter as a safety issue within our jurisdiction. At the preliminary hearing we learned that the Martin team had recommended the installation of a recording system primarily to facilitate investigation of any future accidents. Witness Martin testified, at Tr. 27,160, that his team's investigation of the TMI-2 accident had been

⁴ Memorandum and Order, February 11, 1982, at 3.

⁵ The Martin team members themselves have not sought further review of their recommendations by this Board (or by any other authority to our knowledge). At the hearing the team's leader testified that the "recommendation" had been offered "for consideration" and not as positive "recommendations for change". Tr. 27,057-58. Also, although in ruling on the motions to reopen we have not relied on the team members' affidavits submitted in support of the Staff's pleading of September 30, 1981, those affidavits do indicate that the team members are generally satisfied that their recommendations received appropriate consideration from the Staff. For these and all other reasons discussed in this Memorandum and Order, we do not see this situation as one in which we should reopen the record on our own motion.

hampered by the lack of a recording system at that plant. The problem which witness Hunter illustrated at Tr. 27,162 with a concrete example, seems to be that the TMI-2 reactor operators had somewhat unreliable recollections of what occurred during the accident. The Board itself was impressed by this testimony. Although we consider it beyond our mandate to impose requirements solely for the purpose of facilitating future investigations, we do consider the point to be of sufficient apparent merit to warrant consideration by an appropriate part of the Commission. We therefore commend this matter to the Staff for such additional consideration as it may deem appropriate in light of the preliminary hearing transcript and our comments.

The motions to reopen are, however, denied.
IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Ivan W. Smith, Chairman
ADMINISTRATIVE LAW JUDGE

Bethesda, Maryland
April 26, 1982

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

**Before Administrative Judge Gary Milhollin
Acting as Special Master**

In the Matter of

**Docket No. 50-289
(Restart)
(Reopened Proceeding)**

**METROPOLITAN EDISON
COMPANY
(Three Mile Island Nuclear
Station, Unit No. 1)**

April 28, 1982

The Special Master, who was appointed by the Licensing Board to conduct a supplementary proceeding on issues connected with cheating on examinations, reports his conclusions and recommendations to the Licensing Board. The conclusions and recommendations concern actions by individuals, by the Licensee, and by the NRC Staff. With respect to individuals, the Special Master recommends that the Licensee not be permitted to use certain individuals to operate TMI-1, and that the Commission consider recommending criminal prosecution of certain other individuals. With respect to the Licensee, the Special Master finds that the Licensee did not encourage, condone, participate in, or know of the cheating by individual operators when that cheating occurred; however, the Special Master finds that the Licensee failed to review the NRC examination in good faith, that the overall integrity of the Licensee's operations staff was inadequate, that the Licensee was responsible for conditions which caused cheating to occur, that the Licensee's response to the cheating was inadequate, and that the Licensee's training program was inadequate. With respect to the NRC Staff, the Special Master found that the NRC examination was inadequately proctored and graded, that the content of the NRC examination was inadequate, and that the NRC Staff's investigation was adequate with respect to some of the cheating but inadequate with respect to other cheating. The Special Master recommends that the Commission take steps to assure itself that the NRC examination

does in fact test the type of knowledge which reactor operators should have.

APPEARANCES

Licensee, General Public Utilities Corporation:

George F. Trowbridge, Ernest L. Blake, Jr., Bonnie S. Gottlieb, Deborah B. Bauser, Esquires; Shaw, Pittman, Potts & Trowbridge

Nuclear Regulatory Commission Staff:

Lucinda Low Swartz, Jack R. Goldberg, Mary E. Wagner, Daniel T. Swanson, Esquires

Commonwealth of Pennsylvania:

Robert W. Adler, Esquire

Three Mile Island Alert, Inc.:

Ms. Louise Bradford, Ms. Joanne Doroshow

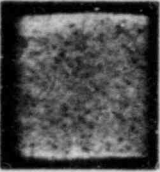

Mrs. Marjorie M. Aamodt and Mr. Norman O. Aamodt:

John Clewett, Esquire

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REPORT OF THE SPECIAL MASTER

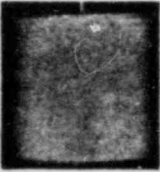
SUMMARY

On April 23, and 24, 1981, the Nuclear Regulatory Commission gave licensing examinations at Three Mile Island Unit 1. The examinations were to test candidates for the positions of Reactor Operator and Senior Reactor Operator. Two of these candidates, who held supervisory positions, cheated extensively on both days and on both examinations by copying.

At about the time the copying was discovered, an Atomic Safety and Licensing Board was ready to publish a decision on the ability of the personnel at Three Mile Island to operate Unit 1 safely. The Board was making its decision after a long litigation which covered the training and testing program for reactor operators at Unit 1. It also covered the examination used by the NRC to verify the results of that training and testing program. The cheating cast doubt upon the training program, the testing program, and the NRC's examination. Therefore, the Atomic Safety and Licensing Board decided to reopen the litigation. The Board announced a supplementary proceeding, and appointed me Special Master to conduct it. This is the report of that proceeding.

The proceeding began with a prehearing conference on October 2, 1981; it ended with the testimony of the last witness on December 10, 1981. It consumed about 18 hearing days and over 3,500 transcript pages. 39 witnesses testified. My conclusions and recommendations are set forth below as follows: those concerning individuals are in ¶¶ 310-313, 315, 317, and 319; those concerning the Licensee are in ¶ 338; and those concerning the NRC Staff are in ¶ 342.

ORGANIZATION OF THIS REPORT



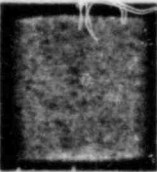

This report presents the following topics in the following order: first, the procedural background; second, the amount of cheating which occurred; third, management's involvement in the cheating; fourth, the Licensee's response to the cheating; fifth, the Licensee's training and testing program; sixth, the Licensee's system for certifying candidates; seventh, the NRC examination; eighth, the NRC Staff's response to the cheating; ninth, my overall conclusions.

I. PROCEDURAL BACKGROUND

1. The accident at Three Mile Island happened on March 28, 1979. At that time Metropolitan Edison Company, the Licensee, held a license to operate both Three Mile Island Unit 1 and Three Mile Island Unit 2. When the accident happened at Unit 2, the Licensee shut down Unit 1 voluntarily. The question then became whether Unit 1 should be restarted. That question was answered, at least temporarily, on July 2, 1979. The Nuclear Regulatory Commission ruled that it did not have "the requisite reasonable assurance that Three Mile Island Unit No. 1 . . . can be operated without endangering the health and safety of the public". The Commission also determined that a public hearing, before an Atomic Safety and Licensing Board, was required before restart would be authorized. In a further order on August 9, 1979, the Commission listed certain "short-term actions" which the Commission's Director of Nuclear Reactor Regulation had recommended be required of the Licensee before restart. The Licensing Board was to consider these actions in the public hearing. Among these actions were the following:

- (1) . . .
 - e.) Augment the retraining of all Reactor Operators and Senior Reactor Operators assigned to the control room including training in the areas of natural circulation and small break loss of coolant accidents including revised procedures and the TMI-2 accident . . . [T]he licensee will conduct a 100 percent reexamination of all operators in these areas. NRC will administer complete examinations to all licensed personnel in accordance with 10 CFR 55.20-23.
- (6) . . . The licensee shall demonstrate his managerial capability and resources . . . Issues to be addressed include . . . the management and technical capability and training of operations staff . . .

CLI-79-8; 10 NRC 141 at 144, 145. The Licensing Board, in accordance with that order, held a public hearing. The Board received evidence on the Licensee's training program. It also examined the technical capability of Licensee's management and operations staff. The Board made extensive findings on these subjects (Partial Initial Decision of August 27, 1981, LBP-81-32, 14 NRC 381). On August 13, 1981, the Commission approved the Licensee's request to transfer to GPU Nuclear Corporation Metropolitan Edison Company's authority to own and operate TMI-1. (CLI-81-17; 14 NRC 299). GPU Nuclear then became the party before the Special Master in the supplementary proceeding.



2. The Licensing Board learned of the cheating in late July and early August, 1981. The first information was that two individuals had admitted cheating. Also, the NRC examiners were reported to have left examination rooms unproctored. After considering this information, the Licensing Board decided not to delay publication of its Partial Initial Decision (hereinafter, P.I.D.). However, the Board retained jurisdiction to consider further the extent to which the cheating might affect its findings. P.I.D. at ¶ 45; 14 NRC at 403. In particular, the Board left open its conclusions on the testing and licensing of operators. P.I.D. at ¶ 584 n.63; 14 NRC at 582. The Board then invited the parties to comment upon whether the record should be reopened for further litigation. Memorandum and Order of August 20, 1981. After considering the comments, it decided to reopen the record by means of the supplementary proceeding mentioned above. In addition to appointing me as Special Master, the Board also appointed me as technical advisor and informal assistant under the provisions of 10 CFR §2.722. Memorandum and Order of September 14, 1981. The Board then scheduled a prehearing conference for October 2, 1981, and directed the parties to present a list of issues for discussion.

3. As a result of that conference, the Board, in a Memorandum and Order dated October 14, 1981, ruled that the supplementary proceeding would consider the following issues:

The Broad Issue

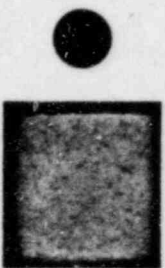
The broad issue to be heard in the reopened proceeding is the effect of the information on cheating in the NRC April examination on the management issues considered or left open in the Partial Initial Decision, recognizing that, depending on the facts, the possible nexus of the cheating incident in the NRC examination goes beyond the cheating by two particular individuals and may involve the issues of Licensee's management integrity, the quality of its operating personnel, its ability to staff the facility adequately, its training and testing program, and the NRC process by which the operators would be tested and licensed.

Particular Issues

1. The extent of cheating by TMI-1 operator license candidates on the NRC license examinations in April 1981, and on any other Licensee- or NRC-administered examinations, including but not limited to the following: the Kelly examinations (including Category T) in April 1980; Category T make-up examinations subsequently administered by the company; the ATTS mock examinations in early April 1981; and such other examinations

as the Special Master shall deem relevant. These latter shall include any other Licensee-administered qualification or mock exam or NRC-administered exam since the accident at TMI-2.

2. The adequacy of the Staff's investigation of, and NRC response to, the cheating incident and rumors of cheating in the April 1981 NRC examinations.
3. The adequacy of Licensee's investigation of, and Licensee's response to, cheating or possible cheating in the examinations listed in Issue 1 above.
4. [Proposed Issue 4 was combined with Issue 3.]
5. The extent of Licensee management knowledge of, encouragement of, negligent failure to prevent, and/or involvement in cheating in the above mentioned NRC and Licensee examinations.
6. The existence and extent of Licensee management involvement in cheating as alleged by the Aamodts in paragraph 7 in response to the Board's Order of August 20, 1981.
7. The existence and extent of Licensee management constraints on the NRC investigation of cheating and rumors of cheating in the NRC April 1981 examinations.
8. The adequacy of Licensee management response to the incident in July, 1979, referred to in the OIE investigation report and involving one of the two operators terminated as a result of cheating on the NRC April 1981 examinations.
9. The adequacy of Licensee's plans for improving the administration of future Licensee qualification examinations for licensed operators and candidates for operator licenses, including the need for independent administration and grading of such examinations.
10. The adequacy of the administration of NRC licensing examinations for TMI-1 personnel, including proctoring, grading, and safe-guarding the integrity of examination materials; the adequacy of the Staff's review of the administration of Licensee's Category T examinations; and the adequacy of the Staff's plan for retesting operators and monitoring its NRC examinations to assure proper adherence to NRC testing requirements in order to assure that the purposes of the NRC examinations, because of the nature of the questions, cannot be defeated by cheating, the use of crib sheets, undue coaching or other evasive devices.
11. The potential impact of NRC examinations, including retests, and operator terminations on the adequacy of staffing of TMI-1 operations.



12. The sufficiency of management criteria and procedures for certification of operator license candidates to the NRC with respect to the integrity of such candidates and the sufficiency of the procedures with respect to the competence of such candidates.

4. On October 2, 1981, at the conclusion of the prehearing conference before the Licensing Board, I convened a conference among the parties who wished to participate in the supplementary proceeding. These were identified as follows: the Licensee, GPU Nuclear Corporation; the Office of Executive Legal Director, United States Nuclear Regulatory Commission (hereinafter, "NRC Staff"); Three Mile Island Alert (hereinafter, "TMIA"), represented by Ms. Louise Bradford; Mr. Norman and Mrs. Marjorie Aamodt. The Commonwealth of Pennsylvania also participated as an interested state under 10 CFR §2.715(c). After the parties were identified, I specified a list of issues, in addition to those specified by the Licensing Board, upon which the Licensee and the NRC Staff were required to present evidence. Special Master's Memorandum and Order following a Conference Among the Parties, November 8, 1981. At the close of the conference, I set a schedule for the balance of the proceeding. *Id.*

5. The parties conducted extensive discovery. It included numerous interrogatories, requests for documents, and depositions. It began on October 2 with an exchange of document requests at the prehearing conference. At my suggestion, the parties then met in negotiating sessions extending into the evening on October 2 to discuss the scope of the discovery and reduce their disagreements to a minimum. They took up the succeeding round of discovery in another negotiating session in a similar conference on October 16, 1981. Because of their diligence and cooperation discovery was accomplished quickly. Only a few rulings were required to be made by me (see Special Master's Memorandum and Order Following a Conference Among the Parties, October 27, 1981). I commend the parties for this effort.

6. Early in the proceeding, three individuals asked that their identities be held confidential. They had been implicated in cheating. The NRC Staff argued that this confidentiality was required by NRC's Rules of Practice and by the regulations which implement the Freedom of Information Act. The Aamodts and TMIA opposed confidentiality. They said it would prevent the parties from developing a full record on the issues. The Licensee's position was, first, that it had no legal right to withhold identities, but, second, that I should exercise my discretion to adopt a lettering system which would have the effect of withholding identities. After considering these arguments I decided that there was no right to confidentiality and that I would not grant confidentiality as a

matter of discretion (Special Master's Memorandum and Order on Confidentiality, October 22, 1981, LBP-81-50, 14 NRC 888). The Atomic Safety and Licensing Board affirmed this decision on appeal (Memorandum and Order Affirming Special Master's Order on Confidentiality, November 6, 1981, unpublished). At that point, the parties negotiated a stipulation on confidentiality. It provided that a system of letters be used instead of names; that the hearing be held *in camera* when certain individuals testified; that I issue a protective order prohibiting disclosure of names; and that the parties withdraw their appeal of the Licensing Board's decision affirming my order. I approved the stipulation and issued the order on November 12, 1981. The hearing was then conducted according to that stipulation.

7. On the first day that witnesses were called to testify, TMIA and the Aamodts moved that Licensee's witnesses be sequestered. Tr. 23,531-33. The parties then submitted, according to an outline which I suggested, a proposed order. It provided that certain listed witnesses would be excluded from the hearing room. Also, these witnesses would be prohibited from discussing among themselves certain listed matters during the period of time beginning on the date of the order and ending when the record should be closed. I signed the order on November 12, 1981. The hearing was conducted according to that order.

8. The parties presented considerable evidence on each of the issues listed in paragraph 3 above. The testimony began with Robert C. Arnold, President of GPU Nuclear Corporation. It continued with witnesses in progressively lower positions in the Licensee's management structure. The personnel in charge of the Licensee's control room, such as Reactor Operators, Shift Foreman and Shift Supervisors, testified extensively. Witnesses were also called from the NRC Staff. Members of the Staff's investigatory branches described the Staff's investigation of cheating; members of the Staff's training and testing branch described the Staff's administration of its examinations. The Aamodts called one witness, Mr. Harry D. Williams. His testimony was excluded for reasons described below. Practically all of the witnesses appeared voluntarily in public session. There were only two and one half days *in camera*. As to those, full transcripts were immediately available to the public. In scope and quantity, the testimony covered thoroughly those persons, documents and events most likely to reveal the depth and meaning of the cheating which occasioned this proceeding. In quality, however, the testimony was poor. This will be evident from the following discussion.

9. The Licensee's control room personnel will generally be designated by letters in this opinion if their position is Shift Supervisor or below. A list of those persons appears in Appendix A, together with each person's

job title. For those who voluntarily identified themselves when they appeared, the name is also given.

II. FINDINGS OF FACT

A. THE EXTENT OF CHEATING

O and W

10. This report must start with two persons, "O" and "W". Both were Shift Supervisors at Unit 1 in April, 1981, when they took the NRC examinations. As Shift Supervisors, they were in charge of the control room and of the reactor while on shift. They supervised the shift foreman, the reactor operators, and any auxiliary operators who happened to be present. Each held a Senior Reactor Operator License granted by the NRC. When they were standing the evening and night shifts, their authority over the reactor would normally be higher than that of any other person present. They also were responsible for providing on-the-job training to control room personnel under their supervision. O in particular, was interested in training. He invited persons on his shift to his home in the evening to study. He was known as a "head pounder" (Staff Ex. 26 at 37) and he had the reputation of studying more than anyone else at the plant (Tr. 26,568(1)). Both O and W were employed at Three Mile Island for many years; their peers regarded them as among the most competent persons in the division of operations. Upper management called them the "cream of the crop" Tr. 24,059 (Hukill).

11. However, they both cheated on examinations. The first time they cooperated was on April 2 and 3, 1981. On those days they took an examination prepared by Associated Technical Training Services (ATTS), one of the Licensee's contractors. That examination was to be a "mock" examination in preparation for the NRC examinations scheduled for April 21-24, 1981. A few days before the ATTS examination, W told O that W did not think he could pass it (Staff Ex. 26, Enclosure 5; Tr. 26,083-084 (W), 26,196 (O)). O replied with words to the effect of "don't worry, just sit next to me." *Id.* Then, O and W cooperated on the Reactor Operator (RO) examination given on April 2, and on the Senior Reactor Operator (SRO) examination given on April 3. Staff Ex. 26 at 17.

12. The next time they cooperated was on April 23, 1981, during the NRC examination for RO and on April 24, 1981, during the NRC examination for SRO. This time, the cooperation was more extensive. On the SRO examination they gave virtually identical answers to most of the

questions; on the questions calling for essay-type responses, their answers usually read the same, word for word. The pattern was similar on the RO examination. Following are some examples:

Question A.6(a) on the RO examination:

O

No it does not mean that the core boron decreased from 1000 ppm to something less. What it means is that the density changed so that the boron, which is in the water, becomes less dense as you heat up. Hence the neutron is able to travel further before it is absorbed by a boron atom. This tends to have a positive effect on Keff because the thermal utilization factor will increase.

W

No it does not mean that the core boron decreased from 1000 ppm to something less. It means that the density changed so that the boron in the water becomes less dense so you increase temperature. Thus neutrons will travel further before it (sic) is absorbed by a boron atom. This will have a positive on Keff since the thermal utilization factor will increase.

Question H.3(a) on the RO examination:

O

At the feed water inlet there is an opening in which steam is drawn and comes in contact with the F.W. This is called aspirating (sic) steam and the heating is called contact heating - a form of convection heat transfer. The more flow you have the more aspirating (sic) steam you will have heating the feed water. When the feed water gets to the bottom of the down comer it is in a saturated condition.

W

At the feed water inlet there is an opening where steam is drawn and comes in direct contact the feed water. This is called aspirating steam and the heating is direct contact heating. The more flow you have the more aspirating steam is used through the aspirating parts to heat the feed water. This is a form of convection heat transfer. When the water gets to the bottom of the down comer it is in a saturated condition.

Question N.5(b) on the SRO examination:

O

On a load reduction you store energy in the OTSG and you get an insurge into the pressurizer. The insurge will cause the pressure to increase thus colloping (sic) the steam in the pressurizer. Since some of the pressure is maintained by the gasses in the pressurizer and they won't collopse (sic), you have pressure hanging up or staying higher for a longer period of time.

W

On a load deduction you store energy in the OTSG and there is an insurge into the pressurizer. The insurge will cause the pressure to increase thus colloping (sic) the steam in the pressurizer. Since some of the pressure is being caused by the gases in the pressurizer and they won't collapse, pressure will hang up or stay higher for a longer period of time.

Id. at 14-16.

13. This copying was accomplished as follows: O, when he had completed an answer sheet, placed it face up on the table in front of him and to his left about two feet away from W, who sat at the same table as O, to O's left (Tr. 26,101-103(W)); W then read the answer from O's sheet or, if he could not see it clearly, leaned closer to the sheet, or moved the sheet closer to himself, copied it, and returned it., *Id.* This happened throughout both examinations (RO and SRO) on both days, while the NRC proctor was about 20 feet away. Tr. 26,207(O).

14. W testified that in addition to receiving help from O, he also gave it. W said that he whispered answers to O on four or five questions on each examination. Tr. 26,088(W). He also passed O a scrap of paper with an answer to question M-6 on the SRO examination. Tr. 21,111(W). O denied this (Tr. 26,201-203(O)), although he did admit whispering about how difficult the exam was. *Id.*

15. One of the most striking aspects of O's testimony was his reluctance to acknowledge that he had cheated. At first, he testified that he did not know W was copying. He said "I know that my papers were taken. I did not see any copying, actual copying. I did not see him actually write any answers." Tr. 26,199(O). O also said ". . . the way I look at it I did not cheat, because I did not copy any answers." Tr. 26,203(O). When asked why he left his answer sheets face up on the table, he said it was so he could save time by maintaining continuity from one answer sheet to the next. Tr. 26,208(O). It was pointed out, of course, that it would be impossible to achieve this purpose while his answer sheet was on W's side of the table. O admitted that it would have been easy to change the location of his answer sheets so that W could not reach them; he also

admitted that he could have declined to sit next to W on the second day of the examination, after W had removed O's papers on the first day. Tr. 26,2118-213(O). O even admitted that he *should* have done these things. Tr. 26,213(O). However, his conclusion that he should have done them appeared to come from the feeling that he would have avoided trouble if he had, rather than any feeling that honesty required it. Tr. 26,211(O).

16. O's attitude toward his own guilt showed a total lack of respect for the NRC examination. He felt quite free to help W subvert the examination. It also showed a failure to understand his responsibilities as a supervisor. O could not build respect for licensing requirements among those he supervised while he undermined those requirements himself. Nor could he think that W would build such respect. It was clear from O's testimony and his demeanor on the witness stand that he still does not acknowledge the character of his acts.

17. This refusal to see his own fault makes it difficult to believe that O was truthful when he denied copying from W. Denial advances O's effort to view his participation as passive. W had no reason to damage O unnecessarily; yet W was certain that he had helped O by passing him an answer on a scrap of paper, and was certain of the question on which he had helped him. Tr. 26,111(W). When O was confronted with W's statement, and asked whether he had received help from W, O said: "To my knowledge I did not." Tr. 26,223(O). He also stated that he "did not recall" asking W for any help. Tr. 26,285(O). My observation of O's demeanor at this time leads me to the conclusion that O was not being truthful. O had testified earlier that after telling W that W could sit next to him on the ATTS examination, O did not know whether W did so or not. Tr. 26,197(O). As pointed out in ¶ 11 above, W sat next to O and copied from O on both of the days when that examination was given. It is impossible to believe that under those circumstances O did not know W was there. My conclusion is that O also copied from W. Mr. Ward, the NRC's chief investigator, is of the same opinion. Tr. 25,385 (Ward).

18. Dr. Bruce Molholt, who testified on behalf of the Aamodts, asserted that he had documentary proof that O had copied from W. Molholt, ff. Tr. 25,185 at 2-3. He said that O's written answers showed that W was giving O answers orally which contained words O couldn't spell. This was because O had spelled words wrong which W had spelled right. *Id.* However, Dr. Molholt admitted that W, while copying answers from O's answer sheet, could have corrected O's spelling. Tr. 25,209 (Adler, Molholt). Consequently, Dr. Molholt's testimony was speculative on this point.

19. W did not respect the NRC examination either. When he was asked about his attitude toward it, he said "this particular exam was one . . . [we] did not want to . . . participate in." Tr. 26,130(W). When he was

asked why he cheated, he replied: "my feeling was, 'Here I am taking the test I do not want to take. I would like to get it over with, do well, and have it behind me.' That is basically how I felt." *Id.* Apparently, neither O nor W believed that it was part of his professional duty to show competence on the NRC examination.

20. O and W have also been implicated in other cheating. On weekly quizzes, W and GG gave similar answers which have not been explained by any theory other than copying. In 1979, O filled out answers to a make up examination which VV then submitted as his own work. These incidents are described below in ¶¶ 82-93, 220-237.

21. In sum, O and W were involved in a pattern of cheating; they were highly respected, senior employees in positions of importance to the public health and safety; they were supervisors with a duty toward subordinates; and, as will appear in ¶¶ 278, 327, below, their attitude toward the NRC examination was shared by many of their peers. The question of further action against O and W is considered in ¶¶ 305-310, below.

22. It is uncertain how much other cheating there was on the April examinations. The NRC Staff studied the answers of other candidates. No obvious copying was found. Staff Ex. 26 at 16, 17. However, at least one person received an answer in the hall (¶ 94), there was a request for assistance by telephone (¶ 123), there was another request for assistance in an unproctored room (¶ 102), there were rumors of crib sheets (¶¶ 130-132), there was a second person available continuously in the hall who could provide assistance, and that person offered assistance to at least one examinee (¶ 118). As stated above, the candidates had a poor attitude toward the examination. The proctoring was also poor (see ¶¶ 260-265, below). In light of the attitude, the proctoring, and the events just described, it is entirely possible that more cheating occurred on the April examinations than has been detected.

23. Dr. Molholt testified that other candidates must have seen O and W cheat, but did not report it. Molholt, ff. Tr. 25, 185 at 3. He said O and W gave nearly identical answers on 87% of the questions on the SRO exam (*id.* at 1) which meant that they must have cooperated throughout the nearly seven hours the exam was given. Four other candidates were in the room (Lic. Ex. 83); A and I sat directly behind O and W (*id.*) at a table about four or five feet away (Tr. 25,850 (HH)); W leaned in the direction of O's papers and moved O's papers across the table and back (see ¶ 12, above); the room was quiet (Tr. 26,040(A); Tr. 26,840(HH); Tr. 26,090(W)); O and W whispered (see ¶ 13, above). Dr. Molholt concluded that it was "hardly possible to imagine that these other operators were unaware of what O and W were doing." Molholt, *supra*, at 3. Mr. Ward found it "highly likely that other people would have noticed . . ." Tr. 25, 385. A and I, however, said they saw nothing. Tr. 26,043-44 (A); Tr.

26,536-537(I). Mr. OO, who was a very credible witness, said he saw nothing during the RO examination. Tr. 25,966(OO). HH's testimony was the same. Tr. 25,846-847(HH). To these denials one must add the fact that the NRC proctor, who was facing O and W, did not see the cheating.

24. If O and W could avoid the attention of the proctor, they could avoid the attention of other candidates; these latter, after all, were taking the examination. From the circumstances which existed, and my own experience in giving and proctoring examinations, I think it is more likely that A and I noticed the cheating than that they didn't. However, the evidence is not strong enough to support a firm conclusion. Absent such a conclusion, one cannot fairly charge a candidate with misconduct.

25. After the cheating by O and W was discovered, other investigations followed. The Licensee had Mr. Edward V. Trunk examine the answers to a series of different examinations. Mr. Trunk is an Assistant Professor of Engineering at the Pennsylvania State University, Capitol Campus. He was aided by one of his colleagues, Mr. Donald L. Miller. These men discovered several answers which appeared suspicious. The suspicion pointed to cooperation between W and GG, between S and Y, and especially between G and H. Trunk, ff. Tr. 24,831 at 5-6.

G and H

26. In their first study, Messrs. Trunk and Miller found that G and H had given identical responses to eleven different questions on three separate tests. Lic. Ex. 70A. The tests were quizzes, administered as part of the Licensee's weekly training program. The tests also served as make-up examinations. They were designed to satisfy the Commission's requirement that all operators be tested on the "lessons learned" from the accident at TMI-2 (see item 1(e) of the Commission's Order of Aug. 9, 1979, cited in ¶ 1 above). The test on "lessons learned" was known as "Category T." G and H were required to take the weekly quizzes on Category T as a make-up because they had failed the original Category T examination given in April of 1980. In a subsequent study, Trunk and Miller found two more sets of similar answers by G and H. Lic. Ex. 70E. These were on weekly quizzes having nothing to do with Category T. Still more similarities were discovered during the hearing.

27. In this first study, Trunk and Miller concluded that "a cooperative effort may have existed between G and H" on the weekly quiz of November 26, 1980. Lic. Ex. 70A. In their last study, on October 14, 1981, they stated that the similarities "appear to indicate that some

cooperative effort did take place . . ." on the weekly quiz of November 2, 1980. Lic. Ex. 70E.

28. The Licensee had Mr. John F. Wilson, one of its lawyers, follow up on these reports. Mr. Wilson interviewed G and H. He also looked for lesson plans and other information that might explain the similarities. He wrote up his interview notes, together with his conclusions, in a memorandum. TMIA Ex. 75. On the witness stand, he defended these conclusions in written testimony sponsored by the Licensee. Wilson, ff. Tr. 24,478. Mr. Wilson's conclusions are the Licensee's position on cheating by G and H.

29. G and H testified extensively. They were shown their examinations; they were taken through the similarities in their answers; they both denied copying. To decide whether G and H cheated, one must compare their similar answers, one at a time. The first similarity was on ATOG Question No. 3 on November 26, 1980. The candidates were asked to "list the four requirements for natural circulation." They answered as follows:

G	H
Heat source available to produce warm water	Heat source available to produce warm water
Heat sink available to produce cold water	Heat sink available to produce cold water
Connecting flow path available	Connecting flow path available
Cold water higher than warm water	Cold water above warm water
Lic. Ex. 66H.	Lic. Ex. 66G.

30. The answers are identical except for the last line, where H used "above" instead of G's "higher than." The lesson plan for this question, which consisted of a view graph and a handout, matched H's answer. TMIA Ex. 75, Attachment A. According to Mr. Wilson's notes, H indicated during his interview that the question "required a lot of straight memorization." TMIA Ex. 75 at 2. According to those same notes, G's response was similar to H's. *Id.*

31. Both G and H were asked on the witness stand to state the conditions for natural circulation. G did so accurately. Then, G was asked whether his response was one he had memorized. He replied: "No, it is common sense." Tr. 25,747(G). H was unable to state the conditions. He said he knew "some requirements." Then, he proceeded to name the first three given in his examination answer. Tr. 25,931(H). However, with respect to the fourth, he stated that it did not matter whether the heat sink was above the heat source or below it. He said that the gravitational position was "irrelevant." Tr. 25,932(H). For H at least, natural circulation is not a matter of common sense.

32. It is impossible to reach a firm conclusion on this item. G's response on the stand belies Mr. Wilson's notes. H's striking ignorance of natural circulation may mean that he did not answer the question honestly when he took the quiz, or that he simply memorized a formula and then forgot it. Straight memorization by both candidates cannot be ruled out when their answers repeat the training material. Of course, copying from the training material cannot be ruled out either, nor can memorization by one candidate followed by copying by the other. One is left uncertain, with insufficient evidence for a clear finding.

33. The second similarity is on Lessons Learned Question No. 1. The candidates were asked to "list two major areas of weakness noted by the Lessons Learned Task Force." G and H answered as follows:

G

Human factors, operational safety.
Lic. Ex. 66H.

H

Human factors, operational safety.
Lic. Ex. 66G.

The answer key to this question listed five areas of weakness. To obtain full credit a candidate could list any two of the five. The five are:

1. Man-machine interface
2. Training
3. Operator qualifications
4. Emergency operating procedures
5. Human element in design, operation, and regulation of system safety.

TMIA Ex. 75 at Appendix B.

34. According to Mr. Wilson's notes, G stated to Wilson that G chose these two answers because they seemed to be the most important of the five. TMIA Ex. 75 at 4. Also, G said these two answers may have been "drummed into" him. *Id.* The first time G and H gave these answers was on the quiz of November 26, 1980. When the same question was repeated on the quiz of March 27, 1981, G and H gave the same answers again. They explained this second similarity by saying that they had reviewed their quiz from November just before taking the one in March; thus, they knew the correct answer and repeated it. *Id.*

35. At the hearing, H could not recall why he chose these two answers. Tr. 25,889(H). G could not recall why he chose them either. Tr. 25,750(G). G said that "maybe" he had felt they were the most important, but he concluded: "I do not know why I chose those two." *Id.* Later, G said he believed his response was "the only right answer . . ." Tr. 25,807(G).

36. The answers given by G and H do not correspond to the answer key. The answer "Human factors" could be an approximation of "Man-machine interface" (answer key item 1) or "Human element in

design . . ." (answer key item 5), but the correspondence is not clear. The answer "operational safety" might also be an approximation of answer key item 5, but the correspondence here is even less clear. When G and H gave these answers the second time on March 27, 1981, the grader marked them wrong, taking off half of the available points. Lic. Ex. 66E, 66F. Either the grader believed that one of the answers did not state an area of weakness, or the grader believed that both answers were examples of a single area of weakness (number 5 on the answer key) rather than a statement of two areas, which the question required. Mr. Wilson testified that these answers were not given by any other candidate. Tr. 24,520 (J. Wilson).

37. The five items on the answer key are short phrases. They abstractly formulate large areas of subject matter. The phrases are vague, even somewhat arbitrary. Memorization is the only way such a list would be studied; yet, memorization is ruled out by the fact that the answers given do not correspond to the answer key. The class was usually taught around the answer key. Tr. 25,750(G). G's explanation that his answers seemed most important to him does not explain how H could have arrived independently at the same conclusion; also, it does not square with G's later statement that his response "was the only right answer." The Licensee, which filed proposed findings on several other similar answers given by G and H, did not do so on these. A conclusion here must take into account the lack of credibility revealed when G and H were questioned on other similarities (discussed below) and must also reflect the poor attitude and lack of proctoring which existed during these quizzes (also discussed below). The preponderance of the evidence is that these abstract, unique, identical, unexplained, and partially wrong answers were produced by cooperation.

38. The next item is Lessons Learned Question No. 2. It reads as follows: "The most important lesson learned fell into the general area of operational safety. What was the primary deficiency in this area?" G and H both responded: "Operator training." Lic. Ex. 66G, 66H. According to the answer key, the correct response was: "Inadequate attention paid to the human element." TMIA Ex. 75 Appendix B. G and H were both marked correct, however, when they gave this answer on November 26, 1980 (Lic. Ex. 66H, 66G) and G was marked correct again on March 27, 1981 when he and H gave it a second time to the same question. Lic. Ex. 66E.

39. When Mr. Wilson interviewed G and H they told him that "operator training" was "the only possible response" (TMIA Ex. 75 at 5). On the witness stand, Wilson said that he had looked at the responses by other candidates to this question and found "operator training" to have been a "universal response." Tr. 24,519 (J. Wilson). He also said that it

"appears to be the correct and only answer." Tr. 24,520 (J. Wilson). Mr. Nelson Brown, the training instructor in charge of the quiz, was also asked whether "operator training" was correct. Brown, however, said "I would have marked that wrong." Tr. 24,668 (Brown). One grader did mark it wrong on H's quiz of March 27, 1981. Lic. Ex. 66F. Brown marked it *right* on G's quiz of March 27, 1981 (Lic. Ex. 66E), which weakens the strength of Brown's testimony. At the hearing G repeated his view that his answer was the only possible one. Tr. 25,751(G). H, however, testified that the answer was *not* the only possible one; he said it was "the only one I could think of." Tr. 25,891(H). Although "operator training" does not correspond to the answer key, and may be wrong, the fact remains that many other candidates thought it was right. G and H could have independently followed the same process as the other candidates to arrive at this answer. The evidence on this item does not establish cooperation.

40. Accident Mitigation Question No. 3 asked the candidates to name two instruments used to measure water pressure. First, they were to name the instrument used to measure "narrow range" pressure; second, the instrument used to measure "wide range" pressure. On the quiz of November 26, 1980, G named "forced balance rosemont" and H named "forced balance" to describe the instrument used to measure narrow range pressure. Lic. Ex. 66H, 66G. Both responses were marked wrong. *Id.* The correct answer is that narrow range pressure is measured by a device known as the "Rosemount Pressure Transmitter." Lic. Ex. 82A. That device does not use a forced balance principle. *Id.* To measure wide range pressure, G named "bordon tube" and H named "bourdon tube." These were both marked correct, and are correct (except for spelling). Lic. Ex. 82B. On the quiz of March 27, 1981, the same question was asked again, but in a slightly different way. This time, the question which asked for the instrument to measure *wide* range pressure was part (a), and the question which asked for the instrument to measure *narrow* range pressure was in part (b). This is the reverse of the order in which the questions had been asked in November of 1980. In March of 1981 G answered "bordon tube" to part (a) and "Rosemont" to part (b), both of which are correct. H, however, apparently did not realize that the order of the questions had been changed. He answered "Rosemont" for part (a), which is incorrect since "Rosemount" is the correct answer for part (b), and he answered "forced balance bourdon tube" for part (b), which is incorrect since "Bourdon tube" is the correct answer for part (a).

41. On the witness stand G stated that "Rosemont is a trade name for forced balance. Forced balance describes the kind of instrument it really is." Tr. 25,752(G). He said he should have contested his grade when, on the quiz of November 26, 1980, he was marked partially wrong for the answer "Forced balance rosemont." Tr. 25,753(G). As stated above, the

Rosemount transmitter does *not* use the principle of forced balance. It is clear that G still does not know how this device operates. This is true despite G's having attended two successive training sessions on it, and having known during the second session that he was marked wrong on it during the first. G was also asked how the Bourdon tube operates. That device measures wide range pressure and works on a forced balance principle. Lic. Ex. 82B. G said it did *not* work on a forced balance principle. Tr. 25,798(G). Then, G admitted that he really did not know how the Rosemount worked; he said he simply thought of the words "Rosemont" and "forced balance" as belonging together. Tr. 25,800(G). He said he did not remember where he got the information (*id.*), or whether it was right (*id.*). He said "I never really questioned what Rosemont was for." Tr. 25,799(G).

42. H was also asked to explain his answers. H said that narrow range pressure is measured by an instrument called "Rosemont forced balance." Tr. 25,900(H). He was then asked to explain how "Rosemont forced balance" worked. He could not. He said: "The wording really does not make that much sense to me, because I do not work with a transmitter" Tr. 25,901(H). H attended two training sessions on this device, and his answers were marked wrong both times.

43. The most damaging fact here is that on the November, 1980 quiz, G and H both wrote "forced balance" (G added "rosemont") as an incorrect answer to the question on narrow range pressure. That suggests cooperation. Neither candidate knew the meaning of the words he was using; in fact, the words did not belong together. H also combined "forced balance" with "bourdon tube" in his wrong answer to part (b) on March 27, 1981. This flatly contradicts H's later testimony on the stand that, in his mind, "forced balance" goes with "Rosemont." The evidence on this item, while not conclusive, strongly suggests cooperation. The evidence also reveals that the training program did not succeed, from one session to the next, in actually teaching candidates materials in which they had shown they were weak.

44. On Accident Mitigation Question No. 4.a, of November 26, 1980, the candidates were asked: "Discuss how hydrogen gas is generated in the reactor coolant system and reactor building following a LOCA." G responded: "From aluminum, Zr water reaction." TMIA Ex. 75 at 7-8. H responded: "From aluminum, Zirc water reaction." *Id.* Both responses were wrong. *Id.* G and H were asked this question again on the quiz of March 27, 1981. This time, G responded: "From NaOH, Zr water reaction." *Id.* at 8. H responded: "NaOH & Zirc water reaction." *Id.* Again, both answers were wrong. *Id.* The correct answer is that hydrogen is produced by two separate reactions: the first is between aluminum and

sodium hydroxide; the second is between zirconium and water. Lic. Ex. 68B; Tr. 24,529-30 (Milhollin, J. Wilson). All four of these elements and compounds must be listed for full credit. *Id.*

45. When the grader marked G and H wrong on November 26, 1980, he wrote "NaOH" above "aluminum" on both candidates' answer sheets. Lic. Ex. 66G, 66H. This was done to show that sodium hydroxide should have been included with aluminum in the correct answer. When G and H were interviewed by Wilson, they told him that just before taking the quiz of March, 1981 they had studied their answer sheets from November, 1980. TMIA Ex. 75 at 8. Thus, they saw the words "NaOH," which had been written by the grader, next to the marks which took off points. They said they then repeated "NaOH" on the March quiz because they thought it was the right answer. *Id.* Obviously, they never learned the reactions. They had no explanation, however, for their original, incorrect answer of "aluminum" in November of 1980. *Id.*

46. On the witness stand, G and H were both asked for explanations. G gave several different ones. One was that his response of "sodium hydroxide" was "the right answer." Tr. 25,780(G). He defended this by saying that the answer of "sodium hydroxide" did not omit anything because "theoretically sodium hydroxide can react with most of the materials in the reactor building." Tr. 25,781(G). When he was asked why he had wrongly listed aluminum by itself, he said he knew the right answer but did not put it down. He explained:

"I had a test previously where I just put down sodium hydroxide, and when they graded the exam they wrote in the word 'aluminum'. And I figured all they wanted to see was the word 'aluminum'. So I just wrote 'aluminum' down . . . because I had recognized the question from a previous test."

Tr. 25,789(G). Of course, G was wrong about that. In fact, there was no quiz on which G could have seen this question before he took the quiz on which he answered "aluminum." Also, no grader had ever written the word "aluminum" on a quiz previously taken by G. The previously-taken quiz was the one upon which the grader had written "NaOH." When the error was pointed out, G changed his testimony. He said he couldn't remember whether he answered aluminum on the first or second quiz. Tr. 25,794(G). He admitted that he was confused. Tr. 25,795(G). G's third explanation was that by saying "aluminum," it was understood that one also meant "hydroxide." He said: "Normally no one never says aluminum hydroxide. You just do not bother saying hydroxide. It is taken for granted." Tr. 25,812(G). In addition, G said that by saying "sodium hydroxide," it was also understood that one meant "aluminum." According to G,

"a lot of times when you talk about sodium hydroxide-aluminum reaction, you either mention one word or the other. It is not

uncommon to just mention aluminum or not uncommon to just mention sodium hydroxide when you are talking about hydrogen production."

Tr. 25,812-813(G).

47. H's testimony was more direct. He was asked how, when he answered "aluminum zinc-water reaction," he envisioned the aluminum being a source of hydrogen. He responded:

I do not know what was going through my mind at that time. In other words, I do not know whether at the time I did not understand the reaction, or that I just forgot to put down sodium hydroxide.

Tr. 25,893(H). He was then asked how he ever could have thought that aluminum, alone, could generate hydrogen. He said: "I do not know." *Id.*

48. G's testimony, presented above, is not credible. Aluminum cannot produce hydrogen by itself, nor does it react with zirconium or water to produce hydrogen (it may oxidize slowly in water to produce hydrogen in minute quantities, but that is irrelevant to a LOCA). "Sodium hydroxide" is not a "right answer" to this question either, notwithstanding the fact that sodium hydroxide can react with various materials in the reactor building. G never saw "aluminum" marked on a previous quiz; his testimony on that point is a fabrication. Finally, it is impossible to believe that "aluminum" was commonly used as short-hand for the hydroxide reaction, or that "sodium hydroxide" was a short-hand reference to "aluminum." John Wilson reviewed the answers given by several other candidates who took the same quiz; no other operator answered "aluminum" without also mentioning "sodium hydroxide." Tr. 24,531 (J. Wilson). One is left without any credible explanation for identical wrong answers which in themselves make no functional sense. The evidence here shows that G and H cooperated.

49. ESAS Question No. 1, on March 27, 1981, asked the candidate to "list the process lines which are isolated on a reactor trip." G and H answered as follows:

G	H
MUV-3 letdown	MUV-3 letdown
WDG-V 3,4	WDG-V-3,4 Gas
WDL-V-304,303	WDL-V-303,304 (illegible)
WDG-V 534,535	WDL 584, 534 R.B. Sump
AHV 1A, B, C, D	AHV-1A,1B,1C,1D R.B. Purge
CAV 1,2,3,13	CA-V-1,2,3,13
CAV 4 A/B, 5 A/B	CA-V-4 A/B, 5 A/B
CAV 189	CA-V-189

CFV 19 A/B, 20 A/B

CFV-2A,2B
(Lic. Ex. 66E).

CF-V-19 A/B Sample, 20 A/B
illegible

CF-V-2A/SB sample
(Lic. Ex. 66F).

The above answers are in identical order. That order is not the same as the order listed in the lesson plan. TMIA Ex. 75 at Attachment C. When questioned by Mr. Wilson, G said that he listed these items "just the way he learned them, i.e., the first closures were the most important and the last four were in the position because of their lesser importance to plant function." TMIA Ex. 75 at 11. Mr. Charles Husted, the training instructor, stated to Wilson that the order on the lesson plan was *not* the order of importance, and that the order chosen by G and H was the order Husted would use if he were to teach the course again, except for one item. *Id.* Mr. Husted, however, was not a credible witness. See ¶¶ 109-110, below.

50. On the witness stand G said that he studied with H, and that the order listed on the training materials "was kind of messed up, so H and I, when we were looking at some of the changes in the plant . . . just put it in a logical order." Tr. 25,756(G). He added that "subconsciously maybe we both had them in the same order . . ." Tr. 25,756-757(G).

51. When H testified, he said that he did not remember why he chose the particular sequence he used. Tr. 25,898(H). When H was asked to examine the sequence carefully, he noticed that the items were grouped by systems, which he felt he probably memorized, but he said he did not know why he memorized them that way. Tr. 25,937(H).

52. G's explanation is not credible in the face of H's testimony that H did not know why he used the order that he did. If H had studied with G, rearranged the order of items in a logical sequence, and then memorized it, H should have remembered what system he used. It remains possible that G and H memorized this particular order independently; however, no credible explanation has been given for such a coincidence. Without such an explanation, the evidence points to cooperation.

53. ESAS Question No. 1. b. on November 26, 1980 asked: "Where are the new radiation monitors located?" G answered: "Monitors are located in Unit #1 control room." Lic. Ex. 66H. H answered: "Control Room." Lic. Ex. 66G. Both these answers are wrong because the monitors are located in the plant, not the control room. Lic. Ex. 66G, 66H. Mr. Wilson did not investigate this item because he did not believe the answers were similar. He said: "I do not see that as a parallelism." Tr. 24,512 (J. Wilson).

54. The answers are in fact the same, and they are wrong. It is surprising that Mr. Trunk did not detect them. It is even more surprising that Mr. Wilson would contend that they are not really similar. No one

has explained how these wrong answers could have been arrived at independently. Without such an explanation, the evidence shows cooperation.

55. ESAS Question 2 of March 27, 1981 is the next item. It read: "List the new radiation monitors installed and the valves they close." G and H answered as follows:

G	H
RML-1--MUV 2A,2B	RM-G-16-CA-V-4A&5A
RMG-16-CAV 4A,5A	RM-G-17-CA-V-4B&5B
RMG-17-CAV 4B,5B	RM-G-18-CAV 1,2,3,13
RMG-18-CAV 1,2,3,13	RM-G-19-MU-V-25,26
RMG-18-CAV 1,2,3,13	RM-G-20-WDL-V-303,304
RMG-19-MUV 25,26	WDG-V-3,4
RMG-20-WDLV 303,304	RM-G-21-WDLV-534,535
WDGV 3,4	(Lic. Ex. 66F).
RMG-21 WDLV 534,535	
(Lic. Ex. 66E.)	

Except for RML-1, the same monitors and the same valves are listed in the same order. Moreover, one of them is wrong. The response for RMG-19, according to the lesson plan and the answer key, is: "ALARM-Operator closes MU-V-33A-D." TMIA Ex. 75, Attachments D,E. Because the monitors are listed in numerical order, and because it would be logical to memorize them that way, cooperation is not indicated simply by the order in which the monitors are given. The fact that there is an identical error in both answers, however, indicates cooperation unless the error can be explained.

56. On the quiz of November 26, 1980 the same question had been asked. TMIA Ex. 75 at n.13. G and H had responded identically, and virtually the same way as they did on March 27, 1981. *Id.* In November their answers were marked right. *Id.* Those right answers in November, however, had become wrong by March because the training department had discovered that its teaching materials were wrong. Tr. 24,545 (J. Wilson). G testified that he made the error in March because he and H were not informed of the change. TMIA Ex. 75 at 16; Tr. 25,758(G). H took the same position Tr. 25,898-899(H). According to Mr. Samuel L. Newton, Operator Training Manager, the training department communicated that change to the shift supervisors, who were to pass it along to the operators in the control room. TMIA Ex. 75 at 16. E, the shift supervisor of G and H, told Wilson that he (E) believed that G and H were informed. *Id.* H told Wilson that H recalled learning of the change in the control room, although H apparently did not say or did not recall when he learned of it. *Id.* Wilson testified that "It was never my understanding that this information got to Messrs G and H in a timely fashion for them

to incorporate that into their thinking prior to taking the March test" Tr. 24,545-546 (J. Wilson). However, Mr. Wilson's memorandum, which he made at the time he investigated this item, did not contain this latter conclusion. TMIA Ex. 75 at 16.

57. This explanation by G and H, that they were not told of the change, is not supported by the testimony of Newton and E. However, it is clear that the change occurred, and that G and H looked at their November quiz before they answered the one in March. They repeated their answers from November, when they were marked right, without any apparent concern that they had become wrong. G and H must have ignored their training materials, which included the change. Does this prove cooperation? The weight of the evidence is that G and H were informed of the change. However, it remains possible that they were not. Since it is not certain that they were, one cannot rule out the possibility that they made the error independently. The evidence here points to cooperation, but it is not conclusive.

58. The last similarity comes from the weekly quiz of November 2, 1980. The question was: "Explain Bernoulli's Equation and its use in solving flow problems." G and H answered as follows:

G

Bernellis (sic equation is the general energy equation, it states that the total internal energy of a system is equal to the gravitational potential energy plus total kinetic energy of the system plus the system internal energy. Lic. Ex. 66A.

H

Bernoulli's equation is the general energy equation, it states that the total internal energy of a system is equal to the gravitational potential energy of the system plus the total kinetic energy of the system plus the system internal energy. We can use it to calculate flow by referencing to points in system and determine energy differences (work). Lic. Ex. 66B.

These answers are identical except for G's omission of the words "of the system" in the first sentence, and his failure to include the second sentence

59. Wilson interviewed G and H and asked them if they had cooperated. They denied it. Wilson, ff. Tr. 24,478 at 7-8. Wilson, however, "could not find any lesson material which was supportive of their responses." *Id.* They also told Wilson that they probably would have memorized their answers. *Id.*

60. On the witness stand, G said at first that he had "most definitely" memorized this answer. He also said that he could not recall from what source he memorized it. Tr. 25,739(G). He said he did not answer the

second part of the question, which asked how Bernoulli's equation is used, because he probably forgot to do so; he said he often forgot to answer questions on tests. *Id.* Then he was asked to explain the equation from the witness stand. His answer was confused, and had little relation to the answer he gave on the quiz. Tr. 25,773(G). He said the equation would *not* be used in the plant and would *not* be used to calculate flow. Tr. 25,774-776(G). He said the equation "is about pressure losses through a piping system . . . [a]nd the final product would be in feet of head." Tr. 25,773(G).

61. At that point G was presented with H's answer, which said that the equation *can* be used to calculate flow, and does so by determining energy differences across points in a system. Lic. Ex. 66-B. G was asked to explain his testimony in light of H's answer. G then changed his testimony. He said that one *could* calculate flow with Bernoulli's equation. Tr. 25,776(G). He added that he, however, would not use it because flow could be calculated by other methods which are "easier." *Id.* He said that if one knows the flow going through a pipe of a given size, one "can extrapolate any other change in flow just by the square root of . . . [the] differential pressure." Tr. 25,774(G). It is obvious that the "easier" method is one application of Bernoulli's equation, and that G did not realize it.

62. G was also asked to explain why his definition was identical to H's. G said "we both memorized it." Tr. 25,815(G). When asked how he knew that H had memorized it, G said "I am assuming he did." *Id.* G testified that he could "only guess" where he and H found their unique definition. *Id.* However, G then proceeded to construct the theory that he and H had both memorized their definition from one of H's textbooks, or other material which H may have brought to the plant. G said:

"We often pulled definitions out of textbooks and other sources other than from Training Department . . . it is a different definition from the standard definition . . . and we think is a little bit better . . . Bernoulli's equation is a little tough to describe . . . [i]t is something you would try and find a good definition for somewhere and remember it."

Id.

63. G was then asked why he bothered to memorize the definition, since he had never been tested on it before, and, according to him, the equation was not used in the plant. G said he memorized it because he knew it was coming up in training and he wanted to prepare in advance. Tr. 25,818(G). When asked how he knew the equation would be coming up, he said he probably discovered training materials left in the control room by operators from another shift, who would already have been studying the equation during lectures. Tr. 25,819-820(G). He said that no

one specifically told him that the equation was coming up but that he might have noticed it because of its subject matter. He said:

You can memorize a few things. You can really, you know, the subject matter—and one of these strange things, Bernoulli, that is a strange thing. You know, who is this Bernoulli dude. It catches your eye as well. This is cool, I never heard of this stuff before, you know, maybe try to memorize it.”

Tr. 25,821(G). G also said that the training department placed a great emphasis upon Bernoulli's equation; he said “that was what the whole week was all about. The whole week was about Bernoulli's equation.” Tr. 25,822(H). Of course, this was not so. The quiz on November 2, 1980 covered the material given that week. Only one part of one category dealt with Bernoulli's equation. Tr. 25,822-823(H); Lic. Ex. 66A.

64. H also testified. He gave, from the witness stand, a clear definition of Bernoulli's equation which matched the answer on his quiz. Tr. 25,881(H); Lic. Ex. 66B. He said it would not be necessary to know how to use the equation to operate the plant. Tr. 25,884-885(H). He did not recall studying the equation with G. Tr. 25,884(H). He said he thought he memorized the definition during training week by copying it from the blackboard. Tr. 25,883(H). He was then asked whether he was “absolutely positive that it was written on the blackboard” Tr. 25,938 (Adler). He responded: “Pretty much so, yes.” Tr. 25,938(H). He added later: “the only way I could have gotten it would be from the blackboard.” Tr. 25,944-945(H). He said he did not know, before training week, that Bernoulli's equation was coming up. Tr. 25,938(H).

65. G's testimony is at its poorest here. His statement that he learned the equation by studying with H before training week is contradicted by H's testimony, and by G's earlier statement that he didn't remember where he learned the equation. It is also contradicted by other portions of G's testimony, where he declared: “I do not study.” Tr. 25,727(G). At that point G said:

“The only time I find myself studying at all is I will be on shift and people I am on shift with they will be studying, and then just to keep from being odd-and-out I will participate.”

Tr. 25,728(G). He also said: “I feel that I can walk in and just take an exam cold and pass it.” Tr. 25,729(G).

66. Cooperation seems to be the only explanation here. Mr. Wilson could not find any lesson material “which was supportive of their responses.” See ¶ 59, above. Mr. Wilson was diligent at finding such material (see ¶ 213, below). One must assume this means that other operators did not give this response (Wilson routinely checked responses of other operators in his investigation) and that it is not recorded in any training materials. The fact that G did not include H's second sentence is

not significant in view of G's habit of not answering questions fully. Tr. 25,739, 787-788(G). One is left again with unique, identical, and unexplained responses. Moreover, G's implausible explanation on the witness stand indicates that he was trying to hide something. G's testimony here, together with his demeanor, destroyed his credibility.

67. The similarities discussed above are not the only ones suggested. Others were mentioned at the hearing (Tr. 24,863-866 (Adler, Trunk)) or in exhibits (TMIA Ex. 7 at 14-15). I selected the ones above for discussion because they appeared to be the most suspicious. Others might have been included. For example, on Accident Mitigation Question 3.b. of March 27, 1981, G and H gave the same answer to the question, "How is the hydrogen removed from the reactor building?" They both answered, "hydrogen recombiner or purge." TMIA Ex. 75 at 9. This was the right answer, and the only answer, so giving it could not be evidence of cooperation. Also, on June 25, 1981, G and H gave similar responses to two questions on the third round of the Category T make-up quiz. *Id.* at 17,18. However, their answers were short, and corresponded to the answer key. *Id.* They are not evidence of cooperation either. My failure to discuss a similarity does not mean that I did not consider it.

68. Many witnesses described the conditions under which the weekly quizzes were given. These quizzes were part of the weekly training program which the Licensee conducted from March, 1979, the date of the accident at TMI-2, to April, 1981, the date of the NRC examination upon which cheating occurred. Newton, ff. Tr. 24,640 at 6-7. The Licensee also used weekly quizzes during the Operator Accelerated Retraining Program (OARP), which culminated in the comprehensive examination in April, 1980, given by Mr. Frank Kelly of PQS Corporation (*id.* at 7) and it used weekly quizzes in its training program from April, 1980 to April, 1981. *Id.* According to Mr. Newton, the Operator Training Manager, "formal procedures for exam and quiz administration during these programs did not exist." *Id.* Newton added that "written examinations and quizzes given in the classroom were generally proctored" (*id.* at 9), but he also said that he discovered, in August of 1980 or shortly before, that the instructors were not proctoring the weekly quizzes. He said that "exams were essentially being delivered to the room and were given to the individuals and whoever the instructor had been would then leave." Tr. 24,820 (Newton). Mr. Charles Husted, a training instructor, testified that he left weekly quizzes unproctored about 50% of the time. Tr. 26,922 (Husted). Mr. U said that about 80% of quizzes were unproctored during the OARP program. Tr. 26,806-807(U).

69. There was also evidence that operators discussed answers during the weekly quizzes. OO testified that cheating on weekly quizzes was "commonplace and accepted." Tr. 25,968-969(OO). He stated that the

operators discussed the quiz while it was being given (Tr. 25,972 (OO)) and that this practice was accepted by the operators who were involved. Tr. 25,971(OO). He admitted that he personally discussed questions and answers on more than one occasion (Tr. 25,982(OO)) and recalled discussing with P and Q the answer to a math problem. Tr. 25,975-976, 995-96(OO). He said he continued to take weekly quizzes during the period of time leading up to the NRC examination in April of 1981, but that quizzes became infrequent for him because he did not often study with his shift. Tr. 26,000(OO). He could not recall specifically whether the practice of discussing the quizzes continued during the period leading up to the NRC examination. *Id.*

70. U testified that the quizzes were taken as a "group effort," including those given during the OARP program. Tr. 26,806-807(U). He said he had cooperated with others and that it was unclear whether operators were supposed to do their own work. *Id.* He said that during the OARP program, quizzes were frequently taken to the control room and done on shift; the operators would then cooperate on the quizzes. Tr. 26,810(U). He said that during the quizzes given in class, the "question would be discussed so that everyone understood the correct answer to it and understood the material they were supposed to know for that answer." Tr. 26,811-812(U). He also said that books and other lesson materials were not removed from the tables in class during quizzes, that he had used such materials during quizzes, and that he had seen other operators refer to such materials during quizzes. Tr. 26,813(U). He said that often it was unclear whether the quizzes were to be open or closed book. *Id.*

71. W testified that he exchanged answers with other operators on take-home quizzes done in the control room. Tr. 25,153(W). O recalled hearing answers being discussed during the time when weekly quizzes were being administered (Tr. 26,232(O)) and O recalled one such discussion in which he participated with others on his shift (Tr. 26,233-234(O)). V said that he had seen cooperative effort on perhaps 5 to 10 percent of the questions on weekly quizzes over the past three years. Tr. 26,306(V). V also said that the practice of cooperation continued until August, 1981, when the cheating by O and W was discovered. *Id.* at 26,307. T said that some quizzes were a "group effort," that operators could work together on such quizzes, and that instructors were in the room at such times. Tr. 26,607-608(T). WW also said that cooperation occurred while the proctor was present. Tr. 26,453(WW). GG said that the quizzes were very informal, that there was no prohibition against talking, and that talking occurred. Tr. 25,696-697(GG). Mr. Husted, a training instructor, said that cooperation "was allowed on occasions" and that even when it was not allowed he remembers "having asked operators to do their own work . . ." Tr. 26,923 (Husted).

72. There was also some testimony to the contrary. G said the weekly quizzes were well-proctored and that there was no talking. Tr. 25,825-826(G). H's testimony was similar. Tr. 25,872-873(H). O testified that talking did not occur during the OARP program because the instructors, who frequently came to the site from elsewhere, gave their quizzes immediately after teaching their subjects, collected the quizzes, and left the site. Tr. 26,233(O).

73. The weight of the evidence clearly establishes that the proctoring on weekly quizzes was poor, that cooperation occurred, and that it was unclear whether operators were expected to do their own work. The Licensee admits this. See *Licensee's Proposed Findings of Fact and Conclusions of Law on Issues Raised in Reopened TMI-1 Restart Proceeding* (hereinafter, "*Licensee's Proposed Findings*") at ¶¶ 328-329, 332-333.

74. Mr. Trunk made an extensive study of the weekly quizzes; he found that "almost all of the exams and make-ups contained unusually varied answers . . ." Trunk, ff. 24,831 at 5. The exceptions to this pattern were the answers of G and H. In the words of John Wilson: ". . . out of the many, many tests and all the participants of those tests, they alone had this many parallelisms." Tr. 24,566 (J. Wilson). The sheer number of similar answers is striking. On the quiz of November 26, 1980, G and H gave the same answers to the following questions: ATOG Questions 2 and 3; Lessons Learned Questions 1 and 2; Accident Mitigation Questions 3.a., 3.b., 4.a., and 4.b.; ESAS Questions 1.a. and 1.b. Lic. Ex. 66G, 66H; Tr. 24,509-512, 600-601 (J. Wilson); Tr. 24,863-865, 879-80 (Trunk). These questions represent almost half the point value of the quiz; they are 14.5 points of the possible 30.5. Lic. Ex. 66G, 66H. On the take-home quiz given March 27, 1981, the pattern was the same: G and H gave similar answers to questions worth 8 points of the possible 13.5. Lic. Ex. 66E, 66F. On the quiz given on November 2, 1980, G and H answered Question No. 1 (on Liquid and Gas Releases) with identical short responses which were uniquely worded, and they answered Question No. 2 (on Fluid Flow, Thermodynamics and Heat Transfer) with the long paragraph on Bernoulli's equation. Lic. Ex. 70E. Finally, G and H gave similar answers to two questions on the quiz of June 25, 1981. Lic. Ex. 66C, 66D, 70A, Appendix B. This is a remarkable string of similar answers; it separates G and H from all the other operators who took the quizzes.

75. Could G and H have independently memorized the same answers to all of these questions? G testified that he studied frequently with H while on shift. Tr. 25,728(G). H, however, said that he often studied alone at home, and with others on his shift, as did G. Tr. 25,867, 948-949(H). Moreover, most operators studied in groups (see, e.g., Staff Ex. 26 at 10, 22, 24, 25, 26, 27-28, 29) so the practice of studying together does not

explain why G and H alone showed similarities. Also, most operators relied upon memorization as a study technique. See, e.g., Staff Ex. 26 at 21, 26, 31, 34.

76. Could G and H have independently copied their answers from lesson materials? This is unlikely for several reasons. First, if lesson materials had been available to G and H the materials would have been available to others. No others showed the pattern of similarities established by G and H. Second, G and H both testified that no lesson materials were available during the quizzes. Tr. 25,737-738(G); Tr. 25,873(H). This was contradicted, of course, by U. See ¶ 70 above. Third, on some quizzes, such as the Category T make-up quiz given March 27, 1981, on which G and H gave very similar answers, no lesson materials were provided. On that quiz the candidates were instructed to review their materials from previous training weeks (Lic. Ex. 66E, 66F); G testified that he threw his training materials away after training week. Tr. 25,817(G). Fourth, for some of the subjects covered in the lessons, it is unlikely that written training materials even existed. Mr. Wilson was able to find only two handouts for all the quizzes at issue. TMIA Ex. 75. Finally, if G and H had copied their similar answers from lesson materials one would expect them to have passed the quizzes. In fact, they failed them over and over again.

77. One is forced to conclude that G and H cooperated on the quizzes. Neither memorization nor the use of lesson material can explain the number and nature of the similarities. There are simply too many instances which are unexplained. Moreover, the testimony seeking to explain them is false. The poor proctoring, the cooperation by others, and the general acceptance of cooperation, are all factors which reinforce this conclusion.

S and Y

78. On the quiz of December 19, 1980, S and Y gave identical answers to ATOG Question 1. That question asked the candidates to "[d]escribe how the ATOG program proposes to simplify the operator's problem of identifying and reacting to (treating) abnormal transients." TMIA Ex. 76 at 1. Both candidates responded: "By developing symptom oriented guidelines." *Id.* According to the answer key, the correct response is:

By shifting from the former traditional method of event oriented guidelines to symptom oriented guidelines. (Including operating instructions and an engineering basis and operating principles as training aid.)

TMIA Ex. 68B. The material used in the training course also answered this question; it said: "Depart from traditional method of *event* oriented guidelines. Develop *symptom* oriented guidelines." TMIA Ex. 76, Attachment 1.

79. S stated to Mr. Wilson that he had not cooperated with Y and that the answers to questions such as this were usually memorized. TMIA Ex. 76 at 3. Mr. Wilson did not interview Y, who was on an "indefinite personal leave of absence." *Id.* at 2. Neither S nor Y testified at the hearing. The responses by S and Y were both marked correct by the graders (TMIA Ex. 76 at 1). Mr. Wilson testified that the training department was looking specifically for the words "symptom oriented guidelines." J. Wilson, ff. Tr. 24,478 at 10; Tr. 24,554. The evidence here does not establish cooperation.

80. ATOG Question No. 3 on this quiz asked the candidates to "[l]ist the four (4) requirements for natural circulation." TMIA Ex. 76 at 1. The responses were as follows:

S	Y
Heat source available to produce warm water	Heat source available to produce warm water
Heat sink available to produce cold water	Heat sink
Connecting flow pater available	Connecting flow path available
Cold water above warm water	Cold water higher than warm water
TMIA Ex. 76 at 2.	TMIA Ex. 76 at 2.

According to the answer key, the correct answer is:

- 1) Heat source available to produce warm low density water
- 2) Heat sink available to produce cold high density water
- 3) A flow path available connecting the two
- 4) The cold water (cold thermal center) must be above the warm water (warm thermal center).

Lic. Ex. 68B (ATOG Question 12)

Both of these responses are correct. S's response is identical to that of a "transparency" used in the training program and entitled "Requirements for Natural Circulation." TMIA Ex. 76, Attachment 2. Y's response is also identical, with the exception of the omission of the words "to produce cold water" after "heat sink", and the substitution of the words "higher than" for the work "above." These responses are also similar to those of G and H, discussed above in ¶¶ 30-33.

81. Both of these responses are correct. Since at least four candidates (S, Y, G and H) wrote responses that were virtually verbatim recitals of the training materials, one must conclude that the responses could have been memorized. The evidence here does not show cooperation.

The responses by GG, W, and MM were marked right, although it is evident that they are quite different from the answer key.

85. John Wilson interviewed both GG and MM. J. Wilson, ff. Tr. 24,478 at 11-12. Both GG and MM denied cheating. *Id.* According to Mr. Wilson, GG insisted that he had not looked at W's answers nor had he allowed W to look at his. *Id.* at 12. GG did admit, however that W may have looked at his (GG's) answers without GG's knowing. *Id.* Wilson did not interview W because W was no longer employed at TMI-1 at the time of GG's interview. *Id.* When Mr. Hukill interviewed GG in October of 1981, GG's statement to Mr. Hukill was similar to the statement GG made to Wilson, except that GG added that there may "have been a handout that was the same" Tr. 24,083 (Hukill).

86. At the hearing, GG testified that he did not copy from W. Tr. 25,695(GG). GG also said, however, that he was not sure whether W had copied from him. *Id.* He said "I do not believe that the seriousness of the exam was felt by anybody in the room, the instructor included." *Id.* He said the atmosphere was very informal, that talking frequently occurred during the weekly quizzes, that the talking was about the answers to the questions, and that course materials were available. Tr. 25,696-697(GG). He recalled where he sat; he recalled that W was present; but he could not recall whether W sat next to him. Tr. 25,694(GG). GG had no explanation for the similarity between his answers and W's, except the possibility that W could have copied. Tr. 25,695(GG). GG said "if he [W] had sat behind me, it is a possibility that he might have looked over my shoulder or maybe he overheard me talking about the exam in the hallway or up at the front of the room after I finished the exam. Tr. 25,698(GG).

87. W also testified. His testimony was somewhat inconsistent. First, he said he "may have" discussed his answer with GG. Tr. 26,144(W). Then, he said he did *not* copy from GG. Tr. 25,145(W). Later, he said that he was unsure whether he cooperated or not, because he did not recall the particular quiz, and the quiz could have been a take-home quiz done in the control room where cooperation on quizzes frequently occurred. Tr. 26,153(W). He was asked to give a response to Lessons Learned Question 1 from the witness stand. His response, though correct, was completely different from his response on the quiz. Tr. 26,138(W).

88. GG, W and MM all misspelled the word "challenge" in the same way when they answered Lessons Learned Question 1. They all spelled it "challange." Lic. Ex. 66K, 66L, 66M. Because this fact was overlooked by Mr. Trunk, Mr. Wilson, and all the parties, there was no attempt to explain this similarity on the record. MM's answer was slightly different from the two others, but it contained this same misspelling. Lic. Ex. 66K.

GG, W and MM

82. On the quiz of December 19, 1980, Lessons Learned Question 1 asked: "List two (2) major areas of weakness noted by Lessons Learned taks (sic) force." GG, W and MM answered:

MM	W	GG
Non safety related systems affecting safety systems operator action compounding the challenge (sic) to safety systems. Lic. Ex. 66K.	Non safety related systems affecting Safety related systems (challenges (sic) the system) and operator action which compounded the challenges (sic) to the safety system. Lic. Ex. 66L.	Non safety related systems affecting safety related systems (challenges (sic) the system)-and-Operator actions which compounded the challenges (sic) to the safety system. Lic. Ex. 66M.

83. On the same quiz, Lessons Learned Question 2 asked: "The most important lesson learned fell into the general area of operational safety. What was the primary deficiency in this area?"

GG, W and MM answered:

MM	W	GG
Operator training inadequate Lic. Ex. 66K.	Operator training allowing actions which challenged (sic) the automatic actions of the safety related system. Lic. Ex. 66L.	Operations training allowing actions which challenged (sic) the automatic actions of the safety related systems. Lic. Ex. 66M.

84. According to the answer key, the correct responses to these two questions were:

Lessons Learned Question 1 [any two of the following responses received full credit]

1. Man-machine interface
2. Training
3. Operator qualification
4. Emergency Operating procedures
5. Human element in design, operation, and regulation of system safety.

Lic. Ex. 68B.

Lesson Learned Question 2

- inadequate attention paid to the human element.

89. The parties also failed to develop another feature of the three responses: the language used. An expression such as "non safety-related systems affecting safety systems operator action which compounded the challenges to the safety system" (Lic. Ex. 66K, 66L) does not flow spontaneously from the pen of an operator. When W answered this question from the witness stand, he said "procedure inadequacies and operator training." Tr. 26,138(W). This is a correct answer, and the sort of response that an operator, working alone, would be expected to give. It is revealing to compare the answers of S and Y to the answers of GG, W and MM. S and Y took the same quiz in the same room as GG, W, and MM. Lic. Ex. 70A, Appendix A. S's response reads: "Operator training, Human engineering of controls room." Lic. Ex. 66I. He received full credit for this answer. *Id.* Y's response, for which he lost only one quarter of a point, reads: "Need a well designed plant. Need well trained operators." Lic. Ex. 66J. These are natural responses in ordinary language. The stilted abstractions used by GG, W and MM do not occur as natural expressions, and could hardly occur in identical form to three operators working alone and answering in their own words.

90. The same similarity in language occurs between GG and W on Question 2. S and Y, who both answered "operator training" to this question, received full credit. Lic. Ex. 66I, 66J. GG and W came up with "Operator training allowing actions which challanged (sic) the automatic actions of the safety related systems." See ¶ 83, above. It is totally improbable that GG and W could have independently formulated these identical answers using the words they chose.

91. Copying seems to be the only explanation. Either a first operator copied the answer to Question 1 from training material or some other source, and the other two copied from him, or the three of them copied the same training material. One of the three could have memorized this answer, and the two others could have then copied it, but it is unlikely that any of the three would have memorized such a clumsy string of words simply to answer a quiz. Training material is the most probable source of these similarities. It is unfortunate that the Licensee was unable to find any training material on these questions. Tr. 24,570-71 (Wilson).

92. The case of MM is slightly different from that of GG and W. The latter two appear to have cooperated on both Question 1 and Question 2. MM's answer to Question 2, however, is not the same as those of GG and W, which shows that MM did not cooperate on that question. Nevertheless, MM's identical, abstract language on Question 1 remains, together with the identical misspelling. It is impossible to believe that MM could have arrived at the same language and the same misspelling independently. MM must have cooperated on Question 1, or copied the same training material.

93. It is more difficult to know who copied from whom. The only evidence is a marked-out word in GG's answer to Question 1. GG began his answer with the word "poor." Then, he crossed out the word and repeated the abstract formulation identical to W's and MM's. Lic. Ex. 66M. This suggests that GG copied from either W or MM, but it is not enough, standing alone, to support a conclusion that he did. The credibility of GG's denial was undermined when he said that "it is a possibility that he [W] might have looked over my shoulder or maybe he overheard me talking about the exam in the hallway." See ¶ 86, above. Such an explanation does not square with the language used in the answers, and the extent of the similarities. Regardless of who copied from whom, or from which material they copied, it is clear that copying occurred. Given the extent and nature of the similarity between the answers of GG and W, the copying appears to have occurred with GG's participation.

Mr. Shipman at the coffee machine

94. Mr. Henry Shipman, a licensed senior reactor operator, left the non-smokers' examination room to get a cup of coffee during the "A" set of examinations. This was on either April 21 or 22, 1981. While he was at the coffee machine, he was approached by another person who asked him a question, which he answered. Arnold, ff. Tr. 23,590 at 10; Hukill, ff. Tr. 23,913 at 14; Staff Ex. 28 Encl. 2. He stated to the NRC investigators that he assumed that the individual who asked the question was also taking the examination, and had come from the smokers' examination room, because only one person was allowed out of each room at a time. Staff Ex. 28 Encl. 2. He said the question asked was on the examination. *Id.* However, he was unable to remember the specific question, his response, the identity of the person who asked it, or whether he was asked on April 21, during the RO examination, or on April 22, during the SRO examination. *Id.* He did remember, however, that no one other than he and the other individual were present at the time. *Id.* He said the encounter was very brief, only long enough to pour a cup of coffee. *Id.*

95. Mr. Shipman did not report this event until he was interviewed by Mr. Hukill on October 7, 1981. Staff Ex. 28 Encl. 3 at 2; Hukill, ff. Tr. 23,913 at 13-14. He reported it voluntarily then in response to one of Mr. Hukill's questions. *Id.* After he reported it, Mr. Hukill questioned him vigorously in order to discover more information, but Mr. Shipman was unable to recall anything beyond what is reported above. Tr. 23,986-987; Tr. 24,091-092 (Hukill). Mr. Shipman reviewed a list of the persons who took the examination in the smokers' room (there were eight (Lic. Ex. 83))

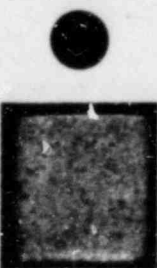
but he still could not remember the name of the questioner. Tr. 26,361 (Shipman). The NRC investigators did not ask any of the eight persons in the smokers' room specifically whether they had asked Mr. Shipman the question. Tr. 25,364-367 (Ward, Baci); Tr. 25,371-372 (Ward). The Licensee did not ask them either. Tr. 23,990-991 (Hukill).

96. None of the NRC investigators who testified believed that Mr. Shipman was being truthful. Tr. 25,368 (Baci, Ward). They did not think he would have remembered the event without remembering the question and the questioner. *Id.* Both Mr. Arnold and Mr. Hukill admitted to skepticism. Tr. 23,696 (Arnold); Tr. 24,091-092 (Hukill). Nevertheless, the Licensee became convinced that Mr. Shipman was telling the truth. Tr. 23,696-697 (Arnold); Tr. 23,987-988 (Hukill). The Licensee determined that the discipline for Mr. Shipman's unacceptable behavior would be to issue a letter of reprimand, which it did. Arnold, ff. Tr. 23,590 at 10; Hukill, ff. Tr. 23,913 at 14-15. Mr. Shipman's good record over seven years' employment and his previous good character were taken into account in reaching this decision. *Id.*

97. There are several reasons why Mr. Shipman's statement is difficult to accept. The first is his background in the nuclear program of the United States Navy. Mr. Hukill described at length the high level of honesty and integrity expected from those in the Navy program. Mr. Hukill said that the Navy program instilled in those within it the principle that cheating "is totally unacceptable and cannot be tolerated." Hukill, ff. Tr. 23,913 at 3. Mr. Shipman admitted that his conduct at the coffee machine, if it had occurred in the Navy, would have been "shocking." Tr. 26,403 (Shipman). Mr. Shipman also testified that he would have been shocked if someone had asked him for an answer during a weekly quiz at TMI. *Id.* at Tr. 26,376. He admitted that the NRC examination was more formal than the weekly quizzes (*id.*), and said that he would have been shocked if someone asked him for help during the NRC examination. *Id.* at Tr. 26,377. He was then asked whether he was shocked when someone *did* ask him for help during the NRC examination. He responded:

At the time it was — it was as if, you know, it was spontaneous. I did not think — I was not thinking in terms of assisting someone else. I was thinking in terms of, here is a question and I know the answer, and I blurted it out.

1a. He was then asked again whether he was shocked. He said: "... I wasn't thinking in terms of shock." *Id.* He was then asked whether he was surprised. He said: "Again, I wasn't thinking in terms of being surprised." *Id.* He also testified that he was "concerned that I had done something wrong" (*id.*) and he said that he recognized that it was wrong shortly after he did it. Tr. 26,378 (Shipman). In his statement to the NRC investiga-



tors, he said that "I realized it was improper on my part but I did not think it was significant enough to constitute a cheating incident." Staff Ex. 28 Encl. 3 at 2. finally, he was asked whether he was sure he had never given a spontaneous response to aid someone during a weekly quiz. He said that he was sure he had not, and said "I am sure because I probably would have some remembrance if I did" *Id.*

98. The second reason Mr. Shipman's statements are difficult to accept is his managerial position at TMI-1. Mr. Shipman is senior operations engineer at TMI-1. *Id.* at Tr. 26,349. He assists Mr. Ross "in the supervision and direction of operating activities." Tr. 23,882 (Arnold). He is Mr. Ross' "right hand man in the control room" (Tr. 24,073 (Hukill)) and considers himself part of management. Tr. 26,388 (Shipman). In such a position he would have the responsibility to know about the ability and integrity of the operators under Mr. Ross' supervision. Any information about this ability or integrity, such as a question asked during an examination, would fit into the pattern of information he already had about the person, and would have been important enough to remember.

99. Mr. Shipman's explanation for his inability to remember is that he did not attach any significance to the event when it occurred. He said that he replied "automatically" because "we are always asking each other questions prior to examinations and at other times just to keep current and fully informed" Staff Ex. 28 Encl. 3 at 2-3. This explanation is only plausible if one believes that such an attitude would actually exist in the mind of someone with Mr. Shipman's background and responsibility. His background is in the Navy nuclear program, and his responsibility is to serve as Mr. Ross' "right hand man in the control room." Also, his testimony that he was concerned that he had done something wrong indicates a feeling of culpability, which is inconsistent with his view of the event as "insignificant." His testimony that he would have been shocked, but he "wasn't thinking in terms of shock" diminished his credibility.

100. The weight of the evidence on this issue is that a person with Mr. Shipman's background, responsibility, and feeling of culpability soon after the event, would have been surprised by the solicitation and concerned enough about it to have remembered who made it. Mr. Shipman's statement that he remembered that the question was on the NRC examination, and that it was asked at the coffee machine while he and the questioner were alone, but that he remembered nothing else, is too improbable to accept. I conclude, as did the NRC investigators, that Mr. Shipman was not being truthful.

P and Mr. Husted in the unproctored room

101. P, a shift supervisor at TMI-1, was interviewed on September 25, 1981 by the NRC investigators. During his interview, he expressed anger about the fact that Mr. Bruce Wilson, the NRC proctor, had left the examination room unproctored. Staff Ex. 27 at 40. P said that he took pride in his ability to do well on examinations, and said that he was so determined to take the NRC examination that he sat for it while being treated for pneumonia. *Id.* He said that Wilson's absence "made him vulnerable to any allegation of cheating" because it "removed a potential witness to his [P's] honesty and put him in the uncomfortable position where he could be solicited by other examinees." *Id.*

102. Mr. Ward, one of the NRC investigators, testified that he became curious about the strength of P's feelings on this subject. Tr. 25,462 (Ward). Mr. Ward concluded that P's "vehemence was rather strange, and it suggested . . . the possibility that he had in fact been solicited." *Id.* After it had been established that P and Mr. Husted were alone in the smokers' room (the room was unproctored because the NRC proctor was reviewing the NRC examination with Messrs. Ross, Brown, and Bolz (see ¶ 140, below)) Mr. Ward pursued the matter further, as follows:

So within that framework, by that time we had established there were only two people in the room, Husted and himself, that it would be worth pursuing that matter a little bit further. And I then said to him the reason why you are so upset about this is it puts you in an awkward position when Husted asked you a question, and he looked startled, and he started to hesitate. And I said something to the effect that we knew he [Husted] had asked the question, and he [P] said well, he only asked one question . . . I was playing out the thing which I assume Ms. Bradford noticed when she looked at the statement that he seemed to be very upset about — more upset about the situation than a hypothetical situation would warrant. So it was within that context that the information about Mr. Husted came to the fore. We pursued it a bit further. He [P] related that it was just one attempt. He could not remember specifically what it was, to my recollection. It was more like what a certain concept was, well, what in the hell does this mean or words to that effect. And when he [P] refused to answer it, no further questions were asked. That is my recollection of how that element of information came in.

Tr. 25,462-463 (Ward). Mr. Ward also testified that the question asked was related to the NRC examination (*id.* at Tr. 25,463) and that he believed P's statement was true. *Id.* at 25,320.

103. The NRC Staff did not include this incident in its investigatory report. Staff Ex. 27 at 40. Mr. Ward stated that the reason for not including it was that it was not really an act of cheating; it was only attempted cheating because the answer had not been given. Tr. 25,320 (Ward). Mr. Ward discussed this interpretation with Mr. Stello, who is Mr. Ward's superior at the NRC, and Mr. Stello agreed with it. Tr. 25,418 (Ward). Mr. Ward did not tell the Licensee of P's statement (Tr. 25,418-419 (Ward)) and did not confront Mr. Husted with it. Tr. 25,317 (Ward). The reason for not confronting Mr. Husted was that Mr. Husted had already been interviewed twice and had twice denied cheating. *Id.* The Staff's response to this incident is discussed below in ¶ 300.

104. On the witness stand, P denied that there had been a solicitation, or that he had told Mr. Ward of one. Tr. 26,691-692(P). P said that when Mr. Ward suggested that Mr. Husted had asked P a question, P turned to Mr. Ward to reply, but Mr. Baci asked P another question before P could respond to Mr. Ward. Tr. 26,692(P). Then, according to P, Mr. Ward said "he was not interested in that particular fact." *Id.* P said he then "let . . . [Ward's suggestion] slide . . . , " and never responded to it during the interview. *Id.*

105. Mr. Husted also testified. He specifically denied asking P the question. Tr. 26,937 (Husted). Mr. Husted said that he and P did not discuss anything during the examination. Tr. 26,936 (Husted). He said he was totally unaware of P's activities during the time the two of them were alone in the unproctored room. *Id.*

106. These conflicts in the testimony can only be resolved by judging credibility. In order to make such a judgment, it will be necessary to review some additional testimony by P and Mr. Husted. P testified on a number of subjects. One of them was the weekly quizzes. P was asked whether he had ever seen operators cooperate on weekly quizzes. P said: "I have not seen any cooperation between the operators." Tr. 26,702(P). He added, however, that operators may have "asked for a clarification of what the question was if there was not a proctor in the room," but he said that the operators did "not . . . [ask] one another for answers on the quiz." *Id.* This was directly contradicted by OO, who testified that he specifically recalled discussing with P and Q the answer to a math problem. Tr. 25,975-976, 995-996(OO). Although OO testified that cooperation occurred on a number of occasions, only in this instance was he confident enough to name specific individuals. OO also implicated himself by giving this testimony. In general, OO seemed determined to testify accurately, and was careful not to make accusations without adequate support. See ¶¶ 118, 121, below.

107. P was asked on the witness stand to explain why, if he had not been solicited for an answer, he had told the NRC investigators that he was angry at the absence of a proctor, and "in the uncomfortable position where he could be solicited by other examinees." See ¶ 101, above. He replied that his statements to the NRC investigators had referred to his attitude *at the time of his interview by them*, rather than to his attitude at the time of the examination. Tr. 26,691, 724, 729-30(P). He testified that at the time of the examination, he was *not* concerned about being solicited. *Id.* P was then asked to explain a series of responses he had made to questions asked of him during his deposition. In that deposition, P was asked whether the proctor was in the room during the NRC examination in April. He responded: "From time to time." Tr. 26,745(P). Next, he was asked to describe the times when the proctor was absent. He responded that the proctor was often gone and that he "was not paying . . . too much attention." *Id.* Next, he was asked whether the operators behaved differently when the proctor was gone. He responded: "No, I did not notice any difference." Tr. 26,746(P). Next, he was asked whether anyone solicited any information from him. He responded: "No." *Id.* Next, he was asked, "Did you feel there was a potential for that happening when the proctor was out of the room?" He responded: "Yes." Tr. 26,746-748(P). He was then asked whether, when he responded to all of the above questions, he interpreted the questions as referring to the time of the examination. Tr. 26,745-746 (Adler). He said he interpreted all of the questions as referring to the time of the examination except the last one. Tr. 26,745-746(P). With respect to the last one, in response to which he had admitted that he felt there was a potential for solicitation, he said: "I interpreted that question to mean, 'Do you feel that there was a potential' at the time of the question." Tr. 26,746(P). It was then pointed out that all the questions in the series had used the same tense, and so he was asked why he suddenly attached a different tense to the last one. Tr. 26,746 (Adler). He responded: "Apparently, my prethinking of the question had colored my judgment of the tense of it, and either I made a mistake or—or I answered it in the present tense." Tr. 26,749(P). During this exchange, P's demeanor was not that of a forthright witness.

108. It is apparent that the above explanation by P is not credible. There was no basis whatever for his claim that he mysteriously understood the tense of the latter question on his deposition to be different from that of those which preceded it. His answer of "yes" to that question conforms to the meaning of the statements which he had already made to the NRC investigators. He told the NRC investigators that the proctor's absence "put him in the uncomfortable position where he could be solicited." Staff Ex. 27 at 40. One does not become "uncomfortable" retroactively. It is

obvious that his response of "yes" to the latter question on his deposition referred to the time of the examination. His denial that it did was plainly untruthful, and undermined his credibility.

109. Mr. Husted's credibility must also be examined. Mr. Husted was first interviewed by the NRC investigators on July 29, 1981. Staff Ex. 26 at 39. The last paragraph of the investigators' report read as follows:

HUSTED was queried concerning the possibility of reference material being covertly brought into the classroom by examinees. However, for unknown reasons, he declined to respond to this question or explain his reluctance to discuss this issue. He was also asked whether any rumors or comments regarding instances of cheating on the exams had come to his attention. He acknowledged that he had heard rumors to this effect which he labeled as "unconfirmed hearsay." However, HUSTED refused to reveal any specifics of the rumors he had heard or to identify the individuals (if named) who were allegedly implicated. Upon further attempted questioning, HUSTED declared he could not recall anything concerning what he had heard.

Id. The Licensee admitted that Mr. Husted's answers "were sometimes flippant" and that "he appeared at times to consider the questions in a less than serious manner." *Lic. Proposed Findings* ¶ 204. It is clear from the paragraph quoted above that Mr. Husted refused to cooperate with the NRC investigation.

110. The NRC investigators interviewed Mr. Husted a second time on September 18, 1981. Staff Ex. 27 at 16. He was asked to clarify what he had meant by "unconfirmed hearsay" in his first interview. According to the NRC investigators, Mr. Husted then stated that:

he did hear one comment made during the time period of the NRC RO/SRO exams where someone (he did not recall who) said they saw someone (the unidentified person did not say who) passing papers in the exam. [Mr. Husted] stated he heard the comment in the area near the coffee pot and men's room in the trailer that was located between the two classrooms. He said . . . he did not know if the above mentioned comment relating to "passing papers" was being directed at him or not; further, he did not know if the person was referring to the NRC exams or some other exam.

Id. Mr. Husted adopted this statement as his testimony. Tr. 26,914-915 (Husted). This information, if true, supports Mr. Ward's opinion that other candidates noticed the passing of papers between O and W. See ¶ 23, above. Mr. Husted was asked on the witness stand about this second

statement. He confirmed that the "passing papers" incident was the same as the "unconfirmed hearsay" he had mentioned during his first interview. Tr. 26,928 (Husted). Then, the following exchange occurred:

Q In the last paragraph on page 39 [the report of the first interview], it states that you refused to reveal any specifics of the rumors you heard or identify the individuals who were allegedly implicated? Why did you refuse to answer that question?

A I do not know. Stupid, I think.

Q You were being interrogated by NRC investigators regarding cheating at TMI. You are a member of the training department. You have stated it is part of your responsibilities to help prevent cheating at TMI. And you are telling me that you refused to answer a question regarding rumors of cheating at TMI because you were stupid?

A I did not like the way the investigation was conducted. I did not like the questions that were being asked. They were so broad and vague that I could not give a specific answer. And I think out of lack of anything other to say, I just told them that I did not want to answer the question.

Tr. 26,928-929 (Adler, Husted). This attitude, together with Mr. Husted's generally flippant demeanor, convinced me that Mr. Husted was not a credible witness. In fact, when one compares his testimony on the witness stand with the sequence and content of his NRC interviews, it appears that he deliberately withheld the information about "passing papers" until his second interview.

111. In contrast to this testimony of P and Mr. Husted, Mr. Ward's testimony was entirely forthright. Mr. Ward described exactly how P's admission was obtained. Mr. Baci, who also testified, was present when the admission occurred. Mr. Ward reported P's admission to Mr. Stello. Mr. Ward was extremely cautious in making accusations; there is no reason whatever to believe that he would accuse P falsely. Both P and Mr. Husted gave testimony which was not forthright. Also, they both had an interest in denying the solicitation. P's version of the interview requires one to believe that the NRC investigators asked P whether he was solicited, and then told him immediately that they weren't interested in the answer. I find that the clear weight of the evidence here is that Mr. Husted solicited information from P during the NRC examination.

U in Mr. Husted's office

112. U has been the subject of more rumors and other indications of cheating than any operator at TMI-1. The issues fall into several categories. The first issue is whether, during the NRC examination in April of 1981, U was stationed near the examination rooms to assist examinees. The second issue is whether U telephoned KK during this examination to ask for help on a question. The third issue is whether U used crib sheets. Each of these issues is discussed below.

113. The most serious allegation of cheating at TMI-1 is that, during the NRC examination, someone was stationed near the examination room in order to look up answers for examinees. A number of operators heard that someone was available. Tr. 26,534(I); Tr. 26,486-487(KK); Tr. 26,217-219(O) (O heard the rumor from multiple sources); Tr. 26,168-169(W); Tr. 25,987-988(OO). In most cases, the rumor was linked specifically to U. Mr. I said that U was named in that rumor (Tr. 26,534(I)) and so did O (Tr. 26,217-219(O)) and W (Tr. 26,168-169(W)). OO was the only person to testify that he heard the rumor *before* the NRC examination was given. OO said that "I heard that for the April exam, that someone would be posted in a trainer's room to help out if we had any questions." Tr. 25,986(OO). OO also said that "I heard that someone was going to be posted in Chuck Husted's office, which would, of course, not be occupied by him." Tr. 25,988(OO). KK told the NRC investigators that he had heard that "the person [stationed outside the examination room] was performing his duty . . . with at least the knowledge of someone higher up in the company." Staff Ex. 27 at 30. On the witness stand, KK added that his impression of the rumor was that the presence of this person would be known by the examinees. Tr. 26,489(KK).

114. On the morning of April 23, 1981, before the "B" set of NRC examinations began, U sought Mr. Husted's permission to use Mr. Husted's office. Tr. 26,916 (Husted). U had already taken the "A" examinations for RO and SRC on the two preceding days (April 21 and 22, 1981). Staff Ex. 27 at 36. Mr. Husted, who was going to be taking the "B" examinations himself on April 23 and 24, and thus was not going to be using his office, agreed. Tr. 26,916 (Husted). After making these arrangements, U went to the non-smokers' examination room. Tr. 26,888(U). He then spent 20 to 25 minutes chatting with the examinees. Tr. 26,879-880(U). This conversation included the content of the "A" examination, which U had just taken, and "may have" described specific questions and answers on that examination. *Id.* O, A, Z and S were among those present. *Id.* Mr. Paul Collins of the NRC Staff testified that the "A" and "B" sets of examinations were so similar that knowledge of questions and answers on "A" would give a candidate unfair advantage on "B." Tr.

25,146-147 (Collins). When the NRC proctor arrived to distribute the examination papers, U returned to Mr. Husted's office (Tr. 26,880(U)) where he spent almost all of the next two days. Tr. 26,825-827; Tr. 26,881(U).

115. U said that he spent the two days in Mr. Husted's office in order to study. In particular, he said he was studying for his oral examinations, which he believed were scheduled for the following August, 4 months later. Tr. 26,829-830(U). He said his study method was to review old written examinations, from TMI and other facilities, because they were "a very good source of questions." Tr. 26,831(U). When U was interviewed by the NRC investigators, he told them that he had time available to study because he "was assigned to study with the Category IV Trainees through April 24, 1981." Staff Ex. 27 at 37. On the witness stand he confirmed that this was his assignment (Tr. 26,834-835(U)) but he stated that he did not in fact study with the Category IV Trainees because as a member of management, he had a certain amount of independence. He said: "I was also management personnel, and I can kind of run my own life a little around there." *Id.*

116. U said that he chose Mr. Husted's office as a place to study because it was "close to the coffee pot, close to the soda machine [and had] lots of reference material in it." Tr. 26,876(U). According to U, operators usually studied in an empty classroom (Tr. 26,876(U)) but on April 23 and 24 the classroom normally used for this purpose was being used as the smokers' examination room. *Id.* Mr. Husted testified, however, that there were four empty classrooms still available in the training complex where U could have studied. Tr. 26,917-918 (Husted). U had never studied in Mr. Husted's office before April 23 and 24, and has never studied there since. Tr. 26,876(U).

117. U was interviewed by the NRC investigators and cross-examined on the witness stand. He made a written statement in which he said he did not "assist, facilitate or otherwise encourage anyone . . . to cheat," and he denied "providing information to anyone who was in the process of taking the NRC exam. . . ." Staff Ex. 27, Encl. 12 at 2. He insisted, however, that the word "knowingly" be inserted in front of each of these denials. *Id.* On the witness stand, he was asked why he wanted this word to be inserted. He said he could have unknowingly provided help in the following way:

I could have met him [an examinee] in the hall, passed them [examinees] in the men's room, at the soda machine, at the candy machine, and they asked me a question, and spontaneously I answered it, but I do not remember doing that, but it is possible.

Tr. 26,837(U). He also testified that he would not have considered cheating to give someone an answer to the NRC examination if the answer

were a brief answer. Tr. 26,837-838; Tr. 26,874-875(U). Finally, he said that although he did not remember meeting any specific person at the coffee machine, "it is not unlikely" that someone taking the examination could have received a brief answer from him there. Tr. 26,837-838; Tr. 26,862-863(U).

118. During the "B" set of examinations OO left the examination room to go to the coffee machine. OO testified that while he was there, making a cup of tea, U appeared in the hall from the direction of Mr. Husted's office. Tr. 25,991-992(OO). During an exchange of greetings OO became convinced from U's demeanor that an implied offer of assistance was being made. Tr. 25,988(OO). OO stated: "I assumed that he [U] had come from that office [Mr. Husted's] and was just more or less trying to give me the opportunity to . . . ask a question." *Id.* See also Tr. 25,998(OO); Tr. 26,004(OO). I observed OO's demeanor; he was a very credible witness. Although he stated later that he felt he may have "jumped to the conclusion at the time" (Tr. 25,998(OO)), there is no reason to question OO's belief that an implied offer of assistance was indeed made. OO had not heard, before seeing U at the coffee machine, that U was the person who would be available. Tr. 26,004(OO). U said he did not remember talking to OO (Tr. 26,829(U)), but he said would not have offered OO assistance. Tr. 26,877-878(U).

119. U's stated reasons for being in Mr. Husted's office are not convincing. First, U could not recall ever having studied in Mr. Husted's office before the NRC examination, or after it. Tr. 26,876(U). Empty classrooms were normally used for such study and were available. Tr. 26,917-918 (Husted). Mr. Husted's office contained training materials, old written examinations, and a telephone; it was equidistant from the examination rooms and was accessible to anyone going from those rooms to the men's room or the coffee machine. Tr. 25,423 (Ward); TMIA Ex. 61. The training materials would have been helpful to someone who was studying; those same materials, plus the old examinations, the telephone, and the office's location, also would have been helpful to someone who was assisting examinees. Tr. 25,423 (Ward).

120. Second, U had just finished 16 hours of NRC examinations over the previous two days. He admitted that he was somewhat exhausted afterward. Tr. 26,876(U). Other examinees couldn't imagine beginning to study for another examination immediately after the one they had just written. See e.g. Tr. 25,713(GG); Tr. 25,771(G). The oral examinations for which U contends he was studying were 4 months hence by his own account. Tr. 26,829-32(U). Mr. Ross and Mr. Hukill testified that the oral examinations were approximately six months hence and that the operators knew it. Tr. 24,209-10 (Ross); Tr. 24,076 (Hukill). It is very difficult to

believe that after two grueling days of examinations, an operator would begin at 8:00 a.m. the following day to study for an oral examination six months hence.

121. U's testimony that he might have unknowingly provided a brief answer amounts to a "non-denial." He was unable to say that he had not rendered assistance; he said that if he had given a brief answer he would not have considered it cheating; and he said that it was "not unlikely" that someone could have received a brief answer from him at the coffee machine. See ¶ 117, above. By contrast to U's hedging, OO's testimony was clear and forthright. From OO's demeanor, it was obvious that he was reluctant to make statements against his employer's interests, and reluctant to incriminate a fellow employee. Nevertheless, OO seemed determined to report accurately everything he knew about cheating, including things which could be detrimental to himself. See, e.g., ¶ 69, above. I found OO's testimony to be convincing, and to have established, together with the other evidence discussed above, that U in fact offered him assistance.

122. There was no firm evidence that U offered or gave assistance to anyone other than OO. U's trip to the examination room did enable him to tell the examinees where he would be located, and thus fits the rumor heard by KK that the examinees would know where to find assistance. Also, U's ostensible reason for being in Mr. Husted's office was not plausible, and U probably telephoned KK during this time. See ¶¶ 123-129, below. However, this evidence is insufficient to establish that U was "stationed" in Mr. Husted's office. There was no independent evidence to show that U was "stationed" either by management or his fellow employees. The rumor reported by KK, that "someone higher up in the company" knew that assistance would be offered, was unsubstantiated. The conclusion is that the evidence does not show that U was "stationed"; but the evidence does show that U cheated by offering OO assistance. U's discussion of the "A" examination with those who were about to take the "B" was not prohibited by the NRC proctor (this is discussed further in ¶ 265, below) but U, as "management personnel," should not have overtly and deliberately compromised the examination's integrity. The offer of assistance to OO was clearly an act of cheating.

The telephone call to KK

123. KK reported that while he was on duty in the shift supervisor's office on Thursday, April 23, 1981, he received a telephone call. The caller identified himself as U. Staff Ex. 27 Enc. 8 at 3. QQ was also in the shift supervisor's office; he and KK discussed the call immediately after it was

made. *Id.* at 3 & 6. QQ could not remember whether the call came in on the speaker phone or whether his recollection of it came from his discussion of it with KK. Staff Ex. 27 at 39. KK said the caller asked a question which was "along the lines of what happens to fuel pin temperature over core life if an oxidizing layer builds up on a cladding surface." Staff Ex. 27 Enc. 8 at 5. QQ confirmed that this was the question asked. Staff Ex. 27 at 39. KK was aware that an NRC examination was in progress, so he asked the caller if he was taking it. Staff Ex. 27 Enc. 8 at 6. The caller then responded: "No, I am helping O take his." *Id.* KK said he then told the caller he would not answer the question until the examination was over *Id.* That ended the conversation. *Id.* KK could not identify the voice of the caller as belonging to U. *Id.*, Encl. 8 at 5.

124. U was asked on the witness stand whether he placed the call. He said that he did not call KK for the purpose of asking the question described by KK, since he felt it was an easy question to which he already knew the answer. Tr. 26,844-845(U). U said, however, that he "could" have called KK with a question, and that if he had made such a call he "may" have said it was about a test question, although he could not remember having made such a call to KK or anyone else. Staff Ex. 27 at 37-38. He explained that by "test question" he meant one of the old examinations from which he was studying in Mr. Husted's office. Tr. 26,846(U). He said:

If I had — if I had a question on heat transfer, Mr. KK would have been the individual I contacted. And I cannot definitely say that I did not talk to Mr. KK that day. But I know a question like it is alleged that I had asked, I would not have required Mr. KK's assistance on.

Tr. 26,844-845(U). U testified that he learned of KK's allegation at the time of the NRC investigation, but that he never spoke to KK about it. Tr. 26,864-865(U).

125. KK and O were friends. Tr. 26,483(KK). KK told the NRC investigators that he (KK) told O about the telephone call at the first opportunity. KK said:

O was taking the test Thursday and Friday, as I remember and it was the first opportunity I got after that when I was with him alone. I can't remember what day of the week that was, if it was Saturday or if it wasn't until the following Monday. It was at some point in time when he and I were alone and I told him what had happened . . . that I had gotten a phone call and that the guy who called said he was helping O take an NRC test. I specifically asked if it was true cause I was surprised would have been

surprised had it been true. Knowing O the way I do and he said, no, it wasn't true that he hadn't asked for or sought in any other way to get help on his exam. And I believe him.

Staff Ex. 27 Encl. 8 at 8. O testified that he was very angry when he learned of the telephone call. Tr. 26,259(O). He was asked whether he went to U to find out whether U had made it. O said: "I was going to, but I never got around to it. I never did it." Tr. 26,258(O). O said that he didn't go to U because O believed he must have been told of the call only after the investigation started, and by that time he was "no longer able to" (i.e., he had been fired). Tr. 26,259(O).

126. Mr. Ward, with the assistance of others, compared the question KK was asked with the questions on RO and SRO examinations. The question was not on either. Staff Ex. 27 at 31. In fact, as U pointed out, the question was on the ATTS examination, which was given in April of 1981, a few weeks before the NRC examination was given. *Id.* at 44.

127. The evidence above is extraordinarily confusing. KK, who was a forthright witness, contradicted O, who was not a forthright witness (see ¶ 15-17, above), with respect to when O learned of the call. KK was certain that he told O immediately afterward; O was unsure when he was told. Tr. 26,259(O). Thus, one must find that O was told immediately afterward. The fact that O did not confront U is very suspicious. O's reputation, and perhaps his job, were at stake if the call became known. Under these circumstances one cannot believe that O would not have confronted U if O were in fact innocent. From this, one concludes that O was not innocent and that O had no need to confront U.

128. U's statement that he "could" have called KK; that he would have called KK if he had a question about heat transfer; and that he could not "definitely say . . . [he] did not talk to Mr. KK that day" lead one to think that he did call KK. Mr. Ward concluded that it was "highly likely" that he made the call. Tr. 25,359-360 (Ward). This conclusion is reinforced by U's position in Mr. Husted's office, where he had access to old examinations, the examinees, and the telephone. See ¶ 119, above. The weight of the evidence is that U made the call.

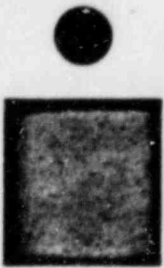
129. However, the question asked was not on the NRC examination. Since this is so, it cannot have been cheating to ask it. Both KK and QQ were certain of the question. Thus, one is left with a mystery. Why would anyone ask a question which most operators could answer easily? O said he knew the answer Tr. 26,272(O). Why would U deny asking a question which was on the ATTS examination? Why would O, who was not a shy person, fail to confront U after learning of something so damaging to O's reputation? One possibility is that U could have been "testing" KK before asking the "real" question. If that were so, however, it would have been unnecessary to mention O. Of course, U could have mentioned O

"spontaneously," without thinking about the consequences. Since there is no evidence to support this theory, however, it does not go beyond speculation. On the evidence in the record, one has the equivalent of Charlemagne dying of a gunshot wound.

Rumors about U

130. The Licensee was informed on July 27, 1981 that the NRC was beginning an investigation into cheating at TMI-1. On the following day, July 28, Mr. S. Polon, Manager, Employee Communications, went home to lunch. His wife was there. His wife told him of a telephone conversation she had had with the wife of P. P was a Shift Foreman at Unit 1. Commonwealth Ex. 8. During that conversation the two women had discussed a previous conversation they had had regarding rumors about cheating. *Id.* They also discussed rumors that they had each been told previously by the wife of T. *Id.* T's wife appears to have told them these rumors before June of 1981. Aamodt Ex. 7. T was a Control Room Operator at Unit 1. When Mr. Polon returned to the office, he told Mr. W.L. Gifford, Vice President Communications, what his wife had said. Commonwealth Ex. 8. Mr. Gifford immediately notified Mr. Arnold and Mr. Arnold immediately notified the NRC investigators. *Id.* On August 27, 1981, Mr. Polon and his wife again discussed the rumors. Mr. Polon's wife said that she had heard that U wrote on his hand and took crib sheets into the NRC examination. *Id.* When Mr. Arnold and Mr. John Wilson learned from Mr. Polon what Mr. Polon's wife had said, they interviewed U and T. Commonwealth Ex. 9. U denied the cheating alleged in the rumor. *Id.* T said he had no idea where his wife heard the rumors. *Id.* T also said that "his wife was an unreliable source." *Id.* At the conclusion of this interview, Mr. Arnold and Mr. Wilson were not able to determine whether U was being honest. *Id.* Mr. Wilson and Mr. Lloyd then interviewed U again. *Id.* This time, Wilson and Lloyd concluded that U's denial was honest, and that there was no reason to believe the rumor. *Id.*

131. There was other, circumstantial, evidence concerning U and crib sheets. O stated that either A or P told him that U had used a crib sheet during the Kelly examination. Tr. 26,274-275(O). T and U are close friends (Tr. 26,819(U)), so T and his wife would be in a position to know whether U had used a crib sheet. During the examination U sat facing the wall, with his back to the proctor (Tr. 26,817; Tr. 26,854(U)), a position which would have made it difficult for the proctor to have observed a crib sheet. U took his briefcase into the examination and had access to it while the proctor was out of the room. Tr. 26,840-841(U). When U was



interviewed by the NRC investigators, he spontaneously reported to them that cheating would have been difficult on the NRC examinations, and he said the reason was that they were "very . . . different from previous exams." Staff Ex. 26 at 33. At the hearing, he explained that by this statement he meant that it would have been difficult to prepare "cards" or "crib sheets." Tr. 26,842(U).

132. In view of the other events and allegations concerning U, the above evidence is troubling. However, this evidence is insufficient to establish that U in fact wrote on his hand, or that he used crib sheets during the examinations.

The telephone call to WW

133. WW was on duty in the shift supervisor's office in April of 1980 while the Kelly examination was being given. Staff Ex. 28 Encl. 1. He received a telephone call from a person who did not identify himself. *Id.* The person asked him: "What are the indices on the DNB curve?" *Id.* WW answered the question, because it "wasn't unusual for people to call up and ask questions." *Id.* Later, WW discovered that the question had been on the Kelly examination. *Id.* He did not disclose the telephone call during an interview with the NRC investigators because the investigators confined their questions to the NRC examination. *Id.* Although the caller's voice was familiar, WW could not identify it. *Id.*

134. There is no reason to doubt that the telephone call was made, or that it was cheating. However, that is about all one can say. There is no way to discover who the caller was if WW cannot identify the voice. If one believes that WW did not suspect the reason for the question, WW's response was innocent. One concludes that there is an uncaught cheater in this episode, as was the case in the episode with Mr. Shipman.

VV and O in 1979

135. In 1979, in satisfaction of a required make-up examination, VV submitted as his own work answers which were in fact written by O. This clearly constituted cheating by VV, and the weight of the evidence established that it also constituted cheating by O. The incident is described in ¶¶ 220-237, below.

B. MANAGEMENT'S INVOLVEMENT IN CHEATING

136. There is no evidence that management encouraged, condoned, participated in, or knew of the cheating by O and W when it occurred. Nor is there any such evidence with respect to any of the other persons mentioned above. Or at least, that is true with respect to "upper" management. There are only four issues under this heading: The first is whether Michael Ross, the Manager of Operations at Unit 1, facilitated cheating by keeping the NRC proctor away from the examination room. The second is whether Mr. Ross improperly caused the answer key to the NRC examination to be broadened. The third is whether Licensee's management was involved in cheating on a test in 1979 for radiation work permits. The fourth is whether, or to what extent, persons such as O, W, VV, Husted and Shipman should be considered "management" for the question of "management involvement."

Keeping the proctor away from the examination room.

137. When the NRC gives an examination at a facility, it is the NRC's practice to have the questions and answers reviewed by senior members of the facility's staff. Staff Ex. 29 at 3. This is done to insure that the questions and answers are currently valid for that facility. *Id.* Another purpose is to insure that the questions are clear enough to be understood. Tr. 25,498-499 (B. Wilson). This review is done while the examination is in progress; it is not done beforehand because of the risk that the questions will be disclosed to the candidates (Boger, ff. Tr. 25,480 at 5; Lic. Ex. 27, Enclosure 3) and it is not done afterward because by then it will have become too late to correct the questions before they are answered.

138. In April of 1981, every licensed individual at TMI-1 who was capable of reviewing the NRC examination was also scheduled to take it. Ross ff. Tr. 24,127 at 2. This is unusual. Ordinarily, the NRC examination is given to a half-dozen or so candidates who are seeking an NRC license for the first time. Tr. 25,131 (Collins). In such cases senior operators, who already hold licenses, are available during the examination to review the questions and answers with the NRC examiner. *Id.* At TMI-1, however, there were no "extra" senior operators available; they were all taking the examination.

139. Two separate sets of examinations were given. The "A" examination for RO was given on April 21, 1981; the "A" examination for SRO was given on April 22, 1981; the "B" examination for RO was given on April 23, 1981; the "B" examination for SRO was given on April 24, 1981. The RO examination lasted nine hours; the SRO examination lasted

seven hours. All the licensed operators who would have been qualified to review the "A" set of examinations on April 21 or 22 were either taking it on those days, or were scheduled to take the similar "B" set of examinations on April 23 and 24. The operators who were scheduled to take the "B" examination would have been available physically to review the "A", but could not do so without being given an unfair advantage on the "B", because the two sets were so similar. Tr. 25,146-147 Collins). In order to provide at least some review of the "A" examination while it was being given, the Licensee provided three unlicensed persons to meet with the NRC examiner. These were Mr. Ronald J. Toole, Operations and Maintenance Director at TMI-1, Mr. Samuel L. Newton, Operator Training Manager at TMI, and Mr. Charles Pardi of ATTS, a consultant to the Licensee on training. Staff Ex. 27 at 14, 17, 18. They reviewed the questions and answer key to the "A" examination with Mr. Bruce Wilson, the NRC examiner, on April 21 and 22. *Id.* The review lasted about one and one half hours on each of those two days. Tr. 25,557 (B. Wilson).

140. After Mr. Ross had taken the "A" examination he became available to meet with the NRC examiner. On April 23, while the RO "B" examination was being given, he met with Mr. Bruce Wilson, the NRC examiner and proctor. They met in an office next to the examination room reserved for smokers. Mr. Nelson Brown and Mr. Dennis Boltz, who are instructors on the Licensee's training staff, were also present. According to Mr. Ross, the object of the meeting was to review the answer key to the "A" examination and the questions and answers to the RO "B" examination. Tr. 24,160 (Ross). Mr. Ross testified that the review lasted "approximately three to four hours." Ross, ff. Tr. 24,127 at 2-3. He stated that in his experience, the time required to review an examination was usually one and one half to two hours. Tr. 24,134 (Ross). He said that on April 23 the questions on the RO "B" examination were reviewed, and so was the answer key to the "A" examinations. Tr. 24,160 (Ross). The process of review consisted of having Messrs. Ross, Boltz and Brown inform Mr. Wilson of any disagreements which they had with a question or an answer, and of having them supply any documentation required to support their point of view. *Id.* Several changes to the answer keys resulted from this process; some of them are discussed below in ¶¶ 153-175. During the time when this review was taking place, Mr. Wilson was not proctoring the examination room. See ¶ 149, below.

141. On Friday, April 24, while the SRO "B" examination was underway, Mr. Ross met again with the same persons in the same room to continue the review. He testified that, to the best of his recollection, the reviewers first completed work on the RO "B" examination and then did the SRO "B" examination. Tr. 24,164; Tr. 24,167 (Ross). Mr. Ross said the review again took approximately three to four hours. Ross, ff. Tr.

24,127 at 2-3. This made Mr. Ross' estimate equal six to eight total hours for both days' review. Mr. Wilson then proctored for the one or two hours which remained. Tr. 25,559 (B. Wilson).

142. Mr. Ross' participation in this review became an issue when YY, a former employee at TMI-1, reported that Mr. Ross had bragged about keeping the NRC proctor out of the examination room. YY made this report to the NRC Staff's Office of Inspection and Enforcement (OIE). He said that on either April 23 or 24, during the 7 a.m. to 3 p.m. shift, Mr. Ross came into the shift supervisor's office in a "very happy — almost ecstatic — mood" Staff Ex. 27, Enclosure 1. According to YY, Mr. Ross

said that he had gotten the NRC to 'expand' the answer key so as to give the examiners more latitude in their answers and also that he had kept the proctor out of the room for a very long period of time. The inference . . . was that by both actions he had made it easier for the people taking the tests.

Id. The NRC investigator informed YY that it was a standard procedure to review examinations and answer keys, and asked YY whether Mr. Ross' "talk was just bragging — that is, if he was just trying to impress his subordinates . . ." *Id.* YY replied that he "felt Ross had meant what he said and that by implication, he had kept the proctor out of the room to facilitate cheating." *Id.* YY added, however, that "it is possible that he could also have been bragging." *Id.* At my request, YY appeared to testify. He repeated on the witness stand his belief that Mr. Ross had meant that he (Mr. Ross) had kept the NRC proctor out of the examination room to facilitate cheating. Tr. 26,011; Tr. 26,015-016 (YY). YY said that he believed, based upon his experience at TMI-1, that Mr. Ross would do such a thing. Tr. 26,011 (YY).

143. There was also other evidence of Mr. Ross' comments. GG, a shift foreman at TMI-1, stated that during the examination period Mr. Ross participated in a conversation about changes in the answer keys, and that during that conversation Mr. Ross said, either to GG or to a group of which GG was a part, "don't worry, you did all right." Staff Ex. 27 at 26. GG said that he interpreted this to mean that the answer keys were broadened to make them more fair, rather than to give the candidates an unfair advantage. *Id.* KK, who also recalled Mr. Ross' conversation about broadening the answer keys, said he (KK) attached the same meaning to Mr. Ross' remarks as did GG. *Id.* at 24. RR, a shift technical advisor at TMI-1, stated that during the examination period or shortly thereafter, he was in either the control room or the shift supervisor's office when Mr. Ross came in at the time of the shift change; the operators were depressed and angry about the examination; in response to their complaints, and in reference to Mr. Ross' review of the examination, Mr. Ross said: "don't

worry about it, I took care of that job." Staff Ex. 27 at 27. According to RR, everyone then "chuckled." *Id.* RR added that this comment was one of Mr. Ross' "standard phrases." RR said that the "comment was made to cheer people up." *Id.*

144. Mr. Ross told the NRC investigators that he did not specifically remember the conversation described by YY, but he said that he might have mentioned how long the reviews had taken. He said he would have done this as an observation, rather than to describe an attempt to distract the proctor. Staff Ex. 27 at 12-13. He denied that he had attempted to prevent the NRC proctor from doing his job. *Id.* On the witness stand, Mr. Ross said that he remembered discussing the answer key, and discussing his review of the examination, but could not remember specifically when or with whom the discussion occurred. Tr. 24,176-177 (Ross). He asked whether he had made the remark "I took care of that job." He said that it was possible that he made it ("I feel I could have made the remark") (Tr. 24,180(Ross)) but he did not specifically recall it. *Id.* He was also asked whether he had said "don't worry you did all right." He replied "very probably," although again he said he did not specifically remember it. Tr. 24,331 (Ross). He said that if he had made the latter remark he would have intended it to indicate that the answer keys reflected what the operators had learned in training, rather than to indicate to GG personally that GG had done well. *Id.* With respect to the "chuckling," Mr. Ross said that there was an attempt at the time to increase morale, so the chuckling could have occurred. Tr. 24,334-335 (Ross).

145. Mr. Bruce Wilson, the NRC proctor who did the review with Mr. Ross, said he did not "gain the impression at the time that any of the three TMI reviewers were attempting to keep me out of the room." Staff Ex. 27, Enclosure 2 at 3. He said "I particularly felt that Mike Ross, whom I have dealt with for over seven years, would not have been a party to such an action." *Id.*, Enclosure 2 at 4. Mr. Wilson stated that it took about three hours to review the RO "B" examination, two to two and one half hours to review the SRO "B" examination, and about two and one half hours for each of the two "A" examinations. This is a total of ten to ten and one half hours. *Id.*, Enclosure 2 at 3. Mr. Wilson said that "[t]hese reviews took much longer than on the previous days because of their [the TMI reviewers'] greater technical competency which in turn allowed them to argue more forcibly and knowledgeably concerning the allocation of credit on answers." *Id.*

146. Mr. Ross was asked about the extent to which the questions and the answer keys were actually changed during the review. With respect to the RO "A" examination, Mr. Ross recalled that he had raised a question concerning Question B4. Tr. 24,266; Tr. 24,268 (Ross). He was asked whether he recalled other instances, and he said "I am sure we had some

discussions as we went through but I do not remember asking for changes on too many other items that I can remember." Tr. 24,277 (Ross). He said that Question B4 was the only one he could specifically recall, "keeping in mind it is more than a year since that happened." Tr. 24,278 (Ross). He was asked how long the review took, and he said "I think it was in the time frame of 1½ hours by the time you go through and look at the question and make sure it reads right." Tr. 24,277 (Ross). Mr. Ross stated that he did not know whether the NRC examiner actually accepted the changes to the answer keys which he and the other reviewers had suggested. Tr. 24,332 (Ross). He said he did not know at the time, and said "I still do not know today." *Id.*

147. The above testimony by Mr. Ross is not credible. First, Mr. Ross' statement that he did not know whether the answer key was actually changed is contradicted by the assurances he made to the operators. Even if those assurances are interpreted most favorably to Mr. Ross, they still amount to a statement that the key *had* been changed (see ¶ 143, above) and "was going to be fair" (Tr. 24,180 (Ross)). Mr. Dennis Boltz, one of the other TMI reviewers, said that as a result of the review, "several answers were modified." Staff Ex. 27 at 22. Mr. Nelson Brown, the other TMI reviewer, said that "based on the review there were some changes and/or clarifications made in the questions and/or answers by Bruce Wilson." *Id.* at 19. Mr. Wilson himself testified that the changes were in fact agreed upon during the review (Tr. 25,608 (B. Wilson)), that the changes were written in by longhand during the review (Tr. 25,597 (B. Wilson)) and that often the changes were written in by one of the reviewers from TMI (Tr. 25,608 (B. Wilson)). This is confirmed by the handwriting on the keys themselves. See ¶¶ 153-175 below. Mr. Ross was by far the most competent of the reviewers (see, e.g., Tr. 25,548 (B. Wilson)); the reviewers argued "forcibly" for changes (see ¶ 145, above); and the changes were extensive (see ¶¶ 153-175, below). Despite Mr. Ross' testimony to the contrary, Mr. Ross obviously knew that Mr. Wilson had adopted the changes during the review. Mr. Ross' testimony that he did "not remember asking for changes on too many other items" conflicts with the fact that extensive changes were requested and made (*id.*) and conflicts with the fact that one and one half hours were required to make the review. Mr. Ross said that this period of time was necessary to "look at the question and make sure it reads right," but the clarity of the questions was not reviewed during this period, only the answer key was. Tr. 25,498-499 (B. Wilson). Mr. Ross' inability to recall the changes cannot be explained by the lapse of "more than a year since . . . [the review] happened," because the review took place on April 23, 1981 and Mr. Ross testified on November 14, 1981. Mr. Ross' estimate of six to eight total hours for both days' review (see ¶ 141, above) misstates the length of the

review and its effect on proctoring. Mr. Ross' estimate was contradicted by Bruce Wilson (ten to ten and one half hours (see ¶ 145, above)) by Nelson Brown (approximately eleven hours (Staff Ex. 27 at 19)) and by Dennis Boltz (approximately eleven hours (*Id.* at 22)). Mr. Ross' lack of credibility here is important in evaluating his response to YY's allegations.

148. The evidence clearly shows that Mr. Ross discussed his review of the examination in the control room or the shift supervisor's office at the time YY alleges that he did. The two remarks "don't worry, you did all right," and "I took care of that job" were no doubt made. "Chuckling" no doubt followed the second. There is no reason to question the testimony of the operators on these points. Moreover, Mr. Ross does not deny making these remarks. With respect to the first remark, the operators' interpretation is entirely plausible; however, one must remember that the operators are Mr. Ross' subordinates, and that a person who testifies to an event has a tendency to interpret it according to his own interest. The second remark, even if designed to increase morale, is quite different from the first. It states that there was a "job" to be "taken care of," and that Mr. Ross "took care" of it. The implication is that the "job" was to broaden the answer key to help the operators pass the examination, and that Mr. Ross "took care" of the job by pursuing that purpose. The "chuckling" of the operators shows that they so interpreted the remark.

149. The extensive reviews on April 23 and 24 caused one of the two examination rooms to remain without a proctor for most of those two days. Tr. 25,556-559 (B. Wilson). Mr. Boltz's office, where the review was conducted, is immediately adjacent to the room left unproctored; the doors of both rooms were partially open during the examination (Tr. 25,514-515 (B. Wilson)); from Mr. Boltz's office one could see into the unproctored room but not far enough to observe cheating (see, Diagram of Training Facility, ff. Tr. 24,152); (Tr. 25,504 (B. Wilson)); or hear whispering (*id.*); the reviewers spoke aloud, but softly because of the open doors (Tr. 25,514 (B. Wilson)). Mr. Wilson visited the examination room on these two days, but only for "several minutes at a time." Tr. 25,501 (B. Wilson). Under these circumstances, Mr. Ross obviously knew that one of the two examination rooms was not being proctored during most of the time the examination was given. His testimony to the contrary (Tr. 24,342-343 (Ross)) is not credible.

150. The question of Mr. Ross' motive depends, ultimately, on credibility. Mr. Ross' testimony must be weighed against that of YY. Mr. Wilson's statement, that Mr. Ross' motive was benign, must be viewed in light of Mr. Wilson's interest in making such a statement. Mr. Wilson was kept away from the examination room for a long time. For Mr. Wilson to say that he was kept away because of Mr. Ross' improper motive would

require Mr. Wilson to admit that he was tricked into not doing his job. As stated above, a person who testifies to an event tends to interpret it according to his own interest.

151. YY's testimony was clear. He said that Mr. Ross made the statement about keeping the proctor out of the room. He also said that when Mr. Ross made that statement, Mr. Ross was "almost ecstatic," and that Mr. Ross clearly meant that the proctor was kept out in order to help the candidates. YY affirmed his position in the face of questions. Mr. Ross' remark that "I took care of that job," which Mr. Ross clearly made, gives the same impression as the impression which YY says Mr. Ross gave about keeping the proctor away. YY had absolutely no reason to misrepresent what he heard. Mr. Ross has a clear interest in denying an improper motive. Mr. Ross' credibility was undermined by his untrue statement that he did not know whether the answer key had been changed. It was also undermined by his untrue statement that he did not know whether the adjoining room was proctored. When he said that the review of the "A" examination took longer because of the need to review the questions for clarity, when he said that the review had taken place more than a year before, and when he said that the total time for all review was only six to eight hours, he was wrong. Each of these wrong answers by Mr. Ross tended to slant the facts in a direction more favorable to himself. I observed the demeanor of both Mr. Ross and YY. YY's demeanor was completely forthright; Mr. Ross' was less than forthright. In my judgment, the weight of the evidence establishes that Mr. Ross said that he kept the proctor out of the examination room, and it establishes that when he made that statement he meant that he had done so in order to help the candidates pass the examination.

152. What are the consequences of this finding? Can the statement be dismissed simply as an improvident gesture, designed to build morale, in which Mr. Ross only pretended to have had an improper motive? That does not seem likely. The absence of a proctor was *not* a benefit to the candidates in the smokers' room. P, who was one of those candidates, was angry about the absence of the proctor. Staff Ex. 27 at 40. He said it "put him in the uncomfortable position where he could be solicited by other examinees." *Id.* The preponderance of the evidence is that he *was* solicited. See ¶¶ 101-111, above. P also "resented having to leave the room to seek clarification of a question" *Id.* It is difficult to see how Mr. Ross could believe that honest operators would welcome the absence of a proctor. The conclusion here must be that Mr. Ross intentionally kept the proctor away in order to aid the candidates.

Broadening the answer keys

153. It was also alleged that Mr. Ross improperly caused the answer key to the NRC examination to be broadened, so that it would be easier for the candidates to pass. As pointed out above, Messrs. Ross, Boltz and Brown reviewed the answer keys to their own examinations. This occurred because there were no persons, other than those who were taking the examination, sufficiently familiar with the reactor to review the examination with the NRC examiner. See ¶¶ 137-139, above. Of course, this opportunity for review meant that Messrs. Ross, Boltz and Brown could influence their own grades. As will appear below, they in fact did so. The review sessions were extensive; they consumed about ten and one half to eleven hours during the last two days of the examination. See ¶ 147, above. Changes to the answer key were written in by hand, during the review, with the agreement of the TMI reviewers. Tr. 25,608 (B. Wilson). Almost all of the changes made were suggested by the reviewers; however, the reviewers also suggested changes which the NRC examiner did not accept. See ¶ 161, below. On some questions, the answer key had been left blank, and the answers were filled in during the review. See ¶ 172, below. In order to determine whether the changes to the key were proper, one must consider them one at a time. In the discussion below, only twelve changes in the key of the "A" examination are considered. There were many more changes than just these twelve. Changes in the key for the "B" set of examinations were not considered at all. These twelve changes are presented simply as examples.

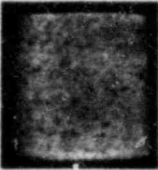

154. The first change examined was on Question B.5.a. The question concerned reactor coolant pumps. It asked: "What is the purpose of the No. 1 seal by-pass line? Include how opening this line affects the No. 1 seal." Staff Ex. 33. The answer key, as originally prepared by the NRC examiner, Mr. Wilson, stated:

Lowers the pressure in the No. 1 seal area, offers lower head resistance to pump injection water, allows more injection flow to be diverted up shaft through the seal and past radial bearing. This prevents binding and contact of seal faces.


Id. After Mr. Wilson discussed the answer with the TMI reviewers, the key was changed to read as follows:

Lowers the pressure in the No. 1 seal area, offers lower head resistance to pump injection water, allows more injection flow to be diverted up shaft past radial bearing for adequate cooling.

Id. The result of this change was to make the answer key state a different effect from opening the by-pass line. The original answer said the effect was to prevent the seal faces from binding; the changed answer said the effect was to cool the radial bearing.



155. Mr. Wilson was asked to explain the change. He said that the change was made during the review, and at the suggestion of the Licensee's reviewers. Tr. 25,597-598 (B. Wilson). He said that the change was made because at TMI-1 the operators had been taught that the purpose of the by-pass line was to allow flow in order to cool the radial bearing when the reactor coolant system is at low pressure. Tr. 25,598 (B. Wilson). He said that at other facilities, operators were taught that this flow accomplished two purposes: to cool the radial bearing, and to prevent binding and contact of the seal faces. *Id.* Because the TMI operators were taught that the purpose was simply to cool the bearing, the sentence about preventing contact of the seal faces was deleted. Tr. 25,599 (B. Wilson). The answer key as changed matched the answers given by Messrs. Ross, Boltz, and Brown. Staff Ex. 35, 37D, 37M. They also matched the answers of B, X, RR, F, G, and FF. Staff Ex. 37Q, 37A, 37P, 37J, 37H, 37F. However, eight other candidates *included* in their answers the statement: "This prevents binding and contact of seal faces." These candidates were T, E, UU, QQ, D, SS, U, and H. Staff Ex. 37R, 37E, 37L, 37O, 37K, 37N, 37B, 37I. These eight candidates must have received their information from the TMI-1 training program. Thus, it appears that the candidates at TMI-1 *were* taught that the effect of opening the by-pass line was to prevent the seal faces from binding. The candidates must have been taught both effects, since about one half answered one way and about one half answered the other way. The eight candidates who included the statement about the seal faces were marked right, and so were the candidates who only mentioned the radial bearing. Staff Ex. 35, 37A-37R. The effect of the change was to cause persons who mentioned only the bearing to receive the same credit as persons who mentioned the seal faces. The TMI reviewers achieved this result by telling Mr. Wilson that the TMI candidates had only been instructed on the bearing, and by getting Mr. Wilson to delete the effect on the seal faces from the answer key.



156. This change in the answer key cannot be reconciled with the question. The question, which was clear and straightforward, consisted of two parts. First, the question asked the candidates to state "the purpose of the No. 1 seal by-pass line." One purpose of the by-pass line (according to Mr. Wilson) was to cool the radial bearing. Thus, an answer mentioning cooling would respond to the first part of the question. The second part of the question asked the candidates to "include how opening this line affects the No. 1 seal." An answer to the second part of the question would necessarily mention an effect on the *seal*, since that is what the question asked. According to Mr. Wilson, the effect of the by-pass line on the *seal* was to "prevent binding and contact of the seal faces." It is obvious that an answer which describes the effect on the *bearing*, which may be a response to the first part of the question, is *not* an answer which describes

an effect on the *seal*, which is asked for by the second part of the question. In effect, an answer describing only the effect on the bearing is half the answer, since it responds to half the question.

157. Mr. Wilson said he agreed to the change because of the candidates' training program which taught only the effect on the bearing. This reasoning cannot be accepted. If the by-pass line has both effects, as Mr. Wilson stated, and if the effect on the seal was important enough to justify a specific question about it, then a candidate who did not know that effect should have been marked wrong, regardless of the training program. The NRC examination is designed to test the Licensee's training program as well as the Licensee's candidates. According to the NRC Staff, its examination is the *only* test of the Licensee's training program. Boger, ff. Tr. 25,480 at 2-4. If the training program was deficient, the grading should have reflected it. If the NRC examination and its answer key are changed to cover only what candidates actually learn in their training programs, there is little purpose in giving the NRC examination. At TMI-1, however, the effect on the seal was covered in the training program. There is no other plausible source for the answers given by half of the candidates. They answered the second part of the question by describing the effect of the by-pass line on the seal faces.

158. The answer key should not have been changed. By changing it the candidates who only responded to the first part of the question received the same credit as was given to the candidates who responded to both parts of the question. The reviewers—and the candidates answering similarly to the reviewers—were the only beneficiaries of this change. The effect of the change was to broaden the answer key improperly.

159. The second change examined was on Question B.5.c. This question asked: "When must a reactor coolant pump be tripped due to high vibration? (assume 4 pump operation)." Staff Ex. 33. The answer key, as originally prepared by Mr. Wilson, stated "20 mils — 4 pump operations; 30 mils single pump operations." *Id.* At the suggestion of the TMI-1 reviewers, the key was changed during the review to add an additional condition for tripping the pump. The additional condition was "motor stand high vibration 2 mils." *Id.*; Tr. 25,603 (B. Wilson). Mr. Wilson testified that the reason for the change was that the motor stand vibration was in fact a condition for tripping the pump, that the reviewers anticipated that the TMI candidates would give that answer, and that the reviewers did not want the candidates to be marked wrong because the motor stand vibration was not on the answer key. Tr. 25,604-606 (B. Wilson). Almost all the candidates, including the reviewers, included the motor stand vibration in their answers. Staff Ex. 35, 36, 37A-37R. This change was proper, and its effect was to make the answer key more complete.

160. The third change examined was on Question B.6.a. The question asked: "How does the response of the NSRW [nuclear services river water] system differ between a loss of offsite power with and without a LOCA?" Staff Ex. 33. The answer key, as originally prepared by Mr. Wilson, stated: "NSRW pumps don't auto start unless there is a LOCA (ES) signal in which case they are block loaded." The key was changed at the suggestion of the TMI reviewers to read: "LOOP [loss of offsite power] w/LOCA: 2 ES [emergency safeguard] selected pumps start - (standby not selected for ES locked out); LOOP w/o LOCA: standby pump starts." *Id.* The effect of this change was to rewrite the NRC answer. Tr. 25,606-607 (B. Wilson). The original NRC answer was based upon information in the Licensee's Operator Accelerated Retraining Program (OARP), which the Licensee had supplied to the NRC examiners. Tr. 25,607 (B. Wilson). However, the information in the OARP conflicted with a blackout procedure at TMI-1 under which the standby pump starts. Tr. 25,608 (B. Wilson). The NRC had also been given the blackout procedure, but the NRC did not compare it to the OARP material when the NRC prepared the answer key. *Id.* The result was that the answer key was incorrect as originally written. *Id.* The answer key was changed during the review (*id.*), and as changed it matched the answers given by the TMI reviewers and most of the other candidates. Staff Ex. 35, 37A-37R. The change in the key was proper, and was required because the NRC was unaware of current facts specific to the site.

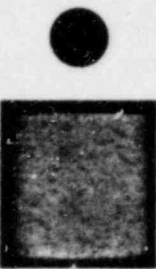
161. The fourth change examined was on Question C.2.b. The question asked:

Control of pH is important to minimize corrosion of primary and secondary components. Primary pH can vary from 4.6 to 8.5. Describe the competing effects that determine primary pH and cause it to vary in this manner.

Staff Ex. 33. The answer key prepared by the NRC examiner read:

Boric acid and lithium hydroxide concentrations compete. Boric acid concentration varies over core life for reactivity control. Boric acid causes pH to be lowered. LiOH is alkaline and causes pH to be increased. Decrease in boric acid over core life is dominant factor.

Id. This answer was not changed despite arguments made by the TMI reviewers. Tr. 25,611 (B. Wilson). The NRC examiner had based the original answer key on material from the chemistry lecture in the Licensee's OARP program. *Id.* According to Mr. Wilson, the TMI reviewers said that the OARP material was "written [for TMI] by outside consultants and it was not . . . the way they operated the power plant." *Id.* The reviewers argued that the key should be changed to show the manner of controlling the concentration of lithium hydroxide. Tr. 25,613. Their ar-

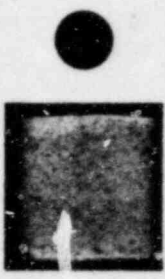


gument was summarized in handwritten notes in the margin of the answer key. The first note said: ".2-2 ppm with lithium control; lithiated demineralizer bed." Staff Ex. 33. The second note said: "For good answers see Zewe and Boltz." *Id.*

162. Mr. Ross' answer to this question matched the handwritten notes in the margin of the answer key. His answer stated that the concentration of lithium hydroxide was controlled between .2 and 2 ppm by using a demineralizer. However, his answer did not mention boric acid. Staff Ex. 35. The answer was marked wrong for leaving out boric acid, but was given half credit for discussing lithium hydroxide. *Id.* Mr. Boltz, one of the two other reviewers, gave an answer similar to Mr. Ross'. Staff Ex. 37D. Mr. Brown, the third reviewer, gave a wrong answer. Staff Ex. 37M. Of the other candidates, only B, F, and U gave answers similar to those of Messrs. Ross and Boltz. Staff Ex. 37Q, 37J, 37B. However, answers similar to the NRC answer key were given by X, T, E, UU, D, SS, and V. Staff Ex. 37A, 37R, 37E, 37L, 37K, 37N, 37G. Apparently, these candidates based their answers on the chemistry lecture in the OARP program. Wrong answers were given by RR, GG, QQ, G, FF, and H. Staff Ex. 37P, 37C, 37O, 37H, 37F, 37I. Thus, few other candidates agreed with the theory of plant operation advanced by Messrs. Ross and Boltz. The most frequently-given answer, in fact, matched the original NRC answer key. Mr. Wilson testified that the change noted in the margin was added simply to reflect the particular method for operationally controlling lithium hydroxide; he said the method was "pretty much standard for most B & W facilities, to control it between .2 and 2 ppm." Tr. 25,613 (B. Wilson).

163. From the above, it appears that Mr. Wilson did not accept the reviewers' argument as valid. Mr. Wilson apparently believed that the method for controlling the lithium hydroxide concentration was conventional and not important; he believed the important relation, and the goal of the question, was the relation between boric acid and lithium hydroxide over the life of the core. Most of the candidates agreed with Mr. Wilson. The reviewers' statement that the NRC's answer "was not the way they operated the power plant" has little support beyond the answers of the reviewers themselves. If Mr. Wilson and the majority of the candidates were right, as they appear to have been, then the reviewers' argument was an attempt to make the answer key less, rather than more, correct.

164. To evaluate the reviewers' position on this question one must keep in mind what the question specifically asked. The question did not ask how lithium hydroxide is controlled. It did not ask how pH was controlled. The question asked the candidates to state the "competing effects that determine primary pH." There are only two of these "competing effects," and both must be present in order for them to compete. One of them is lithium



hydroxide and the other is boric acid. An answer limited to lithium hydroxide, whether including the method of controlling it or not, is not an answer which responds to the question.

165. It is difficult to imagine how the NRC examiner could have accepted the reviewers' change and still have graded the question. If the answer key had been rewritten to give full credit to a description of lithium hydroxide alone, the key would have stated one "competing effect" without stating the other, which makes no sense. The reviewers' statement that "it was not . . . the way they operated the power plant" was really irrelevant to the question, which was not concerned with controlling either of the effects.

166. Only if the reviewers totally misunderstood the question could they believe their answer should be substituted. Once Mr. Wilson pointed out the meaning of the question, as he must have done during the review, it is difficult to see how the reviewers could have persisted in good faith. Most of the other candidates did *not* misinterpret the question; they answered it correctly on the examination. If the reviewers' change had been adopted, the key would have given the same credit to candidates who mentioned lithium hydroxide alone (one competing effect) as was given to candidates who mentioned lithium hydroxide and boric acid (the two competing effects). Only Messrs. Ross and Boltz—and the few other candidates answering similarly to them—would have been aided by such a change. The conclusion is that Messrs. Ross and Boltz made an improper attempt to broaden the answer key.

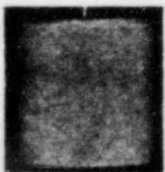
167. The fifth change examined was in Question D.5. The question asked:

Sensors to start or initiate emergency, safeguard, or control system action come from a variety of different sources. List the sensors that will initiate an automatic action for the following abnormal situations (for example, high flux as sensed by the linear power range detectors causes the RPS to trip the control rods).

- a. Auto initiation of EFW due to loss of main feedwater.
- b. Main steam line isolation.
- c. Main transformer fire deluge.
- d. ICS tracking signal.

Staff Ex. 33. The answer key, as originally prepared by the NRC examiner, read:

- a. 200 psi delta p
- b. 500 psi
- c. (blank)
- d. Mngen



Id. During the review with the TMI reviewers, Mr. Wilson changed these answers to read:

- a. Low 50 lb delta p across feed pumps
- b. 600 psi
- c. Temp sensors - electrical protection manual
- d. Question was too vaguely worded - will accept those signal[s] that put ICS in track.

Id.; Tr. 25,614-618 (B. Wilson). These changes were written in by hand during the review. Tr. 25,614 (B. Wilson).

168. Mr. Wilson changed the answer to part "a" from "200 psi delta p" to "Low 50 lb. delta p across feed pumps" because the original answer of 200 was incorrect. Tr. 25,614-615 (B. Wilson). Mr. Wilson had based his original answer upon the OARP program, and upon information supplied to the NRC which showed that a design change using the 200 figure would be in place at the time of restart. Mr. Wilson learned during the review that the design change had not been made, so he changed the answer key. Tr. 25,615 (B. Wilson). On part "b", Mr. Wilson changed the answer key because "500 psi" was incorrect. Mr. Wilson said the figure of 500 came from erroneous information possessed by NRC, or from the false assumption that TMI-1 was the same as other Babcox and Wilcox facilities, in particular TMI-2, or from a typographical error. Tr. 25,616 (B. Wilson). On part "c", Mr. Wilson had left the original answer key blank. He did so because at the time he asked the question he could not find a source of reference material which contained an answer specific to TMI-1. He filed in the answer during the review (Tr. 25,617 (B. Wilson)) and undoubtedly relied upon the reviewers to supply it. On part "d", Mr. Wilson's original answer of "megawatts generated" was correct. However, he stated that the candidates at several facilities, including TMI, had systematically misinterpreted the question as seeking an answer different from that which Mr. Wilson anticipated. Tr. 25,618 (B. Wilson). Mr. Wilson changed the answer key so as to grade the candidates' answers in accordance with the candidates' interpretation. *Id.* Practically all the candidates, including the reviewers, gave the changed answers. The NRC examiner depended entirely upon the reviewers for all the answers to this question.

169. The sixth change examined was to Question E.3. The question reads as follows:

With respect to a major steam line break inside the reactor building.

- a. identify the main and backup signals that could cause the reactor to trip. Include setpoints and coincidences.
- b. One of the concerns with this incident is the restart of the reactor. Explain how a result could occur and how automatic actions would prevent a restart.

Staff Ex. 33. The answer key, as originally prepared by the NRC examiner, stated:

- a. 1. High Flux at (blank)
2. Low Pressure at (blank)
3. (blank)
4. (blank)

Coincidence — any two of these signals on different channels will cause a Rx trip — including same signal on two channels or different signal on 2 channels.

- b. Cooldown will lead to [increase in reactivity] with a negative MTC — automatic actions include Rx trip — rods insert [decrease in reactivity], ES actuation [decrease in reactivity] from boron.

Id. In part "a", Mr. Wilson filled in "104.75 to 105.5" in subpart "1"; he filled in "1900" in subpart "2"; he filled in "Hi reactor building pressure at 4 psig" in subpart "4"; and he deleted subpart "3". *Id.* Mr. Wilson testified that he did not have the set points for these answers when he prepared the questions, so he added them during the review. Tr. 25,619 (B. Wilson). He said it was a common practice to wait until the review to fill in set points because they can change widely during a short period of time. Tr. 25,620 (B. Wilson). In part "b" of this question, Mr. Wilson changed the answer key to indicate that the answer should assume that the reactor was tripped and to add that feedwater isolation occurs at 600 psi. Staff Ex. 33. The answers to parts "a" and "b", as filled in and changed, matched the answers given by Messrs. Ross and Boltz and by candidates X, RR, E, V, and FF. Staff Ex. 35, 37D, 37A, 37P, 37E, 37G, 37F. Mr. Brown and B, T, GG, UU, QQ, D, SS, G, U, and H gave wrong answers. Staff Ex. 37M, 37Q, 37R, 37C, 37L, 37O, 37K, 37N, 37H, 37B, 37I. It is clear that the NRC examiner depended upon the reviewers for the answers to this question. Since so many other candidates missed this question, one wonders whether the information supplied by the reviewers was correct. If it was not, and if Mr. Wilson could not or did not verify it, there may have been unfairness to the other candidates.

170. The seventh change examined was on Question E.4. That question asked the candidates to "describe the two methods which are used to detect a leak in the RB emergency cooling system." Staff Ex. 33. The answer key, as originally prepared by the NRC examiner, stated the two methods as follows:

- a. While system is shutdown, a rotometer located on the supply line is monitored locally.
- b. While operating, a differential between inlet flow and outlet flow (temperature compensated) will alarm in the control room.

Id. Mr. Wilson changed the answer key during the review by adding a third method suggested by the reviewers. It stated: "Drip pan alarm — 0.3 gpm." *Id.*; Tr. 25,620-622 (B. Wilson). The effect of the change was to allow a candidate who listed any two of the three methods to receive full credit on the question. The reviewers and almost all the other candidates gave answers which matched the change. Staff Ex. 35, 37A-37R. The change appears to be necessary and correct; without it the NRC answer would have been incomplete. This is yet another example of the reliance which NRC must place on the Licensee's reviewers.

171. The eighth change examined was on Question F.2.a. The question asked the candidates to "list the six logs and/or records that must be reviewed by the oncoming CRO." Staff Ex. 33. The answer key, as originally prepared by the NRC reviewer, stated:

1. Hourly log
2. CR log
3. Shift Foreman log
4. Check Lists
5. Recorder charts
6. Computer printouts

Id. The answer key was changed during the review to read as follows:

1. Control Room log
2. TCN + SOP
3. Ops. Memo Book
4. Revision Review Book
5. Active Tagging Appl.
6. Locked valve [list]
7. Outstanding Surveillance schedule

Id. Mr. Wilson testified that he prepared the original NRC answer from an administrative procedure furnished by the Licensee; in a section on definitions, the procedure contained the six logs which Mr. Wilson used. Tr. 25,623-624 (B. Wilson). During the review, however, the TMI reviewers pointed to a later section of the same procedure, which specifically listed the logs which operators must review when assuming a shift. *Id.* The latter section contained a different list of logs, so Mr. Wilson changed the answer key to match this latter list. Tr. 25,625 (B. Wilson). The reviewers and practically all of the other candidates gave the changed answer. Staff Ex. 35, 37A-37R. The change appeared to be necessary in order to match the applicable procedure and to overcome the inadequacy of the NRC answer. This inadequacy in the NRC answer was caused either by an ambiguity in the procedure or by a misinterpretation of the procedure by the NRC examiner.

172. The ninth change examined was on Question F.5.c. The question asked: "Under what conditions may HPI be throttled after ESAS initiation during a LOCA?" Staff Ex. 33. The answer key, as originally prepared by the NRC examiner, left the answer blank. *Id.* During the review the following answer was written in:

1. LPI flow stable at > 1000 gpm for 20 min.
2. 50' subcooled & action is necessary to prevent pressurizer from going off scale high
3. To prevent pump run out, throttle to 550 gpm
4. To prevent violation of Rx vessel brittle fracture limit

Id. Apparently, the NRC examiner did not have the proper procedure available when he prepared the examination. He relied upon the Licensee to provide the most current version of the procedure. This is another indication of the extent to which NRC examiners rely upon the Licensee for answers to questions. The reviewers and the other candidates answered according to the filled-in answers. Staff Ex. 35, 37A-37R.

173. The tenth change examined was on Question G.4. The question asked the candidates to "give the nuclear process for the formation of . . . [Cobalt-60] and [state] why it is considered to be a hazard." Staff Ex. 33. The answer key, as originally prepared by the NRC examiner, stated:

Co60 primarily from Co59 + n, where Co59 is found in the steel and other materials in the system. The hazard is that it has a 5 yr. half life thus takes a long time to decay.

Id. During the review Mr. Wilson changed the answer key to add, at the end of the answer, the clause: "and emits high energy gammas (2)." *Id.*; Tr. 25,626-627 (B. Wilson). Mr. Wilson testified that he changed the answer (which he had not personally prepared) in order to make it more complete; he said the hazard of Co60 arises from the gamma radiation which it emits, and so the answer should have included that radiation. Tr. 25,626-627 (B. Wilson). The change makes the answer complete and accurate. It is unknown why the original NRC answer was not complete. All the reviewers and all the other candidates included the gamma radiation in their answers. Staff Ex. 35, 37A-37R.

174. The eleventh change examined was on Question H.5.c. The question stated: "It is desired to increase the discharge head of a pump from 1200 psi to 1800 psi. How much does the speed of the pump have to increase?" Staff Ex. 33. The answer key, as originally prepared by the NRC examiner, stated: "Discharge head is proportional to the square of the speed. Need 4 times the speed to double the head. Thus $(1.5)^2 = \text{speed of pump} = 2.25$." *Id.* Mr. Wilson testified that the original answer was simply an error which he had made. Tr. 25,628 (B. Wilson). He stated that he believed that it was corrected before the meeting with the TMI reviewers. Tr. 25,629 (B. Wilson). The correction consisted of changing the

relation between the speed and the head from the square, as originally indicated, to the square root, which was written into the answer key by hand. Staff Ex. 33. All the reviewers and most of the other candidates gave the changed answer. Staff Ex. 35, 37A-37R.

175. The twelfth change examined was on Question N.5.a. The question asked: "List the design flow capacity of the HPI pumps." Staff Ex. 34. The answer key, as originally prepared by the NRC examiner, stated: "Module 6 GPU letter dated 1/3/80; 300 gpm at 1800 psig." *Id.* This answer was changed to "500 gpm at 600 psig" by a handwritten entry on the answer key. *Id.*; Tr. 25,629-630 (B. Wilson). Mr. Wilson testified that the original answer was based on a letter supplied by the Licensee on January 3, 1980. Tr. 25,629-630 (B. Wilson). The letter gave the flow capacity of the pumps as 300 gpm at 1800 psig. *Id.* The TMI training department, however, had informed the candidates that the design flow was 500 gpm at 600 psig. *Id.* It appears that the discrepancy here was caused by inaccuracy in the information supplied to the NRC by the Licensee. All the reviewers and candidates except one gave the changed answer. Staff Ex. 36, 37A-37R.

176. These twelve changes are examples; they are about one-fourth of the total number. If the twelve are typical, and they probably are, then the NRC examiner depends heavily upon the Licensee for answers to examination questions. This dependence is discussed further below in ¶ 276.

177. The good faith of the reviewers is at issue on Questions B.5.a. and C.2.b. On Question B.5.a., the answer key was changed so as to give full credit to candidates who answered only half the question asked. The change was made because the reviewers told Mr. Wilson that the seal faces were not covered in the TMI-1 training program. The seal faces *were* covered in the training program, and the change was *not* reconcilable with the question asked. There was no ground upon which the change could have been rationally defended, and the ground actually given by the reviewers misrepresented the training program. Question C.2.b. asked the candidates to list the competing factors which determine pH in the primary cooling system. The reviewers tried to change the answer so as to give full credit to candidates who listed only one of the two factors which compete. The reviewers' statement that "it was not . . . the way they operated the power plant" was irrelevant to the question asked, and was not shared by the majority of the candidates, who gave the right answer to the question. On both of these questions, the change would have (or did) increase the reviewers' score. On Question C.2.b., the reviewers were virtually the only candidates who stood to gain from the change.

178. The most important piece of direct evidence on the reviewers' motive came from Mr. Ross. During the days when the review took place he discussed it in the control room with some of the candidates. In

reference to the review he said: "I took care of that job." See ¶¶ 143-144, above. The candidates then "chuckled." *Id.* The motive which Mr. Ross displayed to the candidates on this occasion, if one can judge from the reaction it produced, was not that of an impartial reviewer. The testimony of YY, GG, and KK on broadening the answer key is described in ¶¶ 142-143, above. Because of the lack of any rational ground for the changes, the advantage of the changes to the reviewers' grades, the inadequacy of the reviewers' reasons for the changes, and the remark by Mr. Ross, I must find that the reviewers did not act in good faith. Since the reviewers acted jointly, and since Mr. Ross was the senior (and most competent) reviewer, the conclusion is that Mr. Ross improperly caused the answer keys to be broadened.

Radiation work permits: Harry E. Williams, Jr.

179. The Aamodts tendered the testimony of Mr. Harry E. Williams, Jr. Tr. 24,984 (Clewett). Mr. Williams had been a security guard at TMI from about January or February of 1979 to May, 1979. Tr. 25,002 (Williams). He alleged, in written testimony, that he had observed cheating in a test for a Radiation Work Permit at TMI in late April, 1979. Aamodt Ex. 11 at 2-3. He said construction workers employed by Catalytic, Inc. used crib sheets, which they turned in to their foreman as they left the examination room. *Id.* The foreman then gave the crib sheets to the next group of workers as those workers arrived to take the same test. *Id.* He also alleged that he had received a Radiation Work Permit without completing two of the four requirements for the Permit; the two uncompleted requirements were a whole-body count, and instruction on the use of a gas mask. *Id.* at 3-4.

180. The Licensee conducted *voir dire* examination of Mr. Williams. The Licensee established that Mr. Williams made material false statements on two applications for employment with Gregg Security. Lic. Ex. 74, 75; Tr. 24,989, 991-994. Mr. Williams also admitted that he took home, without permission, documents from the office of John Herbein, who was then vice-president of Metropolitan Edison Company. Tr. 25,021-025 (Williams). When I asked Mr. Williams about the circumstances of his taking these documents, he gave a series of responses which were entirely incredible. Tr. 25,025-029 (Williams). The Commonwealth then inquired whether the Aamodts could offer even one piece of evidence to corroborate Mr. Williams' allegations about the cheating. Tr. 25,030 (Adler). The Aamodts were unable to do so. Tr. 25,030-031 (Clewett). The Commonwealth then joined the Licensee and Staff in objecting to the testimony.

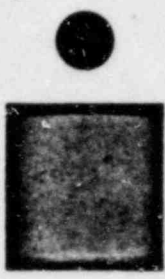
Tr. 25,031 (Clewett). I ruled that the testimony would be excluded, in view of the fact that the testimony was of little probative value (the alleged cheating occurred just after the accident at TMI-2; no TMI personnel were alleged to have been involved) and in view of my complete lack of confidence in the truthfulness of the witness. Tr. 25,031-032 (Milhollin). This was the only evidence tendered on issue 6 (quoted in ¶ 3, above) so that issue is resolved in favor of the Licensee.

The definition of "management"

181. Who should be considered "management" for the purpose of determining management's involvement in cheating? Two definitions appeared at the hearing. Mr. Arnold said that common usage at TMI considered management to include "exempt [non-union] employees." Tr. 23,622-623 (Arnold). This definition would include all supervisory employees and other senior professional employees. *Id.* Mr. Ward testified that the NRC Staff regarded as management only those persons who controlled the actions of more than one shift. Tr. 25,377 (Ward). Mr. Arnold's definition would include the position of shift foreman and above; Mr. Ward's would include the position of manager of operations and above. Neither definition is inherently more logical than the other. There is little value in choosing between them unless the choice can be related to cheating.

182. A more fruitful approach is to consider the importance and function of the persons who cheated. O, W, U, Mr. Husted and Mr. Shipman cheated on the NRC examination. VV and O cheated in the incident in 1979. O and W were shift supervisors. They had supervisory authority over the personnel on their shifts and would normally have control of the reactor on the evening and night shifts. U was a shift foreman, who had supervisory authority over the control room operators and auxiliary operators on his shift. Mr. Husted was a training instructor, who was responsible for administering his portion of the training program and for helping to prevent cheating in that program. Mr. Shipman was senior operations engineer; he acted as Mr. Ross' "right hand man in the control room." P did not cheat on the NRC examination, but he gave untruthful testimony at the hearing. P was a shift supervisor with responsibilities similar to O's and W's. G, H, GG, and W cooperated on the weekly quizzes. G and H were control room operators with no supervisory responsibility. GG was a shift foreman with responsibility similar to U's. VV was supervisor of operations and clearly part of management.

183. From the above, it appears that the cheating on the NRC examination did not occur in the lower ranks of the operations staff. It occurred



in the middle and upper ranks. The senior operations engineer, the two shift supervisors, and the shift foreman came from those ranks. VV, of course, occupied the highest rank on the operations staff. Shift supervisors and shift foremen have important responsibilities for safety and for supervision. They function as managers while on duty, and their authority is important. Mr. Shipman, the senior operations engineer, has important managerial functions and regards himself as part of management. Therefore, with respect to the operations staff, one must conclude that the cheating involved the "management" of that staff. Of course, cheating by the operations staff—whether by its management or not—is not cheating by the upper management of GPU Nuclear Corporation. Ultimately, the question whether management was involved in cheating depends upon which management one is talking about. If one refers only to the operations staff, it is clear that its management was involved in cheating; if one refers to the upper management of the Licensee, then that management was not involved in cheating. Mr. Ross and VV functioned as the link between upper management and the operations staff.

C. THE LICENSEE'S RESPONSE TO THE CHEATING

184. The Licensee's management responded to three different types of cheating. First, the cheating on the NRC examination in April of 1981; second, the cheating on the weekly quizzes; third, the cheating by VV and O in 1979. The response varied according to the type of cheating. With respect to the NRC examination, the Licensee had to respond to the cheating by O and W, to Mr. Shipman's remark at the coffee machine, to U's presence in Mr. Husted's office, to the rumors about U and to the telephone call to KK. With respect to cheating on the weekly quizzes, the Licensee investigated the similarities among the answers given to those quizzes by all the operators who took them. The Licensee's response to VV's conduct in 1979 had already occurred before the hearing began, but it became an issue nevertheless. The first question was whether the Licensee had hindered the NRC's investigation of cheating on the NRC examination.

Management constraint on the NRC investigation

185. When the NRC Staff learned of the similarity between the answers of O and W, the Staff decided to interview O and W. The Licensee refused to allow the interviews to take place, however, unless a member of

management could sit in at the request of the interviewee. Arnold, ff. Tr. 23,590 at 5; Tr. 23,655 (Arnold); Tr. 25,428-429 (Ward). This led to a conversation between Mr. Hukill and Mr. Baci, the NRC investigator, in which Mr. Baci resisted the Licensee's position. Tr. 23,995-996 (Hukill); Tr. 25,433 (Baci). Mr. Baci presented his reasons on the witness stand. He said:

We felt that whenever you have an interview of a subject or an individual and you have his boss there, it is an inhibiting factor, in our experience. Also, when you have a large group setting it makes it a little bit more difficult to conduct an interview. And the other reason is that if an individual felt that he had some information which he wanted to provide to us in confidence, say he was providing information on a fellow employee, he might not want his boss to know that he was providing that information.

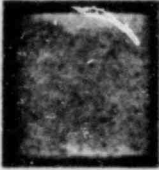

Tr. 25,433 (Baci). Mr. Baci said that he communicated these reasons to Mr. Hukill (*id.*) but Mr. Hukill said that he did not think Mr. Baci stated his reasons. Tr. 23,996 (Hukill). Mr. Hukill was asked what he assumed were the reasons why the NRC Staff did not want management to be present. Mr. Hukill said:

I think that, myself, I thought he could probably work the guy over harder without management there to watch them. That was my own personal opinion. I frankly — the main reason I wanted to go up was to ensure our people were treated fair, as well as to gain knowledge . . . I wanted to make sure that my people were treated fair, and I felt our presence would ensure that.

Id. The conversation then moved up the administrative ladder, and Mr. Arnold discussed management's presence with Mr. Stello, who is Mr. Baci's superior on the NRC Staff. Mr. Arnold stated on the witness stand why he opposed the NRC Staff's position. He said:

My own sense of fair play is people being interviewed in these types of circumstances ought to be aware of whatever flexibility they have in the way in which the interview is conducted. I just do not think that you can assume that the average person that may be subject to these interviews has the degree of familiarity with the procedures and that he ought to, in a sense, be completely on his own to look out for himself.

Tr. 23,656-657 (Arnold). Mr. Stello then decided to allow the interviews to go forward with management present. Apparently, Mr. Stello had not recognized that management's involvement in the cheating was an issue, and he had not yet received a legal opinion on the question from the Executive Legal Director. Tr. 25,430 (Ward). When Mr. Stello did recognize the issue of management involvement, and got a legal opinion, he changed his mind. *Id.* However, the Staff's first investigation was done



with management present at all the interviews except one, which was conducted off-site. Ward, ff. Tr. 25,274 at 18. By the time of the second and third investigations, the issue of management involvement had become clear, and no management representative was allowed. Tr. 25,430-431 (Ward); Hukill, ff. Tr. 23,913 at 9.

186. The NRC investigators all agreed that management's presence "did inhibit the free flow of information." Ward, ff. Tr. 25,274 at 18. However, they did not see "Mr. Arnold's constraints as being malevolently motivated, notwithstanding the fact that they could have adversely affected our ability to obtain all of the information that we felt we needed." *Id.* at 19. The Staff's position on this point is considered further in ¶¶ 291-298, below.

187. It seems clear that management did inhibit the flow of information. The opinion of the NRC investigators to this effect was unchallenged. Mr. Hukill, a former Navy captain, is several management levels above the operators. He is an imposing man. When W was scheduled to meet with Mr. Stello in Bethesda, W was offered the opportunity to have Mr. Hukill present. W declined because "I respected the man [Mr. Hukill], and I guess I had a guilt feeling about admitting my participation to Mr. Stello, and I just did not want Mr. Hukill present at the time." Tr. 26,164(W). During W's interview by the NRC investigators, he was asked whether he would sign a sworn statement. He turned to Mr. Hukill and asked: "Would the company care?" TMIA Ex. 55 at 5; Tr. 26,167(W). W explained that he "knew . . . there was a serious problem, and . . . did not know how the company was going to respond . . ." Tr. 26,167(W). Finally, there is the question of confidentiality. If any operator had evidence of management participation in the cheating, it would have been impossible, with management in the room, for NRC to receive it on a confidential basis.

188. In view of this evidence, it is difficult to regard management's presence as proper. Management knew that its presence would "inhibit the free flow of information;" its presence did so. Mr. Hukill's desire to "make sure that my people were treated fair" is legitimate, but his desire to prevent NRC from "work[ing] the guy over harder without management there to watch them" is not, because the discovery of cheating in these circumstances requires vigorous questioning. Tr. 25,387 (Ward). Mr. Arnold's concern that an operator not "be completely on his own to look out for himself" is either a concern that the operator "on his own" might divulge something detrimental to himself — which is not a proper concern if there is something detrimental to divulge — or a concern that the operator "on his own" might divulge something detrimental to management

— which is not a proper concern either. Management's burden on the flow of information did not produce any corresponding benefit. I find that this action by management was improper.

Management's dealings with O and W

189. After the NRC investigation of O and W was complete, and O and W had admitted cheating, Mr. Arnold interviewed each of them. During these interviews he informed them that they were fired. Tr. 23,666-667 (Arnold). He made that decision after consulting with all levels of senior management. *Id.* at 23,674-675. The sole issue which arises out of these dealings is management's failure to ask either O or W why he cheated. Mr. Arnold, in response to questions about this failure, said that he "would not have attached too much reliability to any rationalization they would have given me at that time." *Id.* at 23,784. It was pointed out that if the cheating were caused by inadequacies in the training program, by a feeling that the NRC examination was unfair, or by some other specific problem which the Licensee could take steps to overcome, then it would be useful for the Licensee to discover this cause. Tr. 23,785 (Milhollin). Mr. Arnold responded:

. . . the only way in which the company could proceed is to assume that all of those things or any one of those things may have contributed so that our action had to address, in my opinion, all of the potential reasons independent of which ones they themselves may have selected.

Id. at 23,785.

190. These responses by Mr. Arnold are not acceptable. If management truly did not know why these men — who were regarded as the "cream of the crop" (see ¶ 10, above) — had cheated, then it was in management's immediate interest to find out. Management had to take steps to prevent future cheating. As a matter of allocating resources, the Licensee would naturally move to meet the principal cause first. This evidence shows either that the Licensee did not care why O and W cheated — which is unlikely given management's interest in finding out — or that the Licensee already knew why they cheated. The latter explanation is the only plausible one. It is consistent with Mr. Hukill's testimony about the operators being "driven" to cheat (¶ 327, below) and it fits into the testimony about the operators' poor attitude toward the NRC examination (see ¶¶ 278, 327, below). The conclusion here is that management did not need to ask why the cheating occurred; management knew that it was caused by the operators' disrespect for the NRC examination.

Management's meetings with employees

191. The cheating by O and W was discovered in late July and early August, 1981. O and W were fired in early August. On August 4 Mr. Arnold met with the operators to explain the reason for his decision to fire O and W. Arnold, ff. Tr. 23,590 at 7-8. GG testified that the message he received from that meeting was that "we live constantly in the public eye and that if you cannot stand being watched, then maybe you are in the wrong business, that he in no way would tolerate cheating." Tr. 25,701(GG). Following this meeting, Mr. Hukill met with each of the licensed operators, by shift, from one to two hours. Hukill, ff. Tr. 23,913 at 10. He explained management's position in more detail, and requested comments from the operators. *Id.* at 11. He learned that there was a serious problem of morale. *Id.* He also learned that there was a need to change the operators' attitude about the NRC examination process. *Id.* During the weeks of October 5 and 12, Mr. Hukill met individually with every licensed operator who had taken the NRC examination in April. *Id.* at 13. His purpose was to insure that each operator understood the responsibility of an "operator in a company which is regulated" and an operator's responsibility for the public health and safety. Tr. 23,951 (Hukill). He also asked each operator whether the operator had cheated on any of the examinations given by Mr. Kelly, by ATTS, by the NRC, or by the Licensee as a make-up quiz on Category T. *Id.* Finally, he asked each operator whether the operator knew of any cheating on these examinations. *Id.* In response to the last question, some of the operators reported that they had seen cheating. TMIA Ex. 60. OO reported that "cheating on exams in [the] past has been commonplace and accepted." *Id.* Mr. Hukill did not follow up on this report, however, because Mr. Wilson, rather than Mr. Hukill, was conducting the Licensee's investigation. Tr. 23,958 (Hukill). Mr. Hukill gave his interview notes — which contained OO's statement — to Mr. Wilson (Tr. 23,925-926 (Hukill)) but Mr. Wilson did not follow up on OO's report either.

Management's response to the Shipman incident

192. The Shipman incident is described in ¶¶ 94-100, above. It was not until October 7, 1981 that Mr. Shipman first informed the Licensee of his action at the coffee machine. See ¶ 95, above. Mr. Hukill's immediate response was to question Mr. Shipman vigorously in order to discover the identity of the person who asked Mr. Shipman the question. *Id.* Mr. Shipman was shown a list of the persons in the room from which the questioner probably came, but this did not help his memory. *Id.* The

Licensee did not ask any of the examinees in the smokers' room whether they had asked Mr. Shipman the question. *Id.* Mr. Hukill admitted that asking them "might have been a good idea in our company investigation." Tr. 23,991 (Hukill). However, Mr. Hukill was not conducting that investigation; Mr. Wilson was. *Id.* There is no indication that Mr. Wilson asked them. The Licensee so admits. *Lic. Proposed Findings* ¶ 261. The Licensee contends, however, that this incident was covered by Mr. Hukill's interviews with all the operators at TMI-1, in which he asked each operator whether that operator had cheated or knew of any cheating on the NRC examination. See ¶ 191, above. There are two problems with this contention. The first is that Mr. Hukill did not interview all the persons in the smokers' room. Two of these persons were training instructors (*Lic. Ex. 83*) whom Mr. Hukill never questioned. *TMIA Ex. 60*. The second is that a broad question is always subject to interpretation, and to vagueness in memory. Mr. Shipman stated repeatedly that he had never considered this as a cheating incident until he discussed it with Mr. Hukill. See ¶ 97, above. Mr. Shipman's questioner could have had an even narrower understanding of "cheating" than Mr. Shipman, and could have failed to reveal his participation under such a broad question. See, e.g., WW's failure to mention the telephone call he received during the Kelly examination because he was not specifically asked about it by the NRC investigators. *Staff Ex. 28 Encl. 1*. See also the similar experience of OO. Tr. 25,976-977(OO). It is also possible that the event might not come to mind unless the person being interviewed were specifically asked about Mr. Shipman. Finally, a person who remembered the event, and deliberately failed to disclose his participation, might have been encouraged to do so by the possibility of being able to claim later that he had interpreted "cheating" narrowly, or had not remembered the event while he was being questioned broadly by Mr. Hukill. This latter possibility is avoided by a specific question mentioning Mr. Shipman.

193. In view of the obvious utility of questioning the eight persons in the smokers' room about Mr. Shipman, and the ease with which it could have been done, it is difficult to see why the Licensee did not do it. If the Licensee had been trying to find Mr. Shipman's questioner, such a step would have been strange to omit. When one considers that Mr. Shipman's failure to remember the questioner was itself so dubious (see ¶¶ 94-100, above), and appeared dubious to the Licensee (see ¶ 96, above), the Licensee's failure to take this step is very difficult to understand.

194. The Licensee's disciplinary action against Mr. Shipman was a letter of reprimand. This action was based upon his good record during seven years' employment. See ¶ 96, above. Also in Mr. Shipman's favor was the fact that his act was not premeditated — it occurred spontaneously at the coffee machine — and the fact that he had reported it

voluntarily to Mr. Hukill. However, against Mr. Shipman was the fact that he did not appear to be telling the truth. As stated in ¶¶ 94-100 above, his denial was against the weight of the evidence.

195. I find that the Licensee's investigation was inadequate because the Licensee did not question the eight persons in the smokers' room. I also find that the Licensee should not have accepted Mr. Shipman's statement as truthful.

Management's response to rumors about U

196. On September 22, 1981, KK went to Mr. Ronald Toole, Operations and Maintenance Director, TMI-1, to report a rumor. KK had heard that someone had been stationed in the vicinity of the examination to assist examinees, and he connected that rumor to the telephone call he had received from a person identifying himself as U. See ¶ 123, above. KK told Mr. Toole that he had received the call and that he had heard the rumor. Staff Ex. 27 at 32. Mr. Toole informed Mr. Wilson and Mr. Arnold of what KK had said. *Id.* Mr. Wilson apparently encouraged KK to give this information to the NRC investigators (Staff Ex. 27 at Encl. 8), which KK did on the next day. Staff Ex. 27 at 30. KK also told the NRC investigators that he had heard that the person stationed outside the examination room "was performing his duty . . . with at least the knowledge of someone higher up in the company." Staff Ex. 27 at 30.

197. Mr. Wilson described the telephone call to KK in his prepared testimony. Wilson, ff. Tr. 24,478 at 13-15. After setting out the circumstances of the call, Mr. Wilson concluded:

Based on my discussion with KK, my review of the NRC's discussion with U, and previous interviews I had had with U concerning rumors of cheating, Mr. Lloyd and I concluded that there was no basis for disbelieving U's denial of cheating. The NRC concurred with this opinion in OIE's Supplemental Investigation Report dated October 13, 1981 in the section entitled "Conclusions of Reporting Investigators."

Id.

198. From management's point of view, the rumor that someone was stationed outside the examination room was very serious. It implied a conspiracy. And KK's statement that the person stationed was acting with the knowledge of "someone higher up," implied a conspiracy touching management. However, Mr. Wilson did not mention this rumor in his direct testimony, and the Licensee did not investigate it. Wilson, ff. Tr. 24,478 at 13-15. Mr. Wilson's discussion with KK was limited simply to

what KK had heard. It could not discover what U and Mr. Husted knew about the rumor, or what the other candidates knew about it. Mr. Wilson's reliance on "previous interviews I had had with U concerning rumors of cheating . . ." does not refer to the rumor about U in Mr. Husted's office. The "previous interviews" took place before KK even reported that rumor. See ¶ 130, above. Thus, Mr. Wilson's conclusion rested only upon one ground: his review of NRC's discussion with U." That was the discussion in which U insisted that the word "knowingly" be inserted to qualify his denials. See ¶ 117, above. The Licensee seems never to have questioned U about his presence in Mr. Husted's office. Nor did it ever question Mr. Husted to discover why Mr. Husted decided to make his office available. Questioning Mr. Husted would have been a logical first step in tracking the rumor down. Mr. Husted's interview with the NRC investigators did not cover this rumor. Staff Ex. 27 at 16. The Licensee did not ask Messrs. Ross, Brown, and Boltz, the TMI reviewers, whether they observed U talking to anyone who was taking the examination. The reviewers were present in the office area during almost all of the time the examination was given, and were frequently searching there for training materials. See ¶¶ 140, 147, 153-178, above. They would have been in a position to observe U's behavior.

199. In view of the seriousness of this rumor it is difficult to understand why the Licensee did not investigate it. The Licensee investigated the rumor that U wrote on his hand and took crib sheets into the examination room (see ¶ 130, above) and it did so after NRC had already investigated that rumor. Tr. 24,607 (J. Wilson). If the Licensee was unwilling to rely upon the NRC to investigate the rumor that U had written on his hand and used crib sheets (an isolated incident of cheating) it seems odd that the Licensee would rely upon the NRC to investigate a rumor of conspiratorial cheating which implicated the Licensee's management. The NRC's investigation of both these rumors was incomplete. The Licensee's lack of interest in the latter rumor is unexplained.

Management's response to cheating on weekly quizzes

200. The first step in the Licensee's investigation of the weekly quizzes was to hire Mr. Edward V. Trunk, an Assistant Professor of Engineering at the Pennsylvania State University, Capitol Campus. Mr. Trunk and one of his colleagues, Mr. Donald L. Miller, reviewed the examinations given by Mr. Kelly in April of 1980, those ATTS examinations given in April of 1981 which had not been reviewed by the NRC investigators, and several sets of weekly quizzes. Mr. Trunk and Mr. Miller searched the answers of

all these examinations and quizzes for similarities. J. Wilson, ff. Tr. 24,478 at 3-4; Trunk, ff. Tr. 24,831 at 5, 8, 10-11. Mr. Trunk and Mr. Miller then filed written reports to the Licensee. See Lic. Ex. 70A-70E. Several sets of similar answers were discovered. *Id.*

201. On the basis of these findings by Mr. Trunk and Mr. Miller, Mr. John Wilson then began the Licensee's investigation. J. Wilson, ff. Tr. 24,478 at 4. Mr. Wilson, with the help of an associate, Mr. Lloyd, interviewed the operators whom Trunk and Miller identified as having given similar answers. Mr. Wilson did not interview W, who by that time had been fired, or Y, who was on an extended leave of absence. *Id.* at 4-12; Tr. 24,555, 557 (J. Wilson). Mr. Wilson interviewed G, H, S, GG, MM and BB. All of these operators denied cheating, and Mr. Wilson believed their denials. *Id.*, at 8-12. Mr. Arnold was satisfied with Mr. Wilson's investigation. Tr. 23,685 (Arnold). So was Mr. Ward of the NRC Staff. Ward, ff. Tr. 25,274 at 14. In order to evaluate Mr. Wilson's work, one must examine each particular item he investigated.

a.) **G and H**

202. Mr. Wilson began with G and H. The first similarity was on the question about natural circulation. See ¶¶ 29-32, above. H's answer matched the lesson plan, and G and H told Wilson they had memorized the lesson plan. J. Wilson ff. Tr. 24,478 at 6. Mr. Wilson found this explanation reasonable. *Id.* There does not appear to be any basis for questioning either Mr. Wilson's method or his conclusion on this item.

203. The second similarity was on the "two major areas of weakness noted by the Lessons Learned Task Force." See ¶¶ 33-37, above. The two identical answers by G and H ("Human factors, operational safety") did not match any of the five possible answers listed in the answer key, and were marked wrong on one occasion. See ¶ 36, above. G told Mr. Wilson that G chose these two answers because they seemed the most important of the five. See ¶ 34, above. Apparently, H did not say why he chose the answers. TMIA Ex. 75 at 4. Mr. Wilson gave no explanation for this similarity in his notes, except to say that the responses matched the answer key (TMIA Ex. 75 at 4), which is not correct. See ¶ 36, above. Mr. Wilson did not mention this item in his prepared testimony. J. Wilson, ff. Tr. 24,478. He was asked about it on the witness stand, but he gave no explanation other than to report that G and H said that their particular responses were "drummed into" them. Tr. 24,514-515 (J. Wilson). Mr. Wilson admitted that he did not find these two answers on the papers of other operators. *Id.* at 24,520. Mr. Wilson failed to formulate any plausible explanation for this item, yet he did not consider it evidence of cheating.

204. The next item was the question about "the primary deficiency" in the "general area of operational safety." See ¶ 38, above. Mr. Wilson examined the papers of other operators and discovered that "operator training," which was the answer which G and H gave, was a "universal response." *Id.* Mr. Wilson's method here was adequate and his conclusion reasonable.

205. The next item was the question on the Rosemount transmitter. Mr. Wilson testified that when he interviewed G about the Rosemount transmitter, G told Wilson that G specifically recalled the question and his answer, "forced balance rosemont." Tr. 24,522 (J. Wilson). Mr. Wilson said that G "thought training was wrong in emphasizing a trade name as opposed to a functional description." *Id.* at 24,522-523. After G made this explanation, Mr. Wilson concluded that "Mr. G did in fact know the information." *Id.*, at 25,523.

206. Mr. G did not, of course, "know the information." The Rosemount transmitter does not use the "forced balance" principle. See ¶ 41, above. Mr. Wilson could have discovered this fact very easily by calling the training department, where the correct information was available. See, e.g., Tr. 24,786-787 (Brown); Lic. Ex. 82A. Mr. Wilson consulted the training department for lesson plans and answer keys; it is odd that he did not consult it to verify G's explanation. If he had done so, he could have probed the source of G's and H's identical misunderstanding of these devices. It was a clear error for Mr. Wilson not to check G's explanation with the training department.

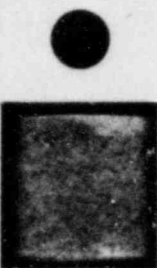
207. The next item was the question asking "how hydrogen gas is generated . . . following a LOCA." G and H both said that it was generated by an "aluminum, zirconium water reaction." See ¶ 44-48, above. These identical wrong answers, which make no functional sense, were never explained. *Id.*; TMIA Ex. 75 at 8. Mr. Wilson admitted that no other operator gave such an answer. Tr. 24,531 (J. Wilson). But he stated in direct testimony that he "had no basis for disbelieving G's and H's denials that they had collaborated . . ." J. Wilson, ff. Tr. 24,478 at 7. On cross examination, it appeared that Mr. Wilson based his conclusion simply upon the denials. Tr. 24,527 (J. Wilson). Given answers which are identically wrong, make no functional sense, and are unexplained, one would have to place a great deal of faith upon a denial in order to believe it. There was nothing in the demeanor or testimony of G or H at the hearing which would justify such faith. The testimony of G made such faith impossible. See ¶¶ 61-66, above. There is no reason to believe that either G or H was more credible during Mr. Wilson's interviews than at the hearing. Mr. Wilson's position on this item appears to lack any identifiable basis.

208. The next similarity was on the question asking for the location of the newly-installed radiation monitors. Both G and H answered that the monitors were located in the control room; the correct answer was that they were located in the plant. See ¶¶ 53-54, above. Mr. Trunk did not detect these similar wrong answers, and Mr. Wilson would not concede that they were similar. *Id.* The only difference in the answers was their wording. The question asked where the monitors were located. G answered: "Monitors are located in Unit #1 control room;" H answered: "Control Room." *Id.* When he was asked why he did not consider these answers to be similar, Mr. Wilson said: ". . . Mr. Trunk was the expert in identifying parallelisms. I do not see that as a parallelism. I can see that an argument may be made for it as being one, but I do not really identify it as a parallelism." Tr. 24,512 (J. Wilson). In an investigation of cheating, answers which are the same, and which are wrong, are "similar." The additional words used by G do not make the answers dissimilar in any meaningful sense. Mr. Wilson's position contradicts the obvious meaning of these answers.

209. Mr. Wilson also investigated the questions which required lists of process lines and radiation monitors. According to Mr. Wilson, G told Mr. Wilson that G listed the process lines in an order which G had learned. TMIA Ex. 75 at 11. The logic of the order was confirmed by E. *Id.* According to Mr. Wilson's notes, H told Mr. Wilson that H had memorized this order either from training materials, by order of importance, or by system. *Id.* At the hearing, however, H testified that he did not remember why he used the order he did. Tr. 25,898(H). With respect to the radiation monitors, G and H made an identical error on RMG-19. See ¶¶ 55-57, above. G told Mr. Wilson that training had never told G and H of the change in the training materials which caused this answer to be wrong. TMIA Ex. 75 at 16. At the hearing, H took the same position. Tr. 25,898-899(H). Mr. Newton and E, however, told Mr. Wilson that G and H had been told of the change. TMIA Ex. 75 at 16. At the hearing, Mr. Wilson testified that "it was never my understanding that this information got to Messrs. G and H in a timely fashion . . . prior to taking the March test." Tr. 24,545-546 (J. Wilson). Although the weight of the evidence is that G and H were informed of the change, and thus that they cooperated on the radiation monitor question, the possibility that G and H were not informed of the change gives at least some support to Mr. Wilson's conclusion. With respect to the question about process lines, Mr. Wilson's position is reasonable if based on the information which he recorded in his notes. However, H's testimony that H did not remember why he used the order he did contradicts those notes. The reasonableness of Mr. Wilson's position thus depends upon what H in fact told Mr. Wilson during their interview.

210. The last item is the question on Bernoulli's equation. In his prepared testimony, Mr. Wilson said that G and H told him that they had memorized their uniquely similar definition "either from a common answer which they may have prepared in preparation for the quiz or from language placed on the blackboard by the instructor." J. Wilson, ff. Tr. 24,478 at 8. G and H denied cooperating and Mr. Wilson "found no reason to disbelieve their denials." *Id.* On the witness stand, H said that he *independently* memorized his answer from the blackboard. See ¶64, above. G said that he and H had memorized their answers *together* from one of H's textbooks, in preparation for training week. See ¶¶ 62-63, above. Thus, Mr. Wilson's testimony reflects both statements by G and H. However, it does not reflect the fact that the statements contradict each other. It is obviously impossible for the statements of both G and H to be true. Mr. Wilson's testimony definitely implies that G and H told him that *either* they *both* memorized the definition from the blackboard, *or* they *both* memorized it from a common source in preparation for training week. Since G and H must have given Mr. Wilson the same explanation they gave at the hearing — otherwise the source of the two explanations given by Mr. Wilson is unexplained — Mr. Wilson must have known that G and H had contradicted each other during their interviews. For Mr. Wilson to submit written testimony implying the contrary was misleading. Both the Licensee, which sponsored the testimony, and Mr. Wilson must have known it was misleading. In fact, the contradictory statements by G and H, together with their unique definition, led to only one conclusion: that G and H had cooperated. Mr. Wilson avoided reaching this conclusion only by misrepresenting those contradictory statements.

211. It was also necessary for Mr. Wilson to evaluate the overall pattern of similarities for G and H. The sheer number of similarities was striking. See ¶74, above. Mr. Wilson gave a series of interrelated reasons for concluding that the pattern was caused by memorization rather than cooperation. First, with respect to the quiz of June 25, 1981, Mr. Wilson said that the similarities must have been caused by memorization because the quiz was closely proctored. J. Wilson, ff. Tr. 24,478 at 8. There were only two similarities on that quiz; the answers were short and matched the answer key. See ¶67, above. Mr. Wilson is correct in saying that they were probably memorized. The importance of the proctor is doubtful, however, in light of the fact that O and W copied extensively with the NRC proctor only twenty feet away. See ¶13, above. Second, with respect to the similarities on the quiz of March 27, 1981, Mr. Wilson said they were caused by memorization because that quiz was a take-home quiz. Mr. Wilson's theory was that if G and H had cooperated on that quiz, they would have passed. J. Wilson, ff. Tr. 24,478 at 8. Also, he said, there would have been a greater number of similarities if they had cooperated.



Id. Mr. Wilson was cross-examined on his theory that cooperation would have caused G and H to pass. He could not explain why cooperation would have that effect. Tr. 24,537-538 (J. Wilson). When Mr. Trunk was asked about this theory, he said: "I do not know if there is any correlation, to be honest. You can cheat and pass; you can cheat and fail." Tr. 24,869-870 (Trunk). With respect to Mr. Wilson's theory that cooperation would have produced more similarities, there was no evidence. Mr. Wilson appeared to express this theory as an opinion of his own. The number of similarities identified on this quiz of March 27 was already large—the similarities accounted for 8 points out of the possible 13.5. See ¶74, above. The only piece of evidence in the record on the question whether the lack of similarity on one question indicated the lack of cooperation on another was given by W, who indicated that there was no correlation. He said: "If I knew the answer, I wrote it down. If not, then I tried to get help." Tr. 26,085(W).

212. The remaining similarities were on the quizzes of November 2, 1980 and November 26, 1980. The quiz of November 2 contained the question on Bernoulli's equation, in response to which G and H gave their unique definition. See ¶58, above. The quiz of November 26 contained the questions which were answered "forced balance rosemont," "aluminum, Zr. water reaction," and "human factors, operational safety." See ¶¶ 33, 40, 44, above. Mr. Wilson did not explain the pattern of similarities on these quizzes in terms of the quizzes themselves. J. Wilson, ff. Tr. 24,478 at 8. Instead, his explanation was that since Mr. Trunk had identified similarities on the quiz of March 27, 1981, and the similarities on that quiz were caused by memorization (according to Mr. Wilson's conclusion about that quiz) then the similarities on the quizzes of November 2 and November 26 must also have been produced by the same "similarity in approach to taking quizzes; namely memorization." *Id.* By this theory Mr. Wilson assumed that the similar answers given on the March 27 quiz were memorized, and he assumed that if similar answers were memorized on one quiz they must have been memorized on another. His first assumption, that the similar answers on the March 27 quiz were memorized, is not in accordance with the facts. See ¶¶ 33, 44-48, 49-52, 55-57, above. His second assumption, that if similar answers were memorized on one quiz they must have been memorized on another, is no more logical than its opposite, which is that if similar answers were copied on one quiz they must have copied on another. Neither this latter assumption nor its opposite has any evidentiary basis. One cannot escape the fact that the only way to determine whether similar answers on a given quiz were memorized or copied is to look carefully at the similar answers on that quiz. The pattern of similar answers on the November quizzes was different from the pattern of similar answers on the other quizzes, and

required a different analysis. Mr. Wilson's failure to make such an analysis leaves the pattern of similarities on the November quizzes without any explanation.

213. Mr. Wilson's testimony was presented as that of an impartial investigator. J. Wilson, ff. Tr. 24,478 at 19. As such, his obligation was to find and present evidence tending to show both the presence of cheating and the absence of cheating. He presented considerable information which tended to show the absence of cheating. He supplied the lesson plan for the question on "natural circulation," which showed that G and H had probably memorized the answer to that question. TMIA #75, Attachment A; ¶¶ 29-32, above. He supplied the fact that an apparently incorrect answer, "operator training," was the one which most operators gave, and thus showed that G and H probably did not cooperate on that answer. See ¶¶ 38-39, above. On the questions requiring lists of equipment, Mr. Wilson conferred with the training department and a shift supervisor to determine that the order used by G and H was logical. See ¶¶ 49, 209, above. He also found other lesson plans and answer keys which were helpful. TMIA Ex. 75, Attachments B, C, D, E.

214. With respect to the other half of this responsibility, which was to find and consider evidence tending to show cheating, Mr. Wilson was not helpful. Mr. Wilson asked G and H whether they sat together, but he did not ask anyone else in the room with G and H where G and H sat (Tr. 24,508 (J. Wilson)) or whether anyone saw G and H cooperating (Tr. 24,532 (J. Wilson)). He did not check G's explanation of "forced balance rosemont" with the training department. See ¶¶ 204-206, above. He did not report in his written testimony the fact that the weekly quizzes were poorly proctored, that cooperation occurred, and that the operators were unsure whether they were expected to do their own work. Wilson, ff. Tr. 24,478 at 4-9; ¶¶ 68-73, above. He admitted on cross-examination that he had been informed of these conditions by U (Tr. 24,612-615 (J. Wilson)) but he said that U was referring to the time prior to the Kelly examination. *Id.* U's testimony on the stand showed that U was not referring to that period. See ¶70, above. See also the testimony in ¶71, above. An even-handed report would have discussed these conditions, which Mr. Wilson could have learned from the operators or the training instructors. Both the operators and the instructors testified freely at the hearing about the conditions during the quizzes. See ¶¶ 68-73, above. Lack of proctoring, talking about questions, and "group efforts" were highly relevant to the issue Mr. Wilson was deciding; these factors should have been discussed and considered before Mr. Wilson reached his conclusion.

215. What overall conclusion should one draw, on Mr. Wilson's investigation of G and H? Mr. Wilson did find training materials which showed that some of the similarities were benign. He also reviewed the quizzes of

other operators, and presented explanations from training instructors and shift supervisors, which showed that still more similarities were benign. All these efforts were responsible and helpful. However, there was a great deal of evidence which pointed to copying that Mr. Wilson did not present or consider. He did not disclose or consider the contradictory statements by G and H on how they learned Bernoulli's equation. He did not take the easy and obvious step of checking G's explanation of "forced balance Rosemont" with the training department. He refused to recognize the similarity of identical wrong answers which said that the new radiation monitors were located in the "control room." Finally, he did not disclose or consider in his direct testimony the highly relevant issue of how the quizzes were proctored, whether there was talking, and whether operators were expected to do their own work. With respect to the evidence he did consider, he consistently interpreted it the same way, as not indicating copying. He did so even when there was no apparent basis for such an interpretation. He interpreted the answers "Human factors, operational safety," in ¶¶ 33-37 above, as not indicating copying despite the fact that they were unique, identical, unexplained, and partially wrong. See ¶203, above. He interpreted the answer "aluminum, zirconium water reaction," in ¶¶ 44-48 above, as not indicating copying despite the fact that it was unique, identical, unexplained and totally wrong. Moreover, this answer made no functional sense. He interpreted the long definition of Bernoulli's equation in ¶¶ 58-66 above as not indicating copying despite the fact that the definition was unique to G and H, the same word-for-word through several lines, and unexplained except by G's and H's mutually contradictory statements of how they learned it. With respect to the overall pattern of similar responses by G and H, Mr. Wilson advanced his theories that copying causes one to pass, that cooperation would have produced more similarities than were found (similar answers were found on 8 points out of the possible 13.5 on the quiz in question) and that if similar answers were memorized on one quiz they would be memorized on another. On balance, one must conclude that Mr. Wilson failed to pursue, present, or consider important evidence of copying. And, with respect to the evidence he did consider, Mr. Wilson interpreted it in such a way as to reveal the lack of any principled basis for his conclusions. In effect, Mr. Wilson's presentation on G and H was that of an advocate for the Licensee's interest. Mr. Wilson appeared to view that interest as being advanced by minimizing the evidence of copying. I cannot find that Mr. Wilson acted as an impartial investigator of G and H. Nor can I find, for the reasons already stated, that his investigation was adequate.

b.) **S and Y**

216. The similarities between S and Y are discussed in ¶¶ 80-81, above. Mr. Wilson produced a lesson plan which matched S's answer. *Id.* The answers were correct, and were similar to those of other operators. *Id.* Mr. Wilson's method here was adequate and his conclusion was reasonable.

c.) **GG, W, and MM**

217. Mr. Wilson also investigated the similar answers of GG, W, and MM. These answers, which are discussed in ¶¶ 82-93 above, responded to the question asking for two of the major areas of weakness identified by the Lessons Learned Task Force. All three operators used similar, abstract language (e.g., "nonsafety related systems affecting safety systems operator action compounding the challenge (sic) to safety systems") which was quite different from the answer key. *Id.* Also, all the operators misspelled the word "challenge" as "challange." Mr. Wilson interviewed GG and MM; they both denied copying. J. Wilson, ff. Tr. 24,478 at 11, 12. Mr. Wilson concluded at first that the answers of GG and W "were so similar that without an acceptable explanation from W and GG, cheating appeared to be the only possible explanation." *Id.* at 12. Then, however, Mr. Wilson interviewed GG, who denied copying from W but suggested that W might have copied from him. *Id.* Based upon this interview, Mr. Wilson concluded that "there was no reason to disbelieve GG's denial." *Id.* Mr. Wilson did not interview W, who by this time had been fired. *Id.*

218. It is apparent that Mr. Wilson based his final conclusion upon the denials alone. His initial conclusion was that the similarities showed copying unless there were an "acceptable explanation." Were the denials an "acceptable explanation"? It is difficult to see how they could have been, even considering that W had already confessed to copying from O on the NRC examination. The only evidence of who copied from whom was GG's crossed out word; this indicated that it was GG, not W, who copied. See ¶93, above. Mr. Wilson does not appear to have considered GG's description of how the quizzes were administered. At the hearing, GG said the atmosphere was informal, that talking frequently occurred, and that course materials were present. Tr. 25,696-697(GG). This information was available from GG for the asking. *Id.* Also, Mr. Wilson did not investigate why all three operators had identically misspelled the word "challenge." This misspelling was obvious from their answers. Finally, Mr. Wilson did not pursue the stilted and unnatural language in which the three operators expressed their answer to Question 1, or the striking difference between this language and the answer key. When Mr. Wilson testified, he stated that no answer key was available for Question 1. He said: "I believe this is the one that we tried to track down with considerable effort . . ." Tr. 24,570 (J. Wilson). When it was pointed out that an answer key would be particularly helpful, in view of the abstract phrases used by the operators,

he said: "It would be very helpful, and that is why we went to the extensive effort that we did." *Id.* In fact, an answer key was available; Mr. Blake, Licensee's counsel, introduced it the next day. Lic. Ex. 68B; Tr. 24,693 (Blake).

219. From what has been said above, it is clear that Mr. Wilson failed to develop or pursue evidence of cheating which was clearly relevant. His conclusion that there was no cheating required him to accept a denial, standing alone, as more persuasive than the clear evidence pointing the other way. Mr. Wilson's investigation of cheating by GG, W, and MM was not adequate.

Management's response to cheating by VV and O in 1979

220. In early July of 1979 VV, who was Supervisor of Operations at TMI-2, handed in to the training department a closed-book, make-up examination comprised of four sections. Miller, ff. Tr. 24,358 at 1, 5. Of these four sections, two were written in the hand of VV, one was written in the hand of O, and one was written partly in the hand of VV and partly in the hand of O. Miller, *id.*, at 1. The examination was to have been completed by the examinee alone. Tr. 24,387 (Miller). At this time, O was VV's subordinate. Miller, ff. Tr. 24,358 at 4. O, it will be recalled, was the person involved with W in copying on the NRC examination in April of 1981. See ¶10-25, above.

221. VV was required to submit this make-up examination because, since 1977, he had been delinquent in his training requirements. In 1977 he sat for a "cross-licensing" examination. TMIA Ex. 64; Tr. 24,366-368 (Miller). This examination was designed to extend licenses for TMI-1 to TMI-2. VV received a score greater than 70% on that examination, which met the NRC's requirement, so he became licensed on TMI-2. Tr. 24,367-368 (Miller). However, he received less than 80% on two sections of the examination, which meant that he was required to receive additional training in the subjects covered by those sections. *Id.* at 24,368; TMIA Ex. 65. This additional training, called Fundamentals and Systems Review (FSR), was not scheduled to begin until March, 1978. TMIA Ex. 64. In February, 1978, before the FSR training began, VV sat for the annual requalification examination on TMI-1, which he passed, again with a score greater than 70%, but on which he scored less than 80% on three sections. TMIA Ex. 64, 66. One of those three sections was the same as one of the sections he had missed on the cross-licensing examination. *Id.* Since he was required to receive additional training in every section on which he had

received a score of less than 80%, he then had a total of four different sections in which he was delinquent at the beginning of the FSR training cycle in March of 1978.

222. VV attended very few of these FSR sessions in 1978. TMIA Ex. 64, 66. As a result, he was sent take-home, make-up examinations in January of 1979. Tr. 24,378 (Miller); TMIA Ex. 66. He did not return these examinations, so they were sent to him again in March of 1979. *Id.* By July 1, 1979, VV had reached the absolute deadline for complying with his training requirements. Tr. 24,379 (Miller); TMIA Ex. 64. On the evening of that day he went to the shift supervisor's office to look up material for answers to the examination questions (Staff Ex. 26 at 40); he was at the site on his own time; it was late; he needed to get home to rest before leaving on vacation the next day in his automobile; he asked O for help. Tr. 26,662(VV). He said "O had the same questions and answers." See ¶224, below. The next day, July 2, the examination was turned in to the training department with answers written by O. TMIA Ex. 66.

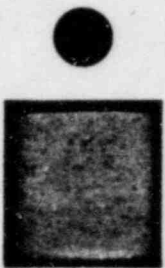
223. VV's conduct raised several questions. One of them was what to do about O. The issue was whether O knew that he was helping VV complete a make-up examination. Mr. Miller testified that when he interviewed O, Mr. Miller was convinced that O had no such knowledge. Miller, ff. Tr. 24,358 at 4. Mr. Miller based this judgment upon his long acquaintance with O, O's reputation as "an upstanding individual of unquestioned integrity," the absence of a cover sheet (indicating that the questions were on an examination) attached to the pages which O answered, and the fact that O, as a subordinate, could reasonably be asked by his superior, VV, to "provide answers to some questions." *Id.* On the witness stand, O denied that he knew the questions were part of VV's make-up assignment. Tr. 26,190(O). O said he thought the questions VV asked him were "just another set of questions that somebody wanted some answers to." Tr. 26,191(O). When VV was asked whether he thought O knew the purpose of VV's request, VV said: "I do not know what was in his mind . . ." Tr. 26,640(VV).

224. O was interviewed by the NRC investigators on July 30, 1981. Staff Ex. 26 at 42. When the investigators brought up the incident involving VV, O "appeared dismayed and looked nervous and upset." *Id.* The investigators also interviewed VV, by telephone, on the same day. *Id.* at 40. VV told the investigators that he had gone to the shift supervisor's office to look up material for answers to the take-home examination. *Id.* He recalled that O "had the same questions and answers" (which implied that O had already responded during training to these same questions), and he said he put a cover sheet on both his and O's answers and submitted them in that form. *Id.* At the hearing, it was pointed out that the question sheets which O filled out had the identifying marks of an

examination. Tr. 24,398-399 (Bradford). On one page, the words "SRO 10.0 pts" were in the upper right hand corner, and the page was entitled "Category H(K) Fuel Handling and Core Parameters." TMIA Ex. 67. Mr. Miller testified that operators sometimes used sheets such as these from previous examinations as study aids. Tr. 24,399-400 (Miller).

225. There are two additional points to consider with respect to O. The first is the high technical competence of VV; the second is VV's attitude toward the training program. It was widely agreed by those who testified that VV's technical competence was extraordinarily high. See, e.g. Tr. 24,375 (Miller). It was higher than O's. *Id.* at 24,401. According to Mr. Miller, VV "had an excellent memory. He knew where every valve and switch was His knowledge, intimate knowledge of the unit were very valuable" Tr. 24,422 (Miller). According to Mr. Arnold, "Mr. VV is a very, very capable technical person." Tr. 23,725 (Arnold). These opinions are corroborated by the score which VV achieved when he was reexamined on the areas he had failed: he received 99.8%. TMIA Ex. 72, at Encl. 1. Yet, his training record shows clearly that he did not respect the training program. He did not attend lectures; he did not return assignments; he allowed his delinquency to continue until the last hours of the last day for curing it. Mr. Miller testified that VV "was knowledgeable of the areas in question . . . he just had not bothered to apply himself. He did not have the respect for the training program that he should have." Tr. 24,423 (Miller). Mr. Miller added: "[W]hen he gave it attention, he got a 99.8. And when they all examined him, they had to go back and look up the answers because they were not sure." Tr. 24,424 (Miller). Mr. Miller also said that "I would doubt that he studied. He might have read some things a couple of days before. I mean he just did not have to." Tr. 24,424 (Miller).

226. In view of VV's high technical competence, his disrespect for the training program, and his disinclination to study, one cannot accept Mr. Miller's theory that O could have believed that VV simply wanted O to "provide answers to some questions" (§223, above). First, it is simply incredible, in view of VV's recognized ability, that VV could have wanted these answers written out by O to help VV do his job. VV had no need for such information—and had no respect for such information—for any purpose other than to satisfy his training requirements. O, who worked directly for VV and must have known of VV's competence and attitude, surely knew this. Second, VV believed that there was nothing wrong with what he did—he told Mr. Miller that he believed that he had satisfactorily completed the assignment simply by looking at what O had written—so there would have been no reason for VV not to inform O of the purpose of O's assignment.



227. Thus, the Licensee's conclusion that O did not know the purpose of his assignment rests upon O's denial. In light of what has just been said, it is difficult to see how Mr. Miller could have accepted that denial. VV testified that he did "not know what was in . . . [O's] mind . . ." See ¶223, above. In the portion of Mr. Miller's testimony which sets forth Mr. Miller's reasons for accepting O's denial, Mr. Miller lists the reputation of O, the absence of a cover sheet, and the fact that VV was O's supervisor. He does not, however, state what VV said about O's knowledge. Miller, ff. Tr. 24,358 at 4. Nor do Licensee's Proposed Findings assert that VV told Miller anything about O's knowledge. *Lic. Proposed Findings* at ¶¶ 305, 310-311. These omissions, in light of VV's testimony at the hearing, are very significant. Mr. Miller's position on O boils down to the following view of the facts: VV, who was O's supervisor and pressed for time, went to the shift supervisor's office late in the evening to look up answers to an examination; O, who was VV's subordinate, was there; VV, who was far more knowledgeable than O, and who disrespected the training program, asked O for help. VV handed O some question sheets with markings which identified them as part of an examination; O "had the same questions and answers"; after O had provided the answers VV placed O's pages together with his own under the examination cover sheet; *and*, during all the time this was going on, VV never told O the purpose of it, despite the fact that VV told Mr. Miller that VV considered the entire procedure as perfectly acceptable, and thus, VV would have had no motive for not telling O the purpose. I cannot find that this view of the facts is credible. VV had neither the motive nor the inclination to appear, late at night, for the purpose of running O through a mysterious exercise in answering examination questions. Things like that do not happen. The most plausible explanation for Mr. Miller's decision not to discipline O is the reluctance anyone would feel in disciplining a subordinate for following the orders of his superior. If that is the explanation for Mr. Miller's position, it would have been better for him to admit it, rather than advancing his theory about O's lack of knowledge.

228. The second question which faced the Licensee was what action to take with respect to VV himself. After VV handed in the examination, the training department graded it. The department attributed the scores on all four sections to VV, despite the apparent fact that VV had not written them all. Miller, ff. Tr. 24,358 at 1; TMIA Ex. 67-70, 72, 74. Then Mr. R. W. Zechman, Supervisor of Training, sent a memo to VV. This was the first communication VV received on this subject. The memo notified VV that because of deficient scores on two of the four sections, he would be required to enter an accelerated training program, and be relieved of licensed duties until that program was completed. TMIA Ex. 72. The memo did not mention anything about handwriting; it simply stated that

the action had been taken because the scores on two of the sections were below 80%. *Id.* VV was credited with passing one of the sections which had been partially written by O. TMIA Ex. 70, 74. All the scores, both good and bad, were attributed to VV as reflecting his knowledge of the four sections. *Id.*

229. Mr. Miller interviewed VV on July 9, after VV had returned from vacation. VV readily admitted O's participation; VV said he (VV) was pressed for time; that he had made no attempt to disguise O's handwriting; that he had studied the material; and that he thought these actions were sufficient to complete the training requirements. Miller, ff. Tr. 24,358 at 3; Tr. 24,396 (Miller). Mr. Miller informed VV that VV's conduct was unacceptable. Tr. 24,396 (Miller). On the basis of this interview, discussions with others, and a review of VV's training record, Mr. Miller recommended that VV be suspended for one week without pay. Miller, ff. Tr. 24,358 at 5; TMIA Ex. 71. Mr. Miller also recommended that a letter describing the incident be placed in VV's personnel file. *Id.* Following a discussion with Mr. Herbein, Mr. Miller increased his recommended period of suspension to two weeks. Miller, ff. Tr. 24,358 at 5. However, VV's suspension was never implemented. Miller, ff. Tr. 24,358, at 5-6; Tr. 23,732, 736-737 (Arnold).

230. On July 3, 1979 VV was placed in the accelerated training program for the two sections he had failed (one of which O had written). TMIA Ex. 72. On July 24 VV received a grade of 99.8% on the two sections. Also, according to Mr. Miller's testimony, VV was examined orally on the section which VV and O had written together. Tr. 24,419, 437-438 (Miller). On August 20, 1979 VV was assigned temporarily to the GPU Accident Investigation Group. TMIA Ex. 54; Tr. 24,446 (Miller). Then, he was assigned permanently to a non-supervisory position to work with outside consultants. Tr. 23,771- 772 (Arnold). He was never returned to his position as Supervisor of Operations at Unit 2.

231. Mr. Arnold testified that he did not follow the recommendation to suspend VV because he (Mr. Arnold) did not believe that suspension was a proper response to the situation. Tr. 23,732, 736-737 (Arnold). Instead, Mr. Arnold believed that VV should be removed from his position. *Id.* Mr. Arnold stated that he came to that decision because he believed there was "a deficiency in the reliability of Mr. VV's judgment in various instances and in particular in situations where his judgment was very important to us as a supervisor." Tr. 23,737 (Arnold). Mr. Arnold said that "a suspension and a reinstatement to his present position would leave us vulnerable to the problems with his judgment . . ." *Id.* He said that removal of VV from his supervisory position was "a much stronger sanction than a two-week suspension . . ." Tr. 23,737-738 (Arnold). He also said that VV's removal "was clearly known to the organization," and that it "was a

very clear signal to the rest of the organization that Mr. VV's performance was deficient in ways that the company was unwilling to not address quite severely." Tr. 23,738 (Arnold). He added that "there is no question in my mind that the assignment represented a demotion and I would certainly think there is no question in Mr. VV's mind or in the rest of the organization's mind that that was a demotion." Tr. 23,772 (Arnold). Mr. Arnold expressed the view that a disciplinary action against an individual had two purposes: to provide instruction to the individual and to provide instruction to the rest of the organization. Tr. 23,620-621 (Arnold).

232. At the time when these decisions were being made, VV was not told that he was being reassigned for disciplinary reasons. Tr. 23,775-776 (Arnold). There is no documentation anywhere in the Licensee's records to show that the reassignment was disciplinary, or that it was connected with VV's performance in the training program. See, e.g., TMIA Ex. 53, 54, 62, 66, 71, 72. The only written record of VV's reassignment characterizes it as temporary and as motivated by the valuable contribution which VV could make to the Accident Investigation Documentation Group. TMIA Ex. 54. When VV testified, he stated that he did *not* consider it as a demotion, but as a lateral transfer. Tr. 26,642(VV). It also appeared that VV's fellow employees were unaware of any demotion. When W was asked about the incident involving VV and O, he said that the incident was not common knowledge among the operators at Unit 1; he also said that he did not know what position VV now holds. Tr. 26,135(W). U was also asked about it. He revealed that he had no specific knowledge of the incident before the cheating scandal broke, and did not know to what position VV had been reassigned. Tr. 26,818(U). V had never heard of the incident either, until the cheating scandal broke in August of 1981. Tr. 26,310(V). On the witness stand, VV clearly denied that the company's motive in reassigning him was to provide an example to others. He said that the cheating incident:

was not the motivation, I am sure, that prompted my superiors to act . . . it was never publicized per se, and in fact, the majority of the people at the plant do not know about this incident, and that is one reason why I have asked for the in camera session.

Tr. 26,675(VV). From this testimony, it is apparent that neither VV nor his fellow employees had the impression that VV's reassignment was disciplinary, or connected to VV's training requirements.

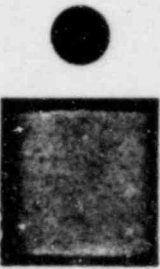
233. The next question for the Licensee was whether to recertify VV as eligible to retain his license as a Senior Reactor Operator. In order for VV's license to be renewed, it was necessary for him to have satisfied his training requirements, and for the Licensee to so certify to the NRC. On August 3, 1979 Mr. Miller sent to Mr. Paul Collins, of the NRC, a letter

which stated, first, that in the 1978-1979 requalification year, VV had become deficient in four examination sections; second, that he had been retested in those four sections; third, that he had passed two of them with grades of higher than 80%; fourth, that he had entered an accelerated requalification program with respect to the two sections upon which he had received less than 80%; and fifth, that at the end of the requalification program he scored 99.8% on those two sections. TMIA Ex. 74. The letter did *not* mention that VV had submitted O's work when VV was "retested" on the four sections. *Id.* Also, the letter gave VV credit for a score of 89.1 (a passing grade) on the section which had been partially completed by O. *Id.*; Staff Ex. 26, Encl. 1. The letter certified VV as "satisfactory" based upon these scores. Before this letter was sent to NRC, it was approved by Mr. Herbein, who was Mr. Miller's superior. TMIA Ex. 73, 74.

234. It is obvious from the above that the Licensee was not candid with Mr. Collins. The Licensee admits that Mr. Collins should have been told about the handwriting. *Licensee's Proposed Findings* at ¶319. To be eligible for renewal, a licenseholder is required to have competently performed his licensed duties. Crocker, ff. Tr. 25,081 at 4; 10 CFR 55.33(a)(5). Mr. Miller knew that the handwriting incident was highly relevant to judging VV's performance; Mr. Miller should have provided that information so the NRC could consider it. Mr. Crocker, of the NRC staff, testified that VV should not have been certified for renewal. Crocker, *id.* Mr. Crocker reasoned that if the Licensee in fact intended to remove VV from licensed duties then the Licensee did not have a continued need for VV's license, so renewal would violate 10 CFR §55.33(c)(3), which requires that there be a continued need. On the other hand, if the Licensee planned to retain VV in licensed duties, "involvement in the cheating incident certainly would cast doubt upon how competently VV had discharged his duties." *Id.*

235. The Licensee's letter to Mr. Collins also stated that VV had actually scored 89.1 on the section which had been partially answered by O. This statement was not true, and Mr. Miller knew it was not true. Mr. Miller's testimony that VV was later given an oral quiz on the material of that section (see ¶230 above), to make sure he knew it, does not make the statement true. Apparently, the intention behind the statement was not to certify someone as competent on that section who was not—if one believes that VV was in fact tested orally. Instead, the decision to report this score as if VV had earned it himself must have had some other purpose. The only purpose which I can discern was to conceal the fact that VV, who was a member of Licensee's management, had been guilty of wrongdoing.

236. In view of the total evidence on cheating by VV and O, what should one conclude about the Licensee's response? First, with respect to O, the Licensee decided to take no disciplinary action. As stated above,



the evidence shows that O must have known the purpose for which he supplied the answers to VV. The Licensee warned O not to engage in such behavior again (Miller, ff. Tr. 24,358 at 5) but the warning was insufficient; O later furnished answers to W on the NRC examination in 1981. Under the circumstances, however, I believe it was reasonable for the Licensee to refrain from any stronger sanction; O's status as VV's subordinate made it very difficult for O to refuse VV's request. It was not, however, reasonable for the Licensee to contend that O did not know the purpose of VV's request. Second, the Licensee responded to VV. The Licensee reassigned VV to nonlicensed duties, but did not notify either VV or his fellow operators that the reassignment was connected with cheating, or was a demotion. Mr. Arnold testified that VV had previously made statements embarrassing to the company (Tr. 23,733 (Arnold)) and that the reassignment was caused by a combination of factors. Tr. 23,871 (Arnold). Among those factors, O's handwriting on the examination does not appear to have been important. In Mr. Miller's memorandum to Mr. Herbein on July 3, when VV's conduct was being considered, Mr. Miller mentioned the handwriting, but emphasized the inadequate examination scores, the need to comply with the regulation requiring VV to be assigned to special training, and the fact that "we need his (VV's) license." The only action proposed on the handwriting was in a note at the end of the memorandum. It said: "If the exam which is not in proper hand script develops to a problem I will have an additional problem and will get to you." TMIA Ex. 62. From this, and the fact that the examination was graded and the scores attributed to VV, it appears that the handwriting was not of great concern to the Licensee in its decision to reassign VV.

237. The overall conclusion on VV and O must be as follows: first, the decision not to discipline O was unfortunate in view of what O did later but understandable in view of O's position as a subordinate; second, there was no statement to either VV or the Licensee's organization that VV's reassignment was connected to cheating on the FSR examination—Mr. Arnold's testimony to the contrary was unsupported by documentation, and was refuted by the testimony of VV and the other operators; third, the weight of the evidence shows that there was little connection in fact between the reassignment and the cheating; fourth, management's failure to disclose the cheating to the NRC was deliberate, improper, and resulted in a false statement in the letter upon which NRC relied in renewing VV's license. With respect to its obligations to the NRC, the Licensee's response to this incident was clearly inadequate. With respect to its obligation to its own employees, the Licensee failed to declare a clear policy against what VV did. If the Licensee had declared such a policy, the Licensee might have prevented the cheating which occurred later on the weekly quizzes and the NRC examination.

D. THE LICENSEE'S TRAINING AND TESTING PROGRAM

238. The Licensee's training and testing program has several purposes. It must train persons who begin at the entry level of auxiliary operators; it must train auxiliary operators who wish to become licensed reactor operators; it must train reactor operators who wish to become senior reactor operators; and it must train all licensed operators for their periodic requalification examinations. P.I.D. ¶¶ 174-195. After the accident at TMI-2, the Commission imposed an additional requirement for training at TMI-1. The Commission ordered that all TMI-1 operators be retrained "in the areas of natural circulation and small break loss of coolant accidents . . . and the TMI-2 accident." See ¶1, above. The Commission also ordered the Licensee to "conduct a 100 percent reexamination of all operators in these areas." *Id.*

239. In response to the Commission's order, the Licensee conducted a special, one time training program for all its licensed operators. P.I.D. ¶¶ 196-204, 260. The program was entitled "Operator Accelerated Retraining Program" (OARP); it covered the topics required by the Commission and it lasted from August of 1979 to March of 1980. *Id.* In April of 1980, at the conclusion of the program, the participants sat for an examination prepared by an independent consulting firm, PQS, headed by Mr. Frank Kelly. *Id.* This examination was known as the "Kelly" examination. It included a special category ("Category T") designed to cover "lessons learned" from the TMI-2 accident. P.I.D. ¶260. The Kelly examination also happened to serve as the Licensee's annual requalification examination. *Id.* After hearing extensive evidence on the OARP and the Kelly examination, the Licensing Board found that they satisfied the requirements for retraining and retesting which the Commission had laid down in its Order. *Id.* at ¶264. However, the Board also ruled that it would retain jurisdiction to reconsider that finding in light of evidence which might be developed subsequently on cheating. *Id.* at ¶¶ 43-45.

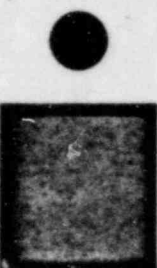
240. The Licensee's training program was administered in weekly segments. The participants attended lectures for one week, and then took a quiz on Friday afternoon which covered the materials taught during that week. See ¶¶ 68-72, above; Tr. 24,514-515 (J. Wilson). There was some testimony that the OARP was administered slightly differently, because instructors from outside TMI gave their quizzes at the end of their lectures and took their quizzes with them when they left the site. Tr. 26,233(O). However, the weekly segment with a quiz on Friday was the usual format. This format was used for the candidates who had failed the Category T portion of the Kelly examination. See, e.g., Lic. Ex. 66E, 66F. These candidates were required to show proficiency on Category T by the

Commission's Order, so the training department included Category T in the weekly format with the quiz on Friday afternoon. *Id.*

241. The Licensee admits that the administration of its weekly quizzes was "very loose." *Lic. Proposed Findings* ¶325. The Licensee also admits that "proctoring varied widely" (*id.* at ¶327), that there was no procedure for safeguarding examination materials (*id.*), that operators "could have harbored a misunderstanding as to whether they were required to do their own work" (*id.* at ¶328), and that "cooperation on quizzes certainly occurred at times" (*id.* at ¶329). And the Licensee admits that "instructors permitted cooperation on quizzes on occasions" (*id.*), that permitting cooperation "is improper as a means of verifying operators' understanding of the subject matter" (*id.* at ¶333) and that the "Licensee did not give sufficient attention to preserving the integrity of its training and testing program" (*id.*). These admissions were clearly warranted by the evidence, which is summarized above in ¶¶ 68-72.

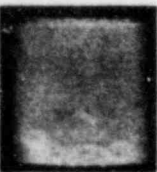
242. Because memorization was an issue with respect to cheating, there was considerable evidence on the method of instruction used in the training program. The most detailed testimony was given by G and H. Their evidence started with the question on "natural circulation." H was asked on the witness stand to state the conditions for natural circulation. He could not; in response to specific questions, he said that it was irrelevant whether the heat sink was above the heat source or below it. See ¶31, above. H had received repeated instruction on natural circulation and the lessons learned from the TMI-2 accident. He received that instruction in the program leading up to the Kelly examination in April, 1980, and he attended at least three separate weekly training sessions at the end of which he took make-up examinations on Category T. *Lic. Ex. 64*. The fact that the training program failed to teach H such a simple and important concept is quite remarkable. H told Mr. John Wilson that the question "required a lot of straight memorization." *TMI Ex. 75 at 2*.

243. G and H also testified about their understanding of pressure gauges. On the quiz of November 26, 1980, they both gave wrong answers to a question which asked them to name the instrument used to measure narrow range pressure. See ¶¶ 40-43, above. G named "forced balance rosemont" and H named "force balance." *Id.* The correct answer was the "Rosemount transmitter," which does not use a forced balance principle. On the quiz of March 27, 1981 they were again asked the same question. *Id.* They had to be reexamined on this subject because they had failed the quiz on November 26, 1980. This time G named "Rosemount," which was the right answer, but H missed the question again. *Id.* On the witness stand G asked to explain his answer. He said that "Rosemount is a trade name for forced balance." *Id.* After further questioning it became obvious



that G still did not know the device, or how it operated. *Id.* H was then asked to explain his answer of "Rosemont forced balance." He could not do so either. H said: "The wording really does not make that much sense to me, because I do not work with a transmitter . . ." *Id.* G and H each attended at least two training sessions on this device, and H was marked wrong both times on the weekly quiz. *Id.* This example shows that the training program did not succeed in actually teaching materials in which G and H had shown they were weak. Instead, G and H appear simply to have memorized word formulas with no understanding of what the formulas stood for.

244. The testimony of G and H on the generation of hydrogen gas was similar to their testimony on pressure gauges. On the quiz of November 26, 1980, G and H were asked to explain "how hydrogen gas is generated . . . following a LOCA." See ¶¶ 44-48, above. G and H both said: "From aluminum, zirconium water reaction," which was a wrong answer. *Id.* The correct answer was that hydrogen is generated from two separate reactions; one between sodium hydroxide and aluminum; the other between zirconium and water. *Id.* G and H were asked the same question again on March 27, 1981. This time they responded: "From sodium hydroxide, zirconium water reaction," which was wrong again. *Id.* They explained these latter responses on the ground that the grader, when marking their quiz on November, had written "NaOH" next to their answers. *Id.* They said they were shown their November quiz before they took the one in March, and they assumed, because of the grader's markings, that "NaOH" was the right answer. *Id.* This testimony shows that they never learned the reactions at all. If they had any knowledge whatever of the reactions they could not have answered as they did the second time. After G and H had answered incorrectly the first time, and showed they did not understand the reaction, a credible teaching process would have taught them the reactions. Instead, G and H were simply given a copy of their previous quiz with markings on it. *Id.* Apparently, G and H were expected to memorize the markings and respond to the second quiz on that basis. This may be a way to have G and H pass the quiz, and technically satisfy the Commission's Order on Category T; however, it shows a definite lack of interest in the operators' actual knowledge.



245. The above testimony of G and H reveals very poor instruction. The training program, from one session to the next, did not attempt to teach either G or H materials in which they had shown that they were weak. Instead, the program appeared to rely simply upon memorization. H's examination answer on natural circulation did not match any concept which H actually understood. The same is true of the answer by G and H on pressure gauges, and the answers by G and H on hydrogen generation. G and H knew words, but not what the words meant.

246. The training department also had another disturbing practice on Category T. On the make-up examinations it repeated the same questions week after week. A total of 14 operators were required to take a make-up examination in order to pass Category T. Lic. Ex. 64. The training department gave the first round of these make-ups over a period of five weeks in November and December, 1981. Lic. Ex. 70A-70E. This was done by including in each of the Friday afternoon quizzes a section on Category T. *Id.*; Lic. Ex. 67B-67F. The same questions were repeated verbatim from week to week with only minor variations. Lic. Ex. 67B-67F. After this first round of make-ups had been completed, it was still necessary to give a second round because some operators had failed the first round or had not taken it. Lic. Ex. 64. The second round was given on March 27, 1981. Lic. Ex. 65, 67G. It repeated verbatim the questions from the first round. *Id.* Mr. Brown admitted that this was "not a good practice." Tr. 24,806-807 (Brown). The second round was also a take-home examination (*id.*) and therefore was unproctored. Lic. Ex. 65, 67G. Furthermore, G and H were shown their papers from the first round shortly before they took the second. See ¶45, above. Notwithstanding all this, G and H failed the second round also. Lic. Ex. 64. From this pattern one must conclude that the training department did not take seriously the Licensee's obligation to teach the subjects required by Commission's Order, and that the operators did not take seriously their obligation to learn it. This conclusion is reinforced by the opinion of Mr. Paul Collins, who told the Licensee that, based on the results of the NRC examination in April of 1981, there were a number of operators who still did not understand the meaning of TMI-2. Tr. 24,815 (Newton).

247. Before discussing the operators' attitude toward the training program, an observation should be made about the type of questions which were asked on the weekly quizzes. If one looks back over the testimony by G and H, one discovers that the operators were examined on many questions which had little to do with their ability to operate the reactor. For example, the operators were asked to "list two major areas of weakness noted by the Lessons Learned Task Force." See ¶33, above. The answer to the question required one to simply memorize a list of abstract word formulations. *Id.* The question on pressure gauges was similar in its requirement for memorization. The fact of which gauge measures which pressure may conceivably be important if the gauge breaks down; however, it is not obvious why an operator would have to know how such a gauge is designed in order to read, from a dial in the control room, the signal which the gauge transmits. See ¶¶ 40-43, above. The question on Bernoulli's equation falls into the same pattern. The equation describes important physical relationships but the value of an operator's knowing such an equation would consist in his being able to use it, not in his having

memorized a long definition of it in words. See ¶¶ 58-66, above. S and Y were asked to "describe how the ATOG program proposes to simplify the operator's problem of identifying and reacting to (treating) abnormal transients." See ¶78, above. S and Y answered, correctly, "By developing symptom oriented guidelines." *Id.* This is another abstract formulation to which they both said they memorized the abstract answer. *Id.* The technical adequacy of the Licensee's training program was not directly in issue at the hearing. However, the nature of many of the questions, and their slight relation to the operators' needs, may explain why memorization was used to answer the questions, and why many of the operators did not respect the training program. Both G (Tr. 25,745) and Mr. Shipman (Tr. 26,404-405) commented specifically on the lack of relevance of the questions.

248. Several operators gave their opinion of the training program. The most striking example of disrespect came from VV, a member of management who ignored the program for as long as he could, and then turned in as his own work answers obviously written by someone else. See ¶¶ 220-237, above. Mr. I, a shift supervisor, expressed to the NRC investigators his opinion that O and W "must have felt compelled to cheat either because they were not prepared, or because they felt they were not prepared." Staff Ex. 27 at Encl. 9. When asked on the witness stand to explain those remarks, he said: "I felt the training program could have been better." Tr. 26,543(I). Mr. Shipman, who repeatedly failed the Category T make-up examinations (Lic. Ex. 64) said that: "The Category T exams that I had previously taken I do not believe reflected the real significant or more important lessons learned . . . I did not take them very serious, as far as my performing — my capacity to perform as a licensed operator." Tr. 26,404-405 (Shipman). Mr. Shipman also said that his "attitude about the Category T exam was prevalent." Tr. 26,406 (Shipman). In response to a question about the third round make-up on Category T, which he passed, Mr. Shipman said: "I think the sense of the question is did I just memorized a couple of things to put down on the exam, and I believe that that is what I did to get through that test." Tr. 26,407 (Shipman). A., however, testified that the training program leading up to the NRC examination "was probably one of the best that we had set up . . ." Tr. 26,049(A). HH, also, said the program was worthwhile and that it helped him in his work. Tr. 25,859(HH). GG, though, said that the training program was not adequate to prepare a person for the NRC examination. Tr. 25,703-704(GG). On balance, the evidence showed that many of the operators did not have confidence in the training program.

249. The Licensee's final effort to satisfy the requirement for Category T was to re-instruct and re-examine all the operators who had not passed the examination originally given by Mr. Kelly. Brown, ff. Tr. 24,695 at 1.

This was necessary because of the evidence of collusion on the make-ups taken during the weekly quizzes. Arnold, ff. Tr. 23-590 at 8. This fourth make-up was given on November 2 and November 6, 1981. Brown, supra, at 1. On each of these two days Mr. Nelson Brown conducted a review session of about 3 ½ hours. *Id.* After the review, a one-hour study session was provided, and then the examination was given. *Id.* The examination was fully proctored. Tr. 24,653 (Brown). About half of the candidates participated in the first session and the remainder participated in the second. *Id.* The same questions were repeated on both days (Lic. Ex. 69A; Tr. 24,822 (Newton)) but the examination was safeguarded in the meantime (Tr. 24,822 (Newton)). H testified that the teaching method used in the fourth-round make-up was the same as that used earlier in the third round make-up session. Tr. 25,907(H). H said the information was well broken down (Tr. 25,906(H)) and that he understood it then for the first time (Tr. 25,907(H)). H said that he was encouraged to memorize the material and that he felt confident he would pass. Tr. 25,905(H). G testified that the fourth-round make-up was more relevant to the lessons learned from TMI-2. Tr. 25,746(G). G added, however, that "everything that was asked on the test for all practical purposes was also gone over the morning before the test . . . they just took 20 questions, about, of the contents of what they had lectured us on . . ." Tr. 25,746(G). From this testimony, it appears that the Licensee's reliance upon memorization has continued. The sessions in November were effective in having the candidates pass a test, and that test contained questions on the subjects required by the Commission. However, it is doubtful whether a half-day course can produce true understanding. One would expect more careful treatment of a subject specially required by the Commission.

250. In response to the cheating incident, the Licensee has adopted new procedures for testing. The new procedures require that examinations be secured, that examinees be told whether the examination is open or closed book, that examinations be proctored, that seating charts be made for major examinations, and so forth. Lic. Ex. 73; Long, ff. Tr. 24,925 at 25-26. If these new procedures are followed the administration of testing at TMI-1 should improve. One should keep in mind, however, the fact that the Licensee adopted new training procedures once before. After the accident at TMI-2, the Licensee assured the Licensing Board that its new training program would overcome the deficiencies in training which had existed before the accident. P.I.D. ¶¶ 182-199, 205. Also, in 1979, Mr. Miller, as a result of the incident with VV and O, recommended steps to "review and upgrade the requalification program and procedures," and he said that "with the advent of the OARP which began at about this time . . . I was confident that my recommendations would be carried out." Miller, ff. Tr. 24,358 at 6. According to U, however, the pattern of loose

quiz administration continued after the accident, and throughout the OARP. See ¶70, above. V said the pattern of cooperation on weekly quizzes continued until August of 1981, when the cheating by O and W was discovered. See ¶71, above. GG testified that the casual attitude toward taking the quizzes still existed during the Category T make-ups. Tr. 25,695-696(GG). Thus, poor test administration followed the Licensee's post-TMI-2 assurances. The Licensee's latest assurances must be viewed with that record in mind.

251. My overall conclusions on the Licensee's training and testing program are as follows. First, the administration of the testing program was clearly inadequate. The weekly quizzes were not proctored on any regular basis. Mr. Husted, a training instructor, testified that the left weekly quizzes unproctored about 50% of the time. See ¶68, above. Operators cooperated on the quizzes, and it was unclear whether they were supposed to do their own work. See ¶¶ 69-71, above. Second, the method of instruction emphasized the memorization of word formulas, rather than an understanding of the concepts which the formulas stood for. Operators were taught words without being taught what the words meant. Third, when operators showed that they were weak in a given area there was no apparent effort to actually teach them the materials in that area. On the second round of the Category T make-ups, for example, instead of actually teaching the operators the subject matter, the questions were simply repeated from the first round, the operators were shown their first round tests, and then left to answer the second round on a take-home basis. Fourth, many of the questions on the quizzes were unrelated to the candidates' ability to operate the reactor. This encouraged memorization and diminished the operators' respect for the training program. In sum, the Licensee's training program was poorly administered and, judging from the evidence presented before me, it was weak in content and ineffective in its method of instruction. I do not believe that the Licensee's training program responded adequately to the Commission's Order of August 9, 1979.

E. THE LICENSEE'S SYSTEM FOR CERTIFYING CANDIDATES

252. Under the Commission's regulations, facility licensees must certify as competent all operator candidates seeking to renew their licenses (10 CFR §55.33) or obtain new licenses (10 CFR §55.10). In the case of a renewal, licensees are required to certify that the operator candidate has satisfactorily completed the requalification program (§55.33(a)(5)). The Licensee's certification of VV in 1979 has already been discussed in ¶¶ 220-237, above.

253. At the time of the NRC examination in 1981, the Licensee had no formal certification procedure. Hukill, ff. Tr. 23,913 at 18; Ross, ff. Tr. 24,127 at 7. In order to decide which candidates to certify, the Licensee relied upon a long meeting, in attendance at which were Mr. Hukill, Mr. Herbein (Vice President of Nuclear Assurance), Mr. Toole, Mr. Ross, Dr. Knief (Manager of Training), Mr. Newton, and Mr. Brown. Hukill, *id.*, at 19-20. During this meeting, these persons evaluated each candidate according to the following criteria: the candidate's score on the ATTS examination, the candidate's performance during the training program over the preceding year, and the performance of the candidate on the job. Hukill, *id.*, at 20. All the candidates were certified. *Id.*

254. At the time the Licensee made this certification, O and W had already cheated on the ATTS examination. Staff Ex. 26 at 17. Fourteen persons took the same ATTS RO examination as O and W; twelve took the same SRO examination. *Id.* The NRC investigators found that O and W gave obviously similar answers to ten of the thirty-seven essay-style questions on the SRO examination. *Id.* However, the Licensee failed to detect these similarities. Newton, Brown, ff. Tr. 24,640 at 10. This failure was caused by the fact that all the ATTS examinations (there were 56) were graded quickly over one weekend "in rather rote fashion." *Id.* The ATTS examination was not fully proctored (*id.*) and the proctor was inattentive (Tr. 26,084-085(W)). Thus, the Licensee's system of certification approved two operators who had cheated on one of the examinations used as a basis for the certification.

255. The Licensee also certified several operators who did poorly on the ATTS examination. R obtained a score of 15.4% in one category and less than the 70% passing grade in two other categories. Aamodt Ex. 9. H obtained less than 70% in six of eight categories. *Id.* G was deficient in two categories; S in four. *Id.* R, H, and G were assigned to their shift supervisors (R was assigned to O) for intensive "cramming" during the week or so which remained before the NRC examination. Tr. 24,760-761 (Newton). S, who was himself a shift supervisor, was assigned to Mr. Boltz, a training instructor, for the same purpose. *Id.* at 24,762.

256. With respect to the candidates' performance in the weekly training program, Mr. Hukill relied upon data from Mr. Brown. Tr. 24,105 (Hukill). This data was not always reliable. For example, Mr. Brown certified to Mr. Hukill that H had fulfilled all the training requirements when this was not the case. *Id.* H was required to make up a category he had failed on the 1979-80 annual requalification examination but the quiz he took to make up that category was not graded on the answer sheet at the time of Mr. Brown's certification to Mr. Hukill; when it was graded H received a failing score of 68.2%. Tr. 24,780-781 (Milhoilin, Brown). Mr. Brown said that he had certified H without computing H's grade because

the equations H used appeared correct "at first glance." Tr. 24,781 (Brown). H's use of those equations in fact provided wrong answers. *Id.* H's performance on the weekly quizzes — as well as G's performance — is discussed above. See ¶¶ 26-67. These quizzes were very poorly administered. See ¶¶ 68-73, above.

257. The evidence here shows that the Licensee's system of certification was unreliable at the time of the NRC examination in April. The grading of the ATTS examination was not adequate to detect obvious copying, and that examination was not fully proctored. The data from the weekly training program did not always reflect actual grades (in the case of H's make-up quiz) and the data from the weekly quizzes suffered from the uncertainty caused by the poor administration of those quizzes.

258. Mr. Hukill admitted that the Licensee "can be legitimately criticized for not formalizing our certification process by establishing a written certification procedure." Hukill, ff. Tr. 23,913 at 18. However, he also said that he intended to establish such a procedure before certifying the next group of candidates. *Id.* That procedure would include signed statements from training personnel certifying that the operators had completed their training requirements. Tr. 24,053 (Hukill).

259. My conclusions on the Licensee's certification process are as follows: First, the Licensee should not have certified O and W; their copying on the SRO portion of the ATTS examination was obvious enough to have been detected through careful grading. Second, the data from the weekly training program was unreliable because it was not verified by the training instructors, and also because it was taken from the weekly quizzes, which were poorly administered. Beyond that, the Licensee's certification process appears to have been adequate. The evidence on this subject was insufficient to warrant any findings other than the brief ones just stated.

F. THE NRC EXAMINATION

Proctoring and grading the examination

260. The NRC examinations in April, 1981 were given on four successive days. See ¶139, above. The candidates for all the examinations were divided into two groups: one in the smokers' room, one in the non-smokers' room. B. Wilson, ff. Tr. 25,481 at 2; Tr. 25,557-558 (B. Wilson). On April 21, the RO "A" examination was given; it lasted nine hours. B. Wilson, ff. Tr. 25,481 at 2. The smokers' room was proctored by Mr. Maines for the entire nine hours, except for lunch, when he was relieved by Mr. Young, the NRC Resident Inspector. Tr. 25,556-557 (B. Wilson).

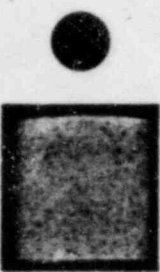
Thus, that room was fully proctored on April 21. The non-smokers' room was proctored by Mr. Bruce Wilson. Mr. Wilson was relieved during lunch, also by Mr. Young (*id.* at Tr. 25,500), but Mr. Wilson was not relieved during the approximately one and one half hours he spent reviewing the examination with the TMI reviewers. *Id.* at Tr. 25,558. Thus, the non-smokers' room was left unproctored for one and one half of the nine hours on April 21. *Id.*

261. On April 22, the SRO "A" examination was given. It lasted for seven hours. B. Wilson, ff. Tr. 25,481 at 2. Mr. Maines again proctored the smokers' room, and was relieved again by Mr. Young for lunch, so the smokers' room was fully proctored for seven hours on April 22. Tr. 25,556-557 (B. Wilson). Mr. Wilson again proctored the non-smokers' room and again left it unproctored for one and one half hours while he reviewed the examination with the TMI reviewers. *Id.* at Tr. 25,557-558. So the non-smokers' room was left unproctored for one and one half hours on April 22.

262. On April 23, the RO "B" examination was given; it lasted for nine hours. *Id.* at 25,558. Mr. Wilson proctored the smokers' room for two or three of the nine hours. During the rest of that time, he was reviewing the examination with the TMI reviewers. *Id.* at 25,559. Thus, the smokers' room was left unproctored for six or seven of the nine hours on April 23. Mr. Maines proctored the non-smokers' room for approximately seven of the nine hours. *Id.* at Tr. 25,584. He was absent from the facility for about two hours for a health physics indoctrination and a whole body count in preparation for a site tour he was to take. *Id.* Thus, the non-smokers' room was left unproctored for about two of the nine hours on April 23.

263. On April 24, the SRO "B" examination was given; it lasted for seven hours. B. Wilson, ff. Tr. 25,481 at 2. Mr. Wilson did not proctor the smokers' room on that day except to enter it from time to time, so it remained essentially unproctored on April 24. Tr. 25,559 (B. Wilson). Mr. Maines proctored the non-smokers' room from 8:00 a.m. until about 11:30 a.m. when he left the facility to go on a plant tour. *Id.* at Tr. 25,584. That room was left unproctored from 11:30 a.m. until about 1:30 p.m. except for brief periods when Mr. Wilson checked it. *Id.* Mr. Wilson began to proctor the room at about 1:30 p.m. and proctored it until the end of the examination. *Id.* at Tr. 25,584-585. Thus, the non-smokers' room was left unproctored for about two of the seven hours on April 24.

264. There was also evidence that the proctors were not attentive while proctoring. G testified that the proctor of the non-smokers' room read a soft cover book. Tr. 25,765(G). O and W cheated rather openly while the proctor was present. See ¶¶ 13-14, above. O and W were in the non-smokers' room during the "B" examinations on April 23 and 24. Mr.



Maines proctored that room for seven of the nine hours on April 23 and Mr. Maines and Mr. Wilson proctored it for five of the seven hours on April 24. An attentive proctor would, at the least, have asked O to turn his answer sheets face down on the table, or to move them were W could not see or reach them.

265. The candidates were seated at tables eight feet long, two candidates to a table, facing the proctor. Lic. Ex. 83; TMIA Ex. 61. The tables were four or five feet apart. Tr. 25,850(HH). U brought his briefcase into the examination and had access to it during the examination. Tr. 26,840-841(U). There was no effort to inspect items such as briefcases. Tr. 25,560 (B. Wilson). Although Mr. Collins stated that the "B" set of examinations was so similar to the "A" that a person taking "B" would have had an unfair advantage by seeing "A" (Tr. 25,146-147 (Collins)) the candidates who had taken "A" were not instructed to refrain from discussing "A" with the candidates scheduled to take "B". Tr. 25,582 (B. Wilson). Mr. Husted appears to have discussed "A" with the "B" candidates. See ¶114, above. Candidates who had finished their examinations could remain in the hall near the examination room, where they would be accessible to candidates on a coffee break who were still taking the examination. Tr. 25,580 (B. Wilson). There was no limit on the time during which a candidate could be absent from the examination room. Tr. 25,423 (Ward). Mr. Wilson testified that these proctoring practices were consistent with the established practice of the NRC Staff. Staff Ex. 24.

266. At the hearing, the NRC Staff took the position that its procedures during the April examination had been adequate, Mr. Paul Collins, Chief Operator Licensing Branch, testified that he did "not believe that the procedures used by the staff to administer the April 1981 exams demonstrated any type of laxity on the part of the staff." Collins, ff. Tr. 25,109 at 6. In view of the evidence just set forth, I cannot agree with Mr. Collins. The risks of allowing an examination to go unproctored are obvious, and proctors can be hired with ease. In this case, the absence of proctoring was combined with inattentive proctoring, close seating, opportunities to receive answers in the hall (see ¶119, above) and access to briefcases. I must conclude that the Staff was lax and that its procedures were inadequate.

267. The grading of the NRC examination was also in issue. The cheating by O and W was discovered by Mr. Monte Davis, who had been hired by the NRC Staff as a consultant to grade twelve "A" and eight "B" SRO examinations. Staff Ex. 24; Collins, ff. Tr. 25,109 at 4. Mr. Davis noticed the cheating during his grading and he provided a list of O's and W's similar answers to Mr. Collins. Staff Ex. 24. Mr. Davis said there were so many similarities that he "got tired of comparing." *Id.* In addition to cheating on the SRO "B" examination, O and W also cheated on the

RO "B" examination. There were seventeen of those examinations and they were all graded by Mr. Collins. Collins, ff. Tr. 25,109 at 4-5. Mr. Collins did not detect the cheating. Mr. Collins said he did not detect it because of the large number of examinations to be graded, because roughly half of the questions required short, rather than long answers (longer, essay-type answers make it easier to detect cheating) and because he "was under a tight schedule and graded the examinations rapidly." Collins, *id.* at 5. If one reviews the answers by O and W which are quoted in paragraph 12, above, one can see that O and W gave long, essay-type answers to Question A.6(a) on the RO examination. These answers show obvious copying. On Question H.3(a), which is also quoted in paragraph 12 above, O and W also gave long, essay-type responses which show obvious copying. These answers are only examples of the many similar essay-style answers by O and W on the RO "B" examination. Special Master's Ex. 1, 2; Staff Ex. 24. The proportion of obviously similar answers by O and W on the SRO examination was higher than on the RO examination. Staff Ex. 26 at 14. However, the number and nature of the similar answers on the RO examination are such that the cheating should have been discovered, despite the greater number of "B" papers which Mr. Collins graded. The Office of Inspection and Auditor listed obvious similarities on the answers to Questions A.6.a, A.7.a, B.3.a, C.3.a, C.3.b, C.3.c, C.4.a, D.3, E.4.a, E.6.c, F.1.a, F.5.c, and H.3. Staff Ex. 24. To that list I would add the answers to several other questions. The Office of Inspection and Enforcement identified "at least 17." Staff Ex. 26 at 14. The sheer number of these similar answers (several of which are wrong) made the cheating obvious.

268. In response to the cheating, the Staff has adopted new procedures. These require 100% proctoring, admonitions against cheating, that the facility furnish a single room large enough for adequate spacing of candidates, that all reference materials and answer paper be furnished by the NRC examiner, and that examinees who have completed the examination must leave the area in which the examination is given. B. Wilson, ff. Tr. 24,481 at 4-5; Staff Ex. 30. The new procedures also require a new form of grading to check for copying. An NRC reviewer must "review in detail the answers and grades assigned for at least one question in 50% of the categories for 50% of the applicants." Staff Ex. 25. These procedures were used during the NRC examinations given at TMI-1 in October of 1981. Tr. 25,129 (Collins). The NRC Staff hired four professors from Pennsylvania State University to provide 100% proctoring. Collins, ff. Tr. 25,113 at 1-2. All the candidates took the examination in the same room. B. Wilson, ff. Tr. 25,481 at 4. Only one candidate was allowed to leave the examination room at a time and a log was made of absences. Collins, ff. Tr.

25,113 at 2. Candidates were admonished against cheating. *Id.* The grading of the October examination was reviewed according to the Staff's new procedure to detect cheating. *Id.* at 3.

Content of the examination

269. At TMI-1, the NRC Staff gave a written examination and an oral test to those operators who have been previously licensed. Staff Ex. 32. For those seeking their first license, the Staff also gave an examination on a simulator. *Id.* The content of these examinations was not expressly made an issue at the hearing; however, the nature of the questions on the written examination became an issue for the purpose of deciding whether the questions were amenable to cheating, rote memorization, or other devices which could defeat the examination's purpose. See ¶13, above. Also, the nature of the questions and their answers became important to the issue of broadening the answer keys. See ¶¶ 153-178, above. Finally, the content of the examination is relevant in evaluating the operators' attitude toward it.

270. The evidence on broadening the answer keys provided the most specific example of the examination's content. Twelve questions were chosen for analysis. See ¶¶ 153-178, above. Question B.5.a was the first example considered. It asked for the purpose of the No. 1 seal by-pass line. See ¶154, above. The question sought to discover whether the operators knew how a particular piece of equipment — the seal by-pass line — functioned. The question was on a fact specific to the design of the plant, and the answer consisted of stating that fact. The only uncertainty arose when Mr. Wilson changed the answer key because of what the reviewers said was covered by the training program. Mr. Wilson apparently accepted two principles in his decision to change the key. First, that the answer should be governed by the training program rather than the design of the plant; and second, that the reviewers' word should be taken for what the training program covered. As indicated above, neither of these principles was valid.

271. The second example considered was Question B.5.c. It asked when a reactor coolant pump must be tripped due to high vibration. See ¶159, above. This question was similar to B.5.a, in the sense that it asked how a particular piece of equipment functioned, and sought to test the operators' knowledge of a specific aspect of plant design. The answer, again, was a specific fact — that the pump must be tripped at a certain vibration. The change in the key was required because the key was incomplete. Appar-



ently, the key was incomplete because the NRC examiner did not have all the necessary information. Tr. 25,604-606 (B. Wilson). The examiner depended upon the reviewers to supply this information. *Id.*

272. The third example was Question B.6.a. The question asked for the way in which the nuclear services river water system responds to a loss of offsite power with or without a loss of coolant accident. See ¶160, above. Again, the question sought to test the operators' knowledge of a specific aspect of plant design — how certain pumps respond to a certain signal. The answer was, again, a specific fact, consisting of which pumps start on which signal. The answer key to this question was rewritten because the NRC's original answer had been taken from the OARP without considering the Licensee's blackout procedure. *Id.* The NRC had all the relevant material, but appeared unaware of how it fit together. *Id.* The NRC examiner depended upon the Licensee for the correct answer to this question. *Id.*

273. The fourth example was Question C.2.b. This question asked for the competing chemical effects which determine primary pH. See ¶161, above. The question corresponds to the pattern of the previous examples. It asked for specific facts about the design of the plant, and the answer was to state those facts. The NRC reviewer resisted the reviewers' efforts to change the answer key on this question, and did so for good reason. See ¶¶ 164-166, above.

274. The fifth example was Question D.5. The question asked for a list of the sensors which initiate automatic action for certain abnormal conditions. See ¶167, above. This question was again similar to those above in the sense that it requested the operators to list specific facts about the plant design. On part "a" the answer was changed because the Licensee had supplied erroneous information to the NRC; the information in the OARP had indicated a design change, but the change had not in fact been made. See ¶168, above. On part "b" the original answer was incorrect, for reasons which were not made clear. *Id.* On part "c" the original answer was left blank because the NRC examiner had not been able to find an answer to it which was specific to TMI-1. *Id.* On part "d", the original answer was changed because the question was too vaguely worded. *Id.* Once again, the NRC examiner depended entirely upon the Licensee's reviewers for the answers to the question. *Id.*

275. From the five examples above, two patterns emerge. The first pattern reveals that the questions all test the same kind of knowledge. In each example, the question asked the operators to state specific facts about the design of the plant. The operators were asked to state the purpose of a by-pass line; to state when certain pumps trip or when certain other pumps start; to state certain chemical effects; and for a list of sensors. If one looks at the seven remaining questions which were chosen as examples, one



sees that this pattern continues. Operators were asked on Question E.3. to list a series of set points; on Question E.4. to describe devices for detecting leaks in the emergency cooling system; on Question F.2.a to list logs which must be reviewed; on Question F.5.c to state the conditions for throttling the high pressure injection system; on Question G.4. to state the formula for the production of Cobalt 60; on Question H.5.c to state the mathematical relation between the discharge head of a pump and its speed; and on Question N.5.a to state the design flow capacity of the high pressure injection pumps. See ¶¶ 169-175, above. All of these questions asked for very specific facts about the design of the plant. To grade such questions accurately, the NRC examiner must have reliable, specific information about the design, and he must understand that material. To answer such questions accurately, the operators must be taught reliable, specific information about the design, and the operators must commit that material to memory.

276. A second pattern also emerges from the five examples above. The second pattern reveals that the NRC examiner in fact relied upon the Licensee for answers to these questions. The examiner relied upon the Licensee for the answer to the question on the purpose of the seal by-pass line (which the examiner should not have done), for part of the answer to the question on tripping a reactor cooling pump, for all of the answer to the question on starting the nuclear services river water system, and for all of the answer to the question asking for a list of sensors. The examiner resisted the reviewers' suggestion only on the answer to the question about primary pH. If one looks at the seven other questions chosen as examples, one sees the same pattern. On Question E.3, which asked for a list of setpoints, the examiner relied upon the Licensee for all of the answer; on Question E.4., which asked for devices for detecting leaks in the reactor building emergency cooling system, the examiner relied upon the Licensee for a third device (in addition to the examiner's two); on Question F.2.a, which asked for the list of logs to be reviewed by the CRO coming on shift, the examiner relied upon the Licensee for a new list of logs to replace the examiner's list of logs; on Question F.5.c, which asked for the conditions for throttling high pressure injection, the examiner relied upon the Licensee for all of the answer, which the examiner had left blank; on Question G.4., which asked how Co60 is formed and why it is hazardous, the examiner relied upon the Licensee for an addition to the answer which was necessary to make the answer complete; on Question H.5.c, which asked for the relation between pump speed and discharge head, the examiner's original answer was erroneous and was contradicted by the reviewers' answer, which was right; and on question N.F.a, which asked for the design flow capacity of the high pressure injection pumps, the examiner relied upon the Licensee for all of the answer. The most striking

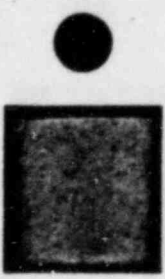
example of reliance occurred while Mr. Ross was taking the examination. Mr. Wilson called Mr. Ross out of the examination room to clarify question B.4., which was on the examination which Mr. Ross was taking. Mr. Wilson did so because Mr. Ross "was the only person available to explain how the particular valve worked." Tr. 25,548 (B. Wilson).

277. The reason for the examiner's reliance on the Licensee was not the same in all of these instances. In some of the instances the reliance was produced by the examiner's misinterpretation of the materials supplied by the Licensee, or by some failure by the examiner to make the question or the answer key complete. This appeared to be the case in examples three, eight and ten. In other instances, the reliance was produced by the Licensee's failure to supply information which was currently valid. This was true in examples two, five and twelve. In still other instances, the examiner left the answer key blank because he did not have the answer when he wrote the question (instances six and nine) or he changed the answer upon the assumption that he should make it correspond to what the reviewers said was covered in the training program (instance one). Mr. Wilson testified that the most frequent cause of change was the inadequacy of the materials he received from the Licensee. He said: ". . . the vast majority of changes were necessitated by the differences between the information that we received and what was actually taking place in the plant." Tr. 25,631-632 (B. Wilson). Mr. Wilson's view was corroborated by other testimony. Mr. Hukill testified that the Licensee's practice of making constant changes to the training materials had caused the operators to have a poor attitude toward the training program. Tr. 24,021-022 (Hukill). He also said that the Licensee's method of providing information to the operators lacked a device, such as a training manual, which would serve as an approved source of information and be kept up to date. *Id.* at 24,026. Mr. Ross said that the Licensee had not furnished NRC with materials which were up to date at the time of the NRC examination and said that the cause was the lack of a prescribed training manual. Tr. 24,243, 307 (Ross). This failure to provide adequate information to Mr. Wilson forced him to rely heavily upon the Licensee's reviewers. In fact, it placed him at their mercy in many of the examples considered above.

278. The first pattern described above, which was the practice of asking questions about specific details of plant design, also encouraged memorization. In the twelve examples cited, the information sought was so detailed that no operator could have supplied it without memorization. GG testified that the NRC examination in October for SRO was so devoted to numbers and design details that it was not a fair measure of his ability. Tr. 25,711(GG). G testified that the NRC was not "capable of understanding our right answer" because, on questions covering operating procedures, the examiner would take off points for leaving out things which were trivial.

Tr. 25,743(G). G said he did "not even regard it as worthwhile . . . putting down . . . an answer" (*id.* at 25,743-744) and that "for me to pass this test I have to cold memorize all the procedures, and I refuse to do that" (*id.* at 25,744). Mr. A testified that the NRC appeared to have constructed the April examination by lifting details from the OARP materials. He said: "They went down through the material that we gave them, and it appeared that they indiscriminately just went into a sentence or paragraph and picked out a statement and fashioned a question around that statement." Tr. 26,045(A). A also said that a good operator "might not have passed that exam because of the specific questions that were on it." Tr. 26,047(A). He said that a candidate with an exceptionally good memory, who was familiar with the particular materials tested, could have passed the examination despite an overall inability to operate the plant safely. *Id.* He added that the RO portion of the October examination was less devoted to detail than the April examination had been (Tr. 26,047-048(A)) but the SRO portion in October was still quite detailed (Tr. 26,053-054(A)). S told the NRC investigators that thirty-five to forty percent of the questions required memorized answers. Staff Ex. 26 at 31. T told Mr. Hukill that the examinations were "absolutely terrible, and in no way reflected whether an operator really knew how to operate the plant or not." Tr. 23,975 (Hukill). P told the NRC investigators that "most operators viewed the NRC examinations as just one more bureaucratic obstacle to be overcome and did not perceive them as having any relevance to their abilities to operate a plant safely." Staff Ex. 27 at 40. V testified that the April examination was not a fair measure of his ability. He said "there was quite a bit of esoteric information . . ." Tr. 26,320-321(V). He cited the example of a question which asked for the definition of "isochronous." Tr. 26,321(V). He said that the switch on Units 2's diesel had a position on it marked "isochronous," but that Unit 1's switch was marked "unit in parallel," so the question, in addition to being obscure, was irrelevant to Unit 1 and therefore technically wrong. *Id.* He said that about twenty percent of the questions were technically wrong. *Id.* He also said that the October examination was better than the one in April. *Id.* at 23,322(V). Mr. Shipman testified that the April examination "covered a very, very broad range of specific details, and . . . that type of information is readily available in the reference material available [in the control room] to all the operators." Tr. 26,411 (Shipman). Mr. I testified that the written examination "really does not find out how you function as an operator . . . basically it asks you questions on . . . [operating procedures] which you would always have available . . ." Tr. 25,585(I).

279. What can one conclude from the above evidence? Whether or not one accepts the operators' criticism as valid, it is obvious that there is a problem of credibility. At TMI, Mr. Wilson was in the position of asking



the operators about details which were difficult to remember and which the operators did not believe were important. At the same time, however, Mr. Wilson was forced to rely upon the operators themselves to supply those details. It is no surprise that the operators did not respect the examination.

280. The NRC also gave an oral test to the TMI-1 operators. This test consists of a four to six hour examination session for each candidate in which the candidate is examined alone by the examiner. Boger, ff. Tr. 25,480 at 7-12. The session begins in an office or conference room, in which the examiner asks the candidate about general reactor theory, radiation protection practices, reactor operation, and so forth. *Id.* The examiner and candidate then move to the control room, where the major portion of the test is conducted. *Id.* The candidate is asked questions about reading and interpreting the instruments and manipulating the controls. *Id.* The examiner also asks the candidate about emergency operation. *Id.* The examiner postulates the symptoms of an unusual condition and asks the candidate what actions are required by the facility's procedures. *Id.* The number of questions on postulated symptoms ranged from two to about six or eight at TMI-1. Tr. 25,540-541 (Boger). The final phase of the oral test is a tour of the plant, during which the candidate is asked about monitors and radiological safety practices. *Id.* Several operators testified that they were asked about abnormal operating conditions during the oral test. See, e.g., Tr. 26,411-412 (Shipman); Tr. 26,052-053(A).

281. There were also other issues at the hearing which touched upon the examination's content. The first was whether the questions on the written examination were repeated from one examination to the next. The evidence was inconclusive. Mr. A said that he had already seen about half of "the general type of questions" on the April examination. Tr. 26,042(A). Mr. Bruce Wilson testified that the number of old questions on the April examination was small. Tr. 25,585 (B. Wilson). However, he also said that NRC does "repeat questions to a fairly significant extent." *Id.* at Tr. 25,586. He said that NRC has written new performance appraisals for its examiners which require that examinations must be changed, from one to the next, by at least fifty percent. *Id.* Mr. Collins testified that his office had compared the October NRC examinations at TMI-1 to all examinations administered since April of 1981 at facilities similar to TMI; he said that less than 4% of the questions were similar. Collins, ff. Tr. 25,113 at 5. GG said that he had already seen about ten or twenty percent of the questions on the October examination. Tr. 25,700(GG). A second issue was whether candidates could be "coached" for the oral test. Since an examiner may administer up to six oral tests during an assignment, some coaching is anticipated. Boger, ff. Tr. 25,480 at 10-11. To minimize the impact of this coaching, the examiners vary the content of the test. *Id.* It

was unclear to what extent the examiners were successful in minimizing this impact at TMI-1. A third issue was the adequacy of the NRC Staff's review of the Licensee's examination on Category T. The Staff decided, apparently at the highest level, to have the Licensee administer this examination. Tr. 25,152 (Collins). The Operator Licensing Branch reviewed and approved the original Category T examination given by Mr. Kelly in April of 1980, but the Staff did not review the Category T make-up examinations (weekly quizzes). Tr. 25,635-636 (Boger). Thus, the Staff was unaware that the same questions on the make-up quizzes were repeated from week to week within the same round; that the same questions were repeated from one round to the next; that the second round was given as an unproctored take-home examination; and that the instruction was poor. See ¶¶ 241-247, above. The NRC staff did review and approve the final Category T make-up which the Licensee gave in November of 1981. Tr. 25,635 (Boger). However, the Staff apparently did not review the method by which it was taught and administered. This method consisted of a three to four hour review session in which the candidates memorized the lecture material and then immediately took an examination on what had been presented. See ¶249, above. This failure to follow Category T more closely does not seem consistent with the emphasis placed on Category T by the Commission. See ¶¶ 1, 26, 238, above. However, the Staff's decision on this matter may have been a product of its manpower shortage (see ¶285, below) and its view that the Category T materials were also covered on the NRC examination. Tr. 25,654 (Boger). This latter position is correct. If one compares the questions on the original Kelly examination on Category T to the NRC examination, one finds that the same subjects are covered in both.

282. The final issue touching the Operator Licensing Branch was its attitude. On October 2, 1981, I asked the NRC Staff to present evidence on the following question:

The Kemeny Commission found that operator training was greatly deficient; that the depth of understanding was far too shallow. It also found that the branch of NRC that monitored operator training was "weak and understaffed," and that NRC limited itself to "giving routine exams." It concluded that no quantity of "fixes" would cure the basic problem, which it found to be the attitude of the people who were involved. Because the cheating incident occurred after the Staff has responded to the Kemeny Commission and promised to improve, what does the possibility of laxity in the Staff's procedures indicate about the Staff's attitude?

The Staff's evidence was presented by Mr. Collins, Chief of the Operator Licensing Branch. He testified that Staff was not lax in its administration of the April examination, that the Staff's procedures were adequate, and that the Staff makes a sincere effort to insure, through its examination, that operators are safe and competent. Collins, ff. Tr. 25,109 at 6. He said that "as soon as the Staff realized that the procedures did not provide as much assurance as deemed appropriate, they were changed." *Id.* Mr. Collins was asked specifically what steps his office had taken to overcome the weaknesses pointed out by the Kemeny Commission. He responded that his office had made an effort to vary the content of the examinations (Tr. 25,155 (Collins)), that the passing grade had been increased, that new categories of subject matter had been added to the examination, and that new candidates for licensing must now be examined on a simulator. *Id.*

283. Mr. Collins was also asked a series of specific questions about the April NRC examination. With respect to proctoring, he testified that "we thought at the time that we . . . [had] the proper balance between the number of people you send on an exam assignment with the various things that they have to accomplish in addition to proctoring . . ." Tr. 25,132 (Collins). He admitted that since the examination the Staff had "revised our thinking, and we have come up with a fairly simple solution to assuring 100 percent proctoring at a minimal cost to our operations." *Id.* He said that he recalled his statement that anyone seeing the "A" examination in April would have had an unfair advantage on the "B", and he admitted that it would be appropriate to ask the examinees not to disclose questions to one another, but he said that the Staff was still considering whether a policy on this subject should be adopted. *Id.* at Tr. 25,147. He was also asked about the fact that Mr. Wilson was absent from the examination room for almost the entire period on the last two days of the examination. Mr. Collins said that he believed that other personnel from NRC were providing proctoring during this time. *Id.* at Tr. 25,148. With respect to the Category T make-ups administered by the Licensee, Mr. Collins appeared to have little knowledge of them. *Id.* at Tr. 25,153.

284. It is difficult to regard Mr. Collins' testimony as adequate. The Staff's administration of the April examination was clearly lax. See ¶¶ 260-265, above. It is disturbing to find that it could be so lax after the concerns expressed by the Kemeny Commission. As Mr. Collins pointed out himself, it would have been possible to provide 100% proctoring at minimal cost. It would also have been simple to instruct the examinees not to disclose the questions to one another and for the proctor to have excluded briefcases. In light of the controversy about the Staff's competence at TMI, it is astonishing that Mr. Collins still did not know, at the time of the hearing, whether anyone was proctoring Mr. Wilson's room on

the April 23 and 24. It is also very surprising, in light of the controversy surrounding the Category T make-ups, that Mr. Collins appeared not to know much about them.

Conclusions about the NRC examination

285. The evidence produces the following conclusions about the NRC examination: First, the administration of the examination was inadequate. The close seating, inattentive proctoring, absence of proctoring, access to briefcases, and access to other examinees in the hall have already been described. See ¶¶ 260-265, above. Second, the grading was also inadequate, in the sense that it did not detect the obvious copying. See ¶267, above. Third, the content of the examination caused the examiner to rely heavily upon the Licensee for answers (¶¶ 276-277, above); it encouraged memorization as a method of preparing for the examination (¶278, above); and it undermined the examination's credibility in the eyes of the candidates who took it (¶¶ 278-279, above). The degree of reliance was, in my opinion, unacceptable, so I find that the content of the examination was inadequate.

286. This last conclusion about the examination's content requires further comment. The heavy reliance upon the Licensee for answers is produced by the type of question asked. The questions elicit specific details of plant design. These details vary from plant to plant, and vary from time to time within the same plant. By deciding to test on this type of information the NRC inevitably must rely upon the licensee to supply it, and to supply some of it at the last minute. The amount of detail is such that the NRC examiners, even with an adequate level of staffing, could not independently master it for all the examinations they must give. Staffing levels at NRC are far from adequate, however, as the NRC Staff admits. Tr. 25,577 (B. Wilson); Tr. 25,637 (Boger). The result is a system of heavy reliance upon the licensee, with the opportunity for abuse described above in the discussion on broadening the answer key (see ¶¶ 153-178).

287. These problems of reliance upon the licensee for answers, and of the examination's credibility, are quite important. However, they are less important than the final problem presented by this evidence. The final problem is this: the operators' opinion of the examination may be right. The examination may not in fact measure their ability to operate the reactor safely. The quantity of evidence on this point was insufficient for a solid conclusion, because this point was not expressly made an issue in the proceeding. However, the evidence does raise a question in one's mind. Of the twelve examination questions which were selected as examples, *all* of

them tested the same form of knowledge. The knowledge consisted of being able to describe the details of design. The questions did not ask the operator to solve a structured problem — which is a higher form of knowledge than the knowledge of the “design facts” which go into such a problem — or to react to a new situation — which is a still higher form of knowledge and which requires knowledge of the technical facts of reactor design, knowledge of how to solve a structured problem, and the ability to use these two forms of knowledge to solve an unstructured problem. Although the operators’ opinion of the NRC examination cannot be taken at face value, their opinion is entitled to weight when it is reinforced by the nature of the twelve questions selected as examples.

G. THE NRC STAFF’S RESPONSE TO THE CHEATING

288. The NRC Staff responded in several ways to the cheating. The Staff made four investigations and filed four separate reports of those investigations. The Staff also voided the April NRC examination, administered new examinations in October, and revised its procedures for proctoring and grading. See ¶268, above.

289. The Staff’s investigation was begun by the Staff’s Office of Auditor and Inspector; however, Chairman Palladino soon directed that the investigation be transferred to the Staff’s Office of Inspection and Enforcement (OIE). Tr. 25,279-281 (Baci). The Office of Auditor and Inspector then wrote a final report (Staff Ex. 24) and turned over the information it had gathered to OIE (Resner, ff. Tr. 25,035 at 3). OIE conducted three subsequent investigations. The first was of the cheating by O and W. The Staff investigators interviewed O and W three separate times; during the third interview, O and W confessed. Staff Ex. 26 at 1-2. The Staff then obtained sworn statements from both O and W (*id.* at Encl. 4, 5) and took steps to insure that neither would continue in licensed duties at TMI (*id.* at 50). The Staff did a thorough and effective job of investigating O and W.

290. The second goal of the first investigation was to determine whether the cheating was limited to O and W. The Staff inspected the ATTS, RO and SRO examinations turned in by candidates other than O and W. The Staff found no improprieties. *Id.* at 1. The Staff also interviewed persons who sat close to O and W, and persons who had failed the NRC examination. Ward, ff. Tr. 25,274 at 7. The Staff did not, however, interview either C or Mr. I. Tr. 25,292, 296 (Baci). C sat directly behind O and W during the RO examination and was in a position to observe the cheating. Lic. Ex. 83. Mr. I sat directly behind O and W on both the RO and SRO examinations and was equally well positioned to observe the cheating. *Id.* Mr. Ward testified that at the time of the first

investigation the investigators did not have a seating chart available and hence did not know who sat behind O and W. Tr. 25,290-291 (Ward). However, W told the investigators during the first investigation that Mr. I had sat directly behind him (TMIA Ex. 55 at 2), and A told the investigators during the first investigation that he (A) had sat next to C, which placed C behind O and W (Tr. 25,292 (Baci)). Also, the investigators did not ask the persons who were interviewed, and who sat next to O and W, specifically whether these persons saw O and W pass papers, whisper, or otherwise cooperate; they asked them only whether, in general, they had seen any cheating during the examination. Tr. 25,293-294 (Baci).

291. During the first investigation, a management representative was present at the interviews. See ¶¶ 186-187, above. This presence "inhibit[ed] the free flow of information." *Id.* It also prevented the investigators from receiving evidence of management involvement on a confidential basis. *Id.* The effect of management's presence at the first investigation was probably not cured by excluding management from the subsequent investigations; a person who had withheld or falsified information at the first investigation would have been unlikely to admit later that he had done so.

292. The Staff's second investigation was launched as a result of YY's allegations concerning Mr. Ross. See ¶142, above. The Staff interviewed YY, Mr. Ross, and other operators who could have been expected to have knowledge relevant to the allegations. Staff Ex. 27 at 1-2. The Staff investigators concluded that they could not corroborate YY's allegations. *Id.* at 46. The Staff did not examine the answer key in arriving at this conclusion, or attempt to assess the credibility of the persons involved. *Id.* During the second investigation, KK revealed that he had received a telephone call during the April NRC examination from a person identifying himself as U. *Id.* at 2; ¶¶ 123-129, above. The Staff compared the question KK said he had been asked with those on the NRC examination (Staff Ex. 27 at 31); the Staff interviewed Mr. Toole (*id.* at 32-33); Mr. Ross (*id.* at 34); U (twice; *id.* at 36-38, 44); QQ (*id.* at 39); P (*id.* at 40-41); T (*id.* at 42); and O (*id.* at 43). Although the telephone call to KK remains a mystery, the Staff's investigation of it was thorough.

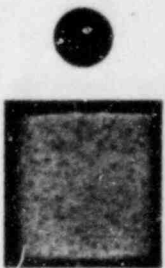
293. The second investigation also included the rumor about U being stationed in the vicinity of the examination room to aid examinees, and the rumor that he was stationed there with the approval of management. *Id.* at 3. The Staff concluded that there was no information to substantiate either of these rumors. *Id.* The record is insufficient to show what steps the Staff took to investigate them. The Staff does not appear to have asked U specifically whether he "unknowingly" offered help to anyone in the hall. *Id.* at Encl. 12; ¶117, above. Nor was Mr. Husted asked why he decided to furnish his office to U (Staff Ex. 27 at 16). Nor were the TMI reviewers asked whether they observed U's activities in the office area. See ¶198,

above. The final item considered in the second investigation was the comment by Mr. I. He had said, apparently, that although O and W had been fired, "the people responsible for their cheating were still around." Staff Ex. 27 at 3. When the Staff interviewed Mr. I, he said that his remark had meant only that O and W should have been better prepared by the Licensee for the NRC examination, not that he "knew of other people who cheated." *Id.* at Encl. 9. The Staff accepted his explanation and apparently did not pursue this item further. *Id.* at 3. It is unclear to what extent the Staff investigated the rumors about U writing on his hand or taking crib sheets into the examination. The Licensee's investigation of these rumors is described above in ¶130.

294. The second investigation also produced the statement by P about Mr. Husted's solicitation of an answer in the unproctored room. See ¶102, above. P's statement was not included anywhere in the Staff's reports because the Staff did not consider the incident an act of cheating; the Staff said it was only "attempted" cheating because P did not supply the answer. Tr. 25,320 (Ward). The Staff did not tell the Licensee of P's statement (Tr. 25,418-419 (Ward)) and did not confront Mr. Husted with it. Tr. 25,317 (Ward). Mr. Ward, when asked to explain his position on this point, said that he did not report Mr. Husted's solicitation because it "was not directly relevant to the main thrust of this . . . second investigation, which was management involvement . . ." Tr. 25,417 (Ward).

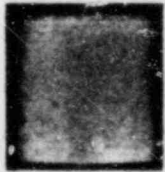
295. The Staff's third investigation was devoted to the telephone call to WW during the Kelly examination, and to Mr. Shipman's admission that he had supplied an answer to another operator at the coffee stand. Staff Ex. 28 at 1. Both of these events were discovered by the Licensee, which had begun its own investigation after the first and second NRC investigations had been completed. *Id.* The NRC investigators had interviewed WW in the second investigation, but the NRC investigators had not asked him about any examination other than the NRC examination. *Id.* at Encl. 1. WW said that if the investigators had asked him about the Kelly examination, he would have told them about the telephone call. *Id.* During the third investigation, the NRC investigators interviewed WW specifically about the telephone call. *Id.* WW said he did not know the identity of the caller, and did not realize at the time of the call that the question asked was on the Kelly examination. *Id.* Lacking further leads, the investigators did not pursue the matter further. Tr. 25,333 (Ward).

296. The other portion of the third investigation concerned Mr. Shipman at the coffee machine. This incident is described in ¶¶ 94-99, above, and the Licensee's response to it is described in ¶¶ 192-194, above. Mr. Shipman told the NRC investigators the same thing he told Mr. Hukill: that he (Mr. Shipman) could not remember the question, the questioner, or the specific day on which the question was asked. Staff Ex. 28 at 5-7.



As a result of this interview, and of Mr. Shipman's inability to remember the questioner when shown a list of the persons in the smokers' room (Tr. 25,363 (Baci)), the Staff decided to take no further action. The investigators concluded: "Lacking any logical leads, the NRC plans no further investigative action in this matter." *Id.* at 8. Of course, there were logical leads. There were only eight persons in the other examination room, from which Mr. Shipman's questioner apparently came. Lic. Ex. 83. It would have been a simple matter to interview them. When the Staff was asked why the eight were not interviewed, Mr. Ward said that five of the eight already had been asked in earlier investigations whether they were aware of any cheating. Tr. 25,364 (Ward). The questions posed to these five, however, had been general. The questions had not asked specifically about Mr. Shipman. Tr. 25,366-367 (Baci). Therefore, the questions were susceptible to the misinterpretation and vagueness described above in ¶192. The other three persons in the other room were not interviewed at all. The Staff said that five of eight was a "representative number," and that cost-benefit constraints limited further effort. Tr. 25,371 (Ward).

297. The OIE is also responsible for monitoring the Licensee's annual requalification program. Tr. 25,633-634 (B. Wilson). This includes the administration of that program. *Id.* After Mr. Trunk had completed his study of cheating on the weekly quizzes (see ¶¶ 26-27, 200, above) Mr. Trunk's conclusions were available to the Staff. Mr. Trunk concluded that cooperation appeared to have occurred. See ¶26, above. The NRC Staff did not, however, pursue this information. Mr. Ward explained the Staff's reason in his direct testimony. He made the following points: First, that Mr. Trunk had found three instances in which there might have been cheating; second, that "in response to questions posed by the Staff, Licensee's counsel indicated that two of the answers which appeared to indicate cheating were suspicious, but not conclusive"; third, that the third instance could not be explained; fourth, that "based on OIE's review of Professor Trunk's report, we find his methodology and analysis adequate." Ward, ff. Tr. 25,274 at 3-4. Mr. Ward was asked about these points on cross examination. First, Mr. Ward was shown the report from Mr. Trunk dated October 14, 1981. Lic. Ex. 70E. This was the report which discussed G's and H's similar definitions of Bernoulli's equation, and which concluded that "some cooperative effort did take place." *Id.* Mr. Ward testified that he had not seen that report before it was shown to him on the witness stand. tr. 25,336 (Ward). He said that the statement in his direct testimony about instances which were suspicious but not conclusive referred to Mr. Trunk's earlier report dated October 1, 1981. Tr. 25,337 (Ward). Mr. Ward was also asked about the NRC Staff's review of the investigation which Mr. John Wilson had done to follow up on Mr. Trunk's reports. Mr. Baci responded, and said that the review was limited



to looking at copies of some of Mr. Wilson's interview reports while Mr. Baci was in Mr. Wilson's office. Tr. 25,399-400 (Baci). Mr. Baci said that he looked at the reports because Mr. Wilson asked him to do so. *Id.* In response to a direct question by me, Mr. Ward admitted that no one in his office had made an independent comparison of the parallel answers given by G and H. Tr. 25,443-444 (Ward). Mr. Ward explained why the Staff did not devote more effort to these matters. He said:

We decided, based on the resources available to us, the lack of immediacy to the examination in which we had the greatest interest — that is, the April examinations — that it was more remote. Based on that, we elected to take no further action."

Tr. 25,338 (Ward). Mr. Ward added:

"As we go backwards in time [from the NRC examination] it becomes more and more remote to us . . . and it becomes less useful for us on a cost-benefit basis to commit resources to it."

Id. at Tr. 25,343.

298. My conclusions on the Staff's investigations are as follows. First, the Staff did a thorough job of investigating the cheating by O and W. Beyond these two matters, however, the Staff's performance was uneven. The Staff's first investigation was not sufficiently thorough to determine whether other operators saw O and W cheat. Also, that investigation was conducted with management present at the interviews. Management's presence was unwarranted, it burdened the flow of information, and it prevented the Staff from receiving information in confidence. These disadvantages should have been enough to convince the Staff to exclude management.

299. In the second investigation, the Staff interviewed the individuals who had information about YY's allegations, but the Staff did not analyze the changes to the answer key. Those changes had been the basis for one of YY's allegations. Nor did the investigators follow up in very much detail the rumor about U being stationed in the hall, or follow up the rumors about U writing on his hand or using crib sheets. Given the limits on the Staff's resources, these steps may not have seemed worthwhile at the time of the Staff's investigation.

300. A lack of resources cannot explain the Staff's attitude about Mr. Husted, however. It is simply not acceptable to consider Mr. Husted's solicitation of P — which the Staff said Mr. Husted made — as other than cheating. P's failure to provide Mr. Husted an answer does not change what Mr. Husted did. There is no ethical or moral difference between an attempted solicitation and a successful one. Mr. Ward's statement that the second investigation's "main thrust" was management involvement, and therefore that the solicitation was "not directly relevant," cannot be taken seriously. An instance of cheating which would have been

relevant to the first investigation, and to the third investigation, does not become irrelevant because it came up during the second investigation. The Staff should have reported this incident, and the Staff should have followed up on it by confronting Mr. Husted with P's statement.

301. The Staff also cited its lack of resources as a reason for not following up on the Shipman incident. As stated above, it would have been a simple matter to have asked the eight persons in the other examination room whether they had received an answer from Mr. Shipman. In view of the strong likelihood that one of the eight persons cheated, the cost-benefit argument fails. There was a strong lead and a narrow field of suspects. The Staff's decision not to pursue this lead was clearly wrong.

302. The last conclusion concerns the Trunk reports. The Staff's response to those reports was to not read them. The Staff never made an independent comparison of the answers of G and H, nor, apparently, of W and GG. Mr. Ward had never seen the fourth report, which contained the parallel definitions of Bernoulli's equation, before he testified at the hearing. The Staff seems simply to have taken Mr. John Wilson's word for the fact that the parallels were "suspicious, but not conclusive." The lack of basis for Mr. Wilson's views is revealed above in §§ 202-219. Mr. Ward's statement that "as we go backwards in time" the incidents in the Trunk reports became "more remote" was not based upon any knowledge of the reports. The second round make-up for Category T, upon which there were numerous similar answers, was given on March 27, 1981 (see ¶246, above); the NRC examination was given less than one month later (see ¶139, above). The third round make-up for Category T, upon which there were also similar answers, was given on June 25, 1981 (see ¶67, above), which was two months *after* the NRC examination was given. In fact, the cheating on the make-ups was very close in time to the cheating on the NRC examination. The similarities between the answers of G and H, and of W and GG, were obvious from the Trunk report; and Mr. Trunk's conclusions were also obvious. The Staff's decision not to pursue this evidence was explained only by citing costs and benefits. In the face of evidence as clear as that in the Trunk reports, costs and benefits cannot justify inaction. The Staff should have pursued this evidence.

III. CONCLUSIONS AND RECOMMENDATIONS

303. The conclusions and recommendations presented below concern three different kinds of interests: those of individuals; those of the Licensee; and those of the NRC Staff. Because these interests are different — particularly the interests of the individuals — different considerations

are appropriate in deciding what conclusions and recommendations to make respecting them. For example, an individual has an interest in maintaining his employment, and can expect not to lose his employment absent a showing of serious misconduct. The Licensee's interest is a corporate interest. In this case that interest is in being authorized to restart TMI-1. In pursuit of that interest the Licensee has the general burden of proving to the Licensing Board and the Commission that the authorization should be granted. The NRC Staff has a governmental interest in its own procedures, action, and decisions in the matters over which it exercises regulatory control. It has the general burden of proving that these procedures, actions and decisions were adequate at TMI-1.

A. CONCLUSIONS AND RECOMMENDATIONS: INDIVIDUALS

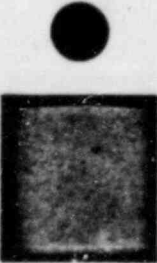
304. The individuals who have been implicated in cheating or other misconduct are O, W, G, H, GG, MM, U, VV, Mr. Shipman, and Mr. Ross. Their actions differed widely. The actions occurred on different examinations, under different circumstances, and were different in character. Separate conclusions and recommendations are made for each individual.

O and W

305. O and W both engaged in a pattern of cheating over a period of time. They also conspired to cheat, by agreeing to do so before examinations were given. They both lied to NRC investigators during their first two interviews. When they testified in this proceeding neither was forthright under oath. O, in particular, still fails to recognize the character of his acts.

306. O and W were both fired when their guilt was established. Both have found other employment. In the case of O, something stronger than dismissal will be required to convince him that the NRC licensing process is important. O's attitude was not unique to himself, although he seemed to express it more clearly than others.

307. O and W appear to have violated two sections of the United States Criminal Code. The first, 18 U.S.C. §1001, makes it unlawful to knowingly falsify or conceal a material fact, or make false statements or representations of a material fact in any matter within the jurisdiction of a department or agency of the United States. The elements of this offense are (1) a statement, (2) falsity (materiality), (3) specific intent, and (4) agency jurisdiction. The second is 18 U.S.C. §371, the conspiracy statute.



Persons indicted under this statute can be charged with conspiracy to defraud the United States, with conspiracy to commit an offense against the United States, or with both. The elements of this offense are (1) an agreement between two or more persons, (2) an unlawful purpose, and (3) an act by one or more of the conspirators to further this purpose. The unlawful purpose can be to defraud the United States or to commit an offense against the United States.

308. Examples of false statements prohibited by §1001 are the following: concealing material facts relating to a patent application, *United States v. Markham*, 537 F.2d. 187 (5th Cir. 1976); submitting false statements in response to inquiries from the Securities and Exchange Commission, *United States v. DiFonzo*, 603 F.2d. 1260 (7th Cir. 1979); filing a false complaint with the Federal Bureau of Investigation, *United States v. Lambert*, 501 F.2d. 943 (5th Cir. 1974); signing false names to civil service examinations, *United States v. Salazar*, 293 F.2d. 442 (2d Cir. 1961); stating falsely to the Nuclear Regulatory Commission that security guards had been properly requalified on firearms, *United States v. Barry*, Case No. 78 CR 28 (W.D. Wis. 1978).

309. The facts in the *Salazar* case are closest to the conduct by O and W. In *Salazar*, the defendant was charged with conspiracy to violate 18 U.S.C. §1001 by taking civil service examinations for ten of his fellow post office employees and signing identification cards and declarations of honesty in their names. Although the court remanded the case because of prejudicial statements by the trial judge, the court found that the materiality and jurisdiction elements of the offense had been clearly established. 293 F.2d. at 445. In general, the test for the materiality of a false statement is "whether the statement has a natural tendency to influence or was capable of influencing the decision of a tribunal in making the determination required to be made." *United States v. DiFonzo*, 603 F.2d. at 1266. A materially false statement is one "calculated to induce action or reliance by an agency of the United States." *United States v. East*, 416 F.2d. 351, 353 (9th Cir. 1969). The copied answers on the NRC examination were materially false in the sense that the Commission would have relied upon them to evaluate the operators' abilities. While the copied answers are not false in the sense of "incorrect," they are false under this statute because they misrepresent the knowledge of the examinees. Such a misrepresentation impairs one of the Commission's functions, which is to evaluate the operators. As the court in *Lambert* noted, "perversion of a governmental body's function is the hallmark of a §1001 offense." 501 F.2d. at 946.

310. Because of the generally disrespectful attitude at TMI-1 toward the NRC examination, the other acts of cheating or attempted cheating which occurred during the examination, the unrepentant posture of O, W,

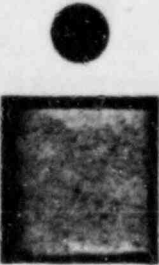
and some of the other operators, and the threat to the public health and safety posed by unqualified operators and supervisors, I believe the Commission should recommend criminal prosecution of O and W.

G and H

311. G and H also engaged in systematic, extensive cooperation over a period of time. The evidence of their cooperation was clear, both from the number, and the nature, of their similar written answers. Despite this clear evidence they denied to Mr. Wilson that they had cooperated and they also denied it on the witness stand. Their denials were wholly implausible. The only mitigating factor concerning G and H is the possibility that they may have thought, because of the loose administration of the weekly quizzes, that cooperation was acceptable. The stance they took at the hearing, however, and the stance which the Licensee took, was to deny that they were, or could have been motivated by such a thought. The Licensee and these individuals took the position that cooperation on the quizzes was cheating, and then contended, in the face of overwhelming evidence to the contrary, that no cheating occurred. The fact is that G and H are guilty of cheating as they and the Licensee have defined cheating. I see no alternative to concluding, and recommending, that the Licensee be prohibited from using G and H to operate TMI-1.

GG, W, and MM

312. On one weekly quiz, GG, W, and MM gave stilted, unnatural, virtually identical answers with the same misspelling. The correct answers of the two other operators who took this same quiz at the same time were expressed in natural language wholly different from that used by GG, W, and MM. The evidence of cooperation is therefore very strong. MM's participation, however, is limited to a brief answer to one question. MM could have copied lesson materials, although the possibility that he did so independently of GG and W is slight because of the wholly different answers given by S and Y, who presumably would have had access to the same materials. With respect to MM, I believe the brevity of his involvement argues against any strong sanction. He was never called to testify, and so had no opportunity to respond to questions from the parties. I recommend that no action be taken against MM.



313. With respect to GG the issue is more difficult. The similarities between GG and W were more extensive than the similarity involving MM, were not explained despite testimony on the witness stand, and apparently cannot be explained. In GG's favor is the fact that he was comparatively forthright in his testimony. He stated that the quizzes were not taken seriously by the instructor or the candidates, that talking occurred, and that instructional materials were present. He gave me the impression that he did not believe, at the time of the quizzes, that cooperation in such an atmosphere was a serious matter. Also in GG's favor, in comparison to G and H, is that GG's cooperation was limited to a single quiz. There is no evidence that GG systematically cooperated over a period of time. I do not believe that GG's conduct was so serious that he should be prevented from performing licensed duties at TMI-1. Some lesser sanction might be appropriate, but the amount of discretion in formulating it is very great. I do not have the information necessary for exercising that discretion. Therefore, I make no recommendation regarding a lesser sanction.

Mr. Shipman

314. Mr. Shipman gave a single, spontaneous answer at the coffee machine to a person who Mr. Shipman believed was taking the NRC examination. The discipline imposed by the Licensee was to place a letter of reprimand in Mr. Shipman's file. In view of Mr. Shipman's position and responsibility, this discipline may seem mild. However, discipline is inherently discretionary. One must consider, as the Licensee did, Mr. Shipman's employment record and other facts. I cannot say that this discipline fell wholly outside the range of what is appropriate to Mr. Shipman's conduct at the coffee machine.

315. The more serious problem with Mr. Shipman is that he does not appear to be telling the truth about what he remembers. Mr. Shipman's statement that he cannot remember his questioner proved to be inconsistent with the circumstances under which the question was asked, with Mr. Shipman's responsibility and background, and with Mr. Shipman's own testimony. The evidence shows, in my view, that Mr. Shipman is protecting someone. This presents the following situation: Mr. Shipman cheated; another person, not named, also cheated; Mr. Shipman has failed to give a credible reason for not naming that person. On the record as it now stands, Mr. Shipman's responsibility to name his questioner, or give a credible reason why he cannot name him, has not been met. It is unacceptable for

such a responsibility not to be met. I conclude, and recommend, that the Licensee be prohibited from using Mr. Shipman to operate TMI-1 until the Licensee can show that this responsibility has been met.

Mr. Husted

316. The preponderance of the evidence showed that Mr. Husted solicited an answer from P in the unproctored room. The evidence is fully described above. However, the evidence amounted to Mr. Ward saying that P said that Mr. Husted made the solicitation. Because of Mr. Ward's credibility, and because Mr. Ward's description of P's statement was corroborated by P's deposition, and by P's statements to the NRC investigators, I found that P said what Mr. Ward said that P said, and I found that what P said was true. Thus, I found that Mr. Husted made the solicitation. Mr. Husted denied making the solicitation, but his flippant demeanor and general lack of credibility deprived his denial of any weight.

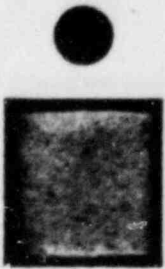
317. The evidence of Mr. Husted's solicitation establishes only a single act. That act is not more culpable than Mr. Shipman's act of giving a single answer at the coffee machine. With respect to Mr. Shipman, I have already said that a letter of reprimand seemed within the acceptable range of discipline for a single act of cheating. Mr. Husted, however, refused to cooperate with the NRC investigation. He appears to have deliberately withheld information from the NRC investigators because the investigation annoyed him. He "did not like the way the investigation was conducted." I cannot see how Mr. Husted's attitude can be acceptable, particularly on the part of a training instructor. In sum, Mr. Husted solicited an answer from P; he appears to have withheld information from the NRC investigators; and he displayed an attitude toward the hearing and the investigators which was unacceptable. Is this enough to exclude Mr. Husted from licensed duties? Or from the Licensee's training program? The only way to answer that question is to have some standard against which to measure the seriousness of these deficiencies. The Licensee's employees do have an obligation to cooperate forthrightly with public regulation, and Mr. Husted did not meet that obligation. Once that is said, however, there remains the problem of deciding what to do about Mr. Husted's failure to meet it. Once again, I find myself without sufficient guides — this time in the form of standards — for arriving at a solid conclusion. Because the evidence that Mr. Husted made the solicitation is subject to at least a small doubt, and because I can find no reliable standard for judging the seriousness of his poor attitude and lack of cooperation with public regulation, I cannot conclude or recommend that he should be removed from

licensed duties. A lesser sanction is no doubt appropriate. However, as in the case of GG above, the lesser sanction requires discretion, and I do not possess the information necessary to exercise such discretion. Therefore I make no recommendation regarding a lesser sanction.

U

318. U spent the two days following his NRC examination in Mr. Husted's office, where U said he was studying for an oral examination scheduled to be given four to six months later. There was a widespread rumor that U was available in the hall to look up answers for examinees. U approached OO in the hall and made an offer of assistance. On one of these same two days, KK received a telephone call from a person identifying himself as U. The caller said he (the caller) was helping O on the NRC examination. The preponderance of the evidence showed that U made the telephone call. U testified that he would not have considered it cheating to give someone a brief answer on the NRC examination, and that he might have done so — without remembering it — when he was in the hall. There were also rumors that U wrote on his hand and took crib sheets into the examination. The evidence was insufficient to establish that U was stationed in the hall by the order of, or with the knowledge of, management.

319. U's conduct and attitude are clearly not acceptable. His conduct consisted of offering assistance to OO in the hall and, apparently, of making the telephone call to KK. The telephone call to KK was not an act of cheating because of the question asked, although the caller's stated intent was to cheat by helping O on the NRC examination. The rumors that U wrote on his hand and used crib sheets were not substantiated. So the evidence on U boils down to this: he offered assistance to OO; he appears to have made the telephone call to KK; he may have "unknowingly" supplied a brief answer to someone in the hall (which he would not have considered cheating); and all of this is consistent with the rumor that he was available to assist examinees. When these items are taken together they are very disturbing. When they are taken one by one, however, they appear less serious. The offer of assistance to OO was the only such offer established by the evidence; the evidence that U telephoned KK was not without doubt; and U never admitted that he actually helped anyone "unknowingly." In order for me to conclude and recommend that U be removed from licensed duties, I believe the evidence of his misconduct should be clearer in the individual instances. The offer of help to OO is the only act of misconduct supported by strong evidence. The



telephone call is not supported by strong evidence. It might be possible to conclude that the offer, plus whatever chance there is that U made the call, plus the rumors, and plus U's attitude, are sufficient in combination for removal from licensed duties. It would seem to be a matter of judgment whether one should insist upon strong proof of each item in a series, or whether one can accept an inference from the cumulative effect of the items taken together. I prefer to give U the benefit of the doubt, so I do not conclude or recommend that he be removed from licensed duties. I make no conclusion or recommendation regarding a lesser sanction for the same reasons as given above for GG and Mr. Husted.

VV and Mr. Ross

320. Mr. Ross and VV are members of the Licensee's management. As such, their acts are the Licensee's acts. Their conduct will be considered below in the discussion pertaining to the Licensee.

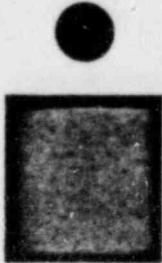
B. CONCLUSIONS AND RECOMMENDATIONS: THE LICENSEE

321. The conclusions and recommendations concerning the Licensee are presented in the following order: first, management's involvement in cheating; second, management's responsibility for the cheating; third, the Licensee's response to the cheating; fourth, the Licensee's training and testing program; and fifth, the Licensee's system for certifying candidates.

Management's involvement in cheating

322. There was no evidence that the Licensee's management encouraged, condoned, participated in, or knew of the cheating by O and W when it occurred. Nor is there any such evidence respecting any of the other individuals mentioned above. There is, however, the question whether the Licensee is responsible for the attitude which produced the cheating. That point is discussed below.

323. The evidence showed that Mr. Ross acted improperly in his review of the answer key to the NRC examination. Twelve changes to the key were examined at the hearing; in two of them there was no rational ground for the changes, there was an advantage to the reviewers' grades from the



changes, and the reasons which the reviewers gave for the changes were not credible. Remarks which Mr. Ross made at the time of the review revealed that Mr. Ross did not act in good faith when he advocated the changes, and Mr. Ross' testimony about the circumstances of the review was not credible. The review of the answer key also had the effect of keeping the proctor away from the examination room for a long time. The evidence of Mr. Ross' motive in keeping the proctor away was not as strong as the evidence concerning the changes to the answer key. However, as I indicated above, I found that the preponderance of the evidence on this point was that Mr. Ross intended to keep the proctor away in order to aid the examinees.

324. The NRC examination relies heavily upon the licensee's reviewers for answers to detailed questions. For the examination to achieve its purpose, the reviewers must act in good faith. If the reviewers use their greater knowledge to mislead the NRC examiner, then the examination can only measure the examinees' answers against the reviewers' suggestions. There is no longer a measure of whether the answers correspond to the facility or to its operation. For this reason, the obligation of good faith in the review of the examination is quite important. I conclude that the Licensee failed to meet that obligation in this case. I also conclude that the failure of the Licensee's management to meet this obligation of good faith shows an attitude toward the NRC examination which is not acceptable.

3.5. The question of management's involvement in cheating also poses the question of who should be considered "management." As stated above, the cheating on the NRC examination did not occur in the lower ranks of the operations staff. It occurred in the middle and upper ranks. The senior operations engineer, the two shift supervisors, and the shift foreman came from those ranks. Shift supervisors and shift foremen have important responsibilities for safety and for supervision. They function as managers while on duty, and their authority is important. With respect to the operations staff, the cheating involved the "management" of that staff. Adding G, H, and GG to the list of those who cheated shows that the operations staff was deeply compromised by the evidence in this case. Mr. Ross and VV, who functioned as the link between upper management and the operations staff, were also compromised. In light of the number of persons who were compromised, and their positions on the operations staff, I conclude that the overall level of integrity of the operations staff has been shown to be inadequate.

Management's responsibility for the cheating

326. To what extent was management responsible for the cheating? This was one of the most elusive, yet important issues at the hearing. The Licensee recognized that it is

difficult to assess . . . whether management has a properly serious attitude about the subject [of cheating], has inculcated its staff with a fundamental understanding of its responsibilities in this regard, and has established adequate lines of communication with its staff members to "reach" them on this subject.

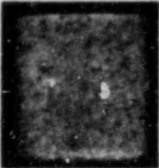

Lic. Proposed Findings ¶ 231.

327. The issue with respect to O, W, U, Mr. Husted and Mr. Shipman is whether the Licensee fostered an attitude which caused these persons to cheat. There was substantial testimony about this attitude, and the Licensee's responsibility for it. W testified that the NRC examination was "one we did not want to participate in . . ."; O said "I did not cheat because I did not copy any answers;" Mr. Shipman said that he regarded supplying an answer at the coffee machine as "insignificant;" and U said he did not consider it cheating to supply someone a brief answer "unknowingly" in the hall. The Licensee admitted that the "operators were quite bitter about the reexamination requirement . . ." *Lic. Proposed Findings* at 129. Several of them expressed this sentiment at the hearing. Tr. 25,686-87 (GG); Tr. 25,843 (HH); Tr. 26,308 (V); Tr. 26,559, 26,588-89 (I). See also ¶278, above. Mr. Hukill testified that he was "concerned with the . . . problem of the degree to which O and W felt 'driven' to cheat . . .," and he described his discovery of the "degree of the morale problem with the operators, and of a need to change their attitude with respect to the importance of the examination process." Hukill, ff. Tr. 23,913 at 11. Mr. Hukill said that he did

not know how much they were driven to cheat . . . There is obviously a very strong feeling from the top to the bottom up there to get that plant on the line . . . Did I push this to the point where these people felt they had to cheat to do it? I would like to say to myself that I am totally innocent, that I did not at all contribute to this; but I somehow cannot do that."

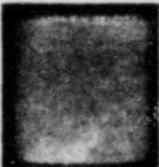
Tr. 24,010-011 (Hukill).

328. Management must have known of the widespread, negative attitude toward the NRC examination. The OARP program and the ATTS examination were designed to prepare the operators for the NRC examination. They were management's principal response to the deficiencies in



training which had been revealed by the accident at TMI-2. It was management's responsibility to insure that the training program succeeded, and to insure that the operations staff realized the importance of the reexamination requirement. I conclude that management failed in its responsibility to instill in the operations staff a proper attitude toward the NRC examination and that after an improper attitude had developed, management did not act to change that attitude. Although management did not encourage or condone the cheating, it permitted an attitude to develop which caused the cheating to occur.

329. Management's responsibility for the acts of G, H, GG, and MM depends upon the conditions under which the weekly quizzes were given. There was inadequate or non-existent proctoring, examinees cooperated, and the operators were uncertain whether they were expected to do their own work. The Licensee must have known that these conditions existed. If it did not, then its management was out of touch with the training program. Since the Licensee was relying upon the training program to overcome the deficiencies revealed by the accident at TMI-2, it is fair to suppose either that the Licensee was not out of touch with the training program, or should not have been out of touch with it. At the very least, the Licensee should have learned of the poor testing conditions on the weekly quizzes when the Licensee prepared for this hearing. Yet, the Licensee did not admit at the hearing that the poor testing conditions, and the operators' uncertainty whether they were expected to do their own work, might explain the similar answers on the weekly quizzes. The Licensee took the position that cooperation on the weekly quizzes was "cheating," and then denied that cheating had occurred. This made it necessary to pull the evidence of cooperation out of the operators on the witness stand. I concluded above, in the case of G and H, that the Licensee should be made to live with its characterization of G's and H's conduct. However, that does not mean that the Licensee is not responsible for it. In effect, the Licensee's litigation strategy was to maintain the credibility of its training program by characterizing the cooperation on the weekly quizzes as "cheating" when the operators did not regard it as such at the time it happened. The heavy reliance upon memorization in the training program, and the poor quality of many of the questions to which similar answers were given, encouraged cooperation. I conclude that the cooperation on the weekly quizzes was caused directly by the conditions under which the quizzes were given, and that the Licensee was responsible for those conditions and whatever "cheating" occurred.



330. There remains the question of management's responsibility for the acts of VV and O in 1979. When VV submitted as his own work answers written by O, VV was Manager of Operations at TMI-2. He had direct

line authority over O and was responsible for O's involvement. VV's acts, and his disrespect for the training program, were the acts and disrespect of a person in management.

331. There was no evidence that any of VV's superiors authorized VV to act as he did. VV's decision was apparently his own. There was, however, evidence that the training program was not taken seriously at this time. Mr. Arnold testified that a person missing class could make it up through "correspondence-type courses" (Tr. 23,627 (Arnold)), that VV had relied too much upon these courses (*id.* at 23,710), that during the year or two before the accident at TMI-2 training had not been a high priority (*id.*), and that at the time of VV's acts, management's effort to improve the training program "did not include the administration of the examinations in the way in retrospect it clearly would have desired to be the case." *Id.* at 23,890. This evidence shows that the Licensee allowed a poor attitude toward the training program to develop, and did little to change that attitude. The Licensee admitted that it "did not give sufficient attention to preserving the integrity of its training and testing program." *Lic. Proposed Findings* at ¶167. It is difficult to know whether VV's acts were caused by this attitude. Could VV honestly have believed that O's answers would be accepted by the training department? The Licensee's reaction was to grade the answers and credit the scores to VV. I conclude that the Licensee was responsible for VV's acts in only three respects: first, VV was a member of management and acted as such when he obtained O's assistance; second, VV set a poor example for his subordinates (the Licensee so admits; see *Lic. Proposed Findings* at ¶ 147); third, VV's attitude of disrespect for the training program was one which the Licensee allowed to develop and did little to change.

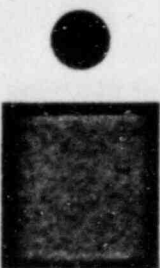
The Licensee's response to the cheating

332. As stated above, the Licensee responded to three different types of cheating. First, the cheating on the NRC examination in April of 1981; second, he cheating on the weekly quizzes; third, the cheating by VV and O in 1979. With respect to the first, the Licensee responded to the cheating by O and W, to Mr. Shipman's remark at the coffee machine, and to the various allegations concerning U. With respect to the second, the Licensee examined the similarities among the answers given to the weekly quizzes by all the operators who took them. With respect to the third, the Licensee's response had already been made in 1979, but the propriety of the response was made an issue at the hearing.

333. My conclusions on management constraint of the NRC investigation, management's dealings with O and W, management's meetings with employees, and management's response to U and Mr. Shipman are set out above in ¶¶ 185-191. I have nothing further to add here on those topics.

334. The Licensee's response to cheating on the weekly quizzes was Mr. John Wilson's investigation. Mr. Wilson testified at the hearing as an impartial investigator, but he presented only evidence which tended to show the absence of cooperation. He could not explain the similar answers of G and H on the question having to do with "two major areas of weakness noted by the Lessons Learned Task Force," but he did not regard the similar answers as evidence of cheating; he accepted an incorrect explanation from G on the question about the Rosemount transmitter (to which G gave a wrong answer similar to H's) without bothering to check G's explanation with the training department; he could not explain the similar wrong answers (which made no functional sense) by G and H on the generation of hydrogen gas, but he did not regard the similar answers as evidence of cheating; with respect to the similar wrong answers of G and H saying that radiation monitors were located in the control room, he refused to admit that the answers were even similar; in order to avoid finding that the uniquely similar definition of Bernoulli's equation by G and H was evidence of cheating, Mr. Wilson gave misleading testimony on how G and H said they learned the definition; to explain the fact that G and H alone showed a consistent pattern of similar answers on several different examinations, Mr. Wilson advanced the theory that copying causes one to pass, that cooperation would have produced more similarities than were found (similar answers were found on 8 points out of the possible 13.5), and that if similar answers were memorized on one quiz they would have been memorized on another. Mr. Wilson also failed to consider the highly relevant fact of how the weekly quizzes were administered in arriving at his conclusion. My conclusion is that Mr. Wilson did not conduct a thorough or impartial investigation of the cheating on the weekly quizzes. Since the Licensee's response to this cheating consisted of Mr. Wilson's investigation, and since Mr. Wilson's testimony was the Licensee's position, I conclude that the Licensee's response to the cheating on the weekly quizzes was inadequate. I also conclude that the Licensee's testimony on this point was very poor.

335. The Licensee's response to the cheating by VV and O has been explained above. Although the Licensee's reluctance to discipline O was understandable — VV was O's supervisor and O could be expected to comply with VV's request — the Licensee's acceptance of O's statement that O did not know the reason for VV's request had very little basis. The Licensee acted properly and in accordance with its procedures when it removed VV from licensed duties. However, the Licensee's contention that



VV was removed permanently from licensed duties because of his training deficiencies was not supported by the evidence. Nor was the Licensee's contention that the removal was a demotion, and known to be such by the operations staff, supported by the evidence. The Licensee should have informed the NRC of VV's cheating, and should not have written a letter to the NRC which stated falsely that VV had achieved a score on an examination which in fact had been achieved by O and VV together. The Licensee's failure to disclose VV's cheating to the NRC was deliberate, improper, and resulted in a false statement upon which NRC relied in reviewing VV's license. This conduct fell considerably short of being acceptable.

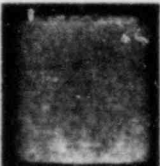
The Licensee's training and testing program

336. My conclusions on the Licensee's training and testing program are set forth above in ¶ 251. As that paragraph states, I conclude that the Licensee's training program was not an adequate response to the Commission's Order of August 9, 1979.

The Licensee's system for certifying candidates

337. The evidence on the Licensee's system for certifying candidates is set out in ¶¶ 252-258, above. My conclusions on that system are stated in ¶ 259.

Overall conclusions: the Licensee



338. There was no evidence that the Licensee's upper management encouraged, condoned, participated in, or knew of the cheating by O and W when it occurred. Nor is there any such evidence respecting cheating by any of the other individuals named in this report. However, the Licensee failed to meet its obligation to review the answer key to the NRC examination in good faith, and that failure showed an unacceptable attitude toward the NRC examination. The number, and the responsibility, of the persons on the Licensee's operations staff who were compromised by the evidence in this case was such that the overall integrity of the operations staff was shown to be inadequate. Although the Licensee did not encourage or condone the cheating on the NRC examination, it permitted an attitude to develop which caused the cheating to occur. The

cooperation on the weekly quizzes was caused by the conditions under which the quizzes were given, and the Licensee was responsible for those conditions. The Licensee's response to the cheating on the weekly quizzes was inadequate and its testimony at the hearing on that subject was not credible. The Licensee's response to the incident involving VV in 1979 was unacceptable because of the Licensee's lack of candor with the NRC. The Licensee's training and testing program was poorly administered, weak in content, ineffective in its method of instruction, and not an adequate response to the Commission's Order of August 9, 1979 CLI-79-8, 10 NRC 141.

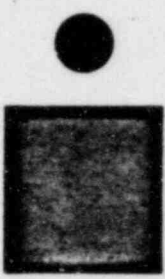
C. CONCLUSIONS AND RECOMMENDATIONS: THE NRC STAFF

Proctoring and grading

339. My conclusions on the proctoring and grading of the NRC examination are set forth above in §§ 226-227, 285. I concluded that the Staff was lax and that its procedures were inadequate. The Staff's new procedures for proctoring are also described above. They were used successfully during the examination at TMI-1 in October of 1981. They should be effective in preventing cheating on NRC examinations in the future if they are followed carefully.

Content of the examination

340. My conclusions about the content of the NRC examination are set forth in §§ 285-287, above. The content of the examination caused the examiner to rely heavily upon the Licensee for answers; it encouraged memorization as a method of preparing for the examination; and it undermined the examination's credibility in the eyes of the candidates who took it. Also, the twelve questions chosen as examples all tested the same form of knowledge. That knowledge consisted of being able to describe the details of design. The questions did not ask the operator to solve a structured problem — which is a higher form of knowledge — or to react to a new situation, which is a still higher form of knowledge. The operator's criticism of the examination was corroborated by the nature of these twelve questions. Because of the examination's heavy reliance upon the Licensee for answers, its encouragement of memorization, its lack of credibility in the eyes of the examinees, and the comparatively rudimen-



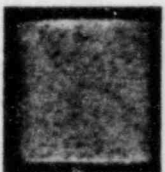

tary form of knowledge which the examination tested, I conclude that the April NRC examination was inadequate in its content. I recommend that the Commission take steps to assure itself that the type of knowledge which the examination tests is the type of knowledge which reactor operators should have. I also recommend that the Commission take steps to reduce the heavy reliance upon licensees for answers to the examination's questions, and to avoid having memorization be the primary means of preparing for the examination.

The NRC Staff's response to the cheating

341. My conclusions on the Staff's response to the cheating are stated above in ¶¶ 298-302. They can be summarized as follows: First, the Staff's investigation of the cheating by O and W, and the investigation of the telephone call to KK, were thorough and entirely adequate. The Staff should not, however, have permitted management to be present at the interviews conducted during its first investigation. Management's presence burdened the flow of information and prevented the Staff from receiving in confidence any evidence of management involvement. The Staff should have reported Mr. Husted's solicitation of Mr. P in the unproctored room; the Staff's stated reasons for not reporting this incident were inadequate. The Staff should have asked the eight persons who took the "A" examination in the smokers' room whether they received assistance from Mr. Shipman at the coffee machine. Finally, the Staff should have followed up on the Trunk reports, which contained clear evidence of cooperation on a series of weekly quizzes. Instead of doing so, the Staff did not read the Trunk reports carefully; the Staff relied instead upon Mr. John Wilson's characterization of this evidence as inconclusive.

Overall conclusions: the NRC Staff

342. My overall conclusions on issues concerning the NRC Staff are as follows: First, with respect to proctoring and grading the NRC examination in April of 1981, the Staff was lax and its procedures were inadequate. Second, the Staff's new proctoring procedures should prevent cheating on NRC examinations in the future if the procedures are carefully followed. Third, the content of the NRC examination in April was inadequate. Fourth, the Commission should take steps to assure itself that the NRC examination in fact tests the type of knowledge which reactor



operators should have. Fifth, the NRC Staff's investigation was adequate with respect to some of the cheating which occurred, but inadequate with respect to other cheating which occurred.

D. OVERALL CONCLUSION OF THE SPECIAL MASTER

343. As stated in ¶ 3, above, the broad issue in this proceeding is the effect of the record made here on the Licensing Board's Partial Initial Decision. It is the Licensing Board's duty, rather than my duty, to determine whether the Licensee's management and operations staff have demonstrated the necessary level of competence and integrity to operate safely Three Mile Island Unit 1. It is also the Licensing Board's duty to determine whether the NRC examination is a reliable measure of that competence. I offer no overall conclusion on these questions, although I recognize that some of the conclusions I have reached above have a great potential for determining the ultimate issues before the Licensing Board. I recommend that the Licensing Board adopt the conclusions I have reached above.

344. I also recommend that the Licensing Board receive, as part of the record in the restart proceeding before it, the record compiled in this proceeding before me. This record includes the transcript of testimony and the exhibits admitted into evidence.

Gary L. Milhollin
ADMINISTRATIVE JUDGE

Rendered:
Bethesda, Maryland
April 28, 1982

APPENDIX A
KEY TO LETTER
DESIGNATIONS OF INDIVIDUALS

Letter	Position	Name
A	Shift Supervisor	
B	Shift Foreman	
C	Control Room Operator	
D	Control Room Operator	
E	Shift Supervisor	
F	Shift Supervisor	
G	Control Room Operator	J. Banks
H	Control Room Operator	D. Mayhue
I	Shift Supervisor	B. Mehler
L	Control Room Operator	
O	Shift Supervisor (terminated)	
P	Shift Supervisor	
Q	Control Room Operator	
R	Control Room Operator	
S	Shift Supervisor	
T	Control Room Operator	R. Heilman
U	Shift Foreman	

V	Control Room Operator	
W	Shift Supervisor (terminated)	
X	Shift Foreman (terminated)	
Y	Control Room Operator	
Z	Shift Foreman	
AA	Control Room Operator	
GG	Shift Foreman	D. A. Smith
HH	Control Room Operator (terminated)	V. Ruppert
JJ	Shift Technical Advisor	
KK	Shift Technical Advisor	R. Lengel
MM	Shift Technical Advisor	
NN	Control Room Operator (terminated)	
OO	Control Room Operator	
PP	Shift Technical Advisor	
QQ	Shift Technical Advisor	
RR	Shift Technical Advisor	
SS	Control Room Operator (terminated)	
UU	Control Room Operator	
VV	Employee at TMI-2	



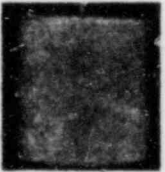
WW

Shift Technical Advisor

H. Crawford

YY

Employee at TMI-1
TMI Project
(terminated)



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman
Dr. Frederick P. Cowan
Ralph S. Decker

In the Matter of

Docket Nos. 50-329 OM
50-330 OM
Docket Nos. 50-329 OL
50-330 OL

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

April 30, 1982

The Licensing Board imposes, on an interim basis, certain conditions governing soils-related construction activities. The conditions, which are to remain in effect pending issuance by the Board of a Partial Initial Decision, require that Consumers Power Co. obtain NRC Staff approval before commencing certain activities and that, with limited exceptions, those activities be governed by a Staff-approved quality assurance program.

CONSTRUCTION PERMIT: AUTHORITY OF PERMIT HOLDER

Under normal circumstances, the holder of a construction permit may engage in construction activities in accordance with the principal architectural and engineering criteria and environmental commitments set forth in the application for the facility and the construction-permit hearing record, without seeking prior approval of NRC Staff.

CONSTRUCTION PERMIT: AUTHORITY OF PERMIT HOLDER

When a construction permit holder undertakes construction activities, it does so at its own risk; the construction is subject to Commission approval before an operating license may be granted. 10 C.F.R. §50.57.

TECHNICAL ISSUE DISCUSSED:

Quality Assurance

**MEMORANDUM AND ORDER
(Imposing Certain Interim Conditions
Pending Issuance of Partial Initial Decision)**

Pending before this Licensing Board are consolidated proceedings arising out of the NRC Staff's December 6, 1979 Order Modifying Construction Permits No. CPPR-81 and No. CPPR-82 (OM proceeding), and the application by Consumers Power Co. for operating licenses for Midland Nuclear Power Plant, Units 1 and 2 (OL proceeding).¹ The facility, currently under construction, consists of two pressurized water reactors located in Midland, Michigan.



The Modification Order was generated as a result of the excessive settlement which occurred with respect to the facility's diesel generator building and other plant structures. Hearings which have been held to date concern the soils settlement issues raised by the Modification Order, as well as related contentions of intervenors in each of the proceedings. (The majority of the soils settlement contentions have been sponsored by Ms. Barbara Stamiris, an intervenor in the OM proceeding.) As reflected in our Memorandum² of October 2, 1981, we have determined to issue separate partial initial decisions dealing with various aspects of the soils issues. The first, now under preparation, deals with quality assurance/quality control (QA/QC) and management attitude issues, as delineated in the October 2, 1981 Memorandum. With limited exceptions, the record on these matters was closed on February 19, 1982, following some thirty-five days of hearings.³ The second will deal with proposed remedial actions to correct the soils settlement problems. Hearings on these matters are not yet completed, partially as result of the as-yet developing positions of all parties on these questions.

With respect to the QA/QC and management attitude issues, proposed findings of fact and conclusions of law, and supplemental proposed findings and conclusions covering matters as to which the record was reopened,

¹ The proceedings were consolidated at the request of Consumers Power Co., the Applicant in the OL proceeding and the Licensee in the OM proceeding (hereinafter referred to as "Consumers"). See Prehearing Conference Order, dated October 24, 1980 (unpublished).

² Memorandum (Concerning Telephone Conference Call of September 25, 1981 and Applicant's Motion for Partial Decision), dated October 2, 1981 (unpublished).

³ Certain aspects of these issues will remain open until our second partial initial decision.



have been received from all interested parties, and Consumers has just recently filed its replies to each of the proposed and supplemental proposed findings and conclusions of the other parties. During the course of our review of these various filings, as well as of the entire record, we have determined that certain conditions governing further construction, as set forth in Section VI of this Memorandum and Order, should be put into effect immediately, pending the completion of our review and the issuance within approximately two or three months of our first Partial Initial Decision.⁴ Our reasons follow.

I. Background

Under construction permits such as are in effect for the Midland plants, a permittee may normally engage in construction activities in accordance with the principal architectural and engineering criteria and environmental commitments set forth in the application for the facility and the construction-permit hearing record, without seeking prior approval of the NRC Staff. The permittee undertakes such activities at its own risk; they are subject to Commission approval before an operating license may be granted. See 10 CFR §50.57; *Cf. Northern Indiana Public Service Co.* (Bailey Generating Station, Nuclear-1), CLI-79-11, 10 NRC 733 (1979), *reversed on other grounds, sub nom. People of the State of Illinois v. NRC* (D.C. Cir. No. 80-1163, July 1, 1981). The December 6, 1979 Modification Order would have modified this regime by prohibiting certain construction activities with respect to safety-related structures and systems affected by the soils settlement problems which have been aired in the ongoing consolidated proceeding. The prohibited activities could not be undertaken absent (1) submission of an amendment to the application seeking approval of remedial actions, and (2) issuance of an amendment to the construction permits authorizing the remedial actions.⁵ The Modifica-

⁴ This procedure has been previously utilized by the Appeal Board with respect to these very same reactors. ALAB-106, 6 AEC 182 (1973).

We note that, in a telephone conference call on April 28, 1982, the Staff indicated that it might reconsider certain earlier testimony expressing reasonable assurance that Consumers' QA program will be appropriately implemented with respect to future soils construction activities (Keppler, prepared testimony, p. 9, fol. Tr. 1864). It requested that we cancel certain near-term hearings which we had scheduled, and we did so. Memorandum and Order (Cancelling Evidentiary Hearings and Conference of Counsel or Representatives), dated April 28, 1980 (unpublished). As a result, our first Partial Initial Decision could be delayed beyond the time frame we are now projecting.

⁵ Modification Order, Part IV. The Modification Order has been admitted into evidence as Stamiris Exh. 3, Attachment 15 (Tr. 2479).

tion Order further provided that a hearing could be requested by Consumers or other interested person and, if it were, the Order would go into effect only as a result of an order made following the hearing.⁶

The construction activities which the Modification Order would have prohibited consist of the following:⁷

- (a) any placing, compacting, or excavating soil materials under or around safety related structures and systems;
- (b) physical implementation of remedial action for correction of soil-related problems under and around these structures and systems, including but not limited to:
 - (i) dewatering systems
 - (ii) underpinning of service water building
 - (iii) removal and replacement of fill beneath the feedwater isolation valve pit area
 - (iv) placing caissons at the ends of the auxiliary building electrical penetration areas
 - (v) compaction and loading activities;
- (c) construction work in soil materials under or around safety-related structures and systems such as field installation of conduits and piping.

Had the hearings in the OM proceeding not been requested, Consumers could not have undertaken any of the foregoing activities without submitting an amendment to its application and obtaining construction-permit amendments authorizing such activities. Since the hearing was requested, the normal construction permit authority remains in effect, and no construction permit amendment (or other NRC authorization) needs to be sought in order for Consumers to engage in the activities in question.

Both the Modification Order (Part V) and the Commission's Notice of Hearing of March 14, 1980 (45 *Fed. Reg.* 18214, March 20, 1980) stated that this Board is to consider and decide the following issues:

- (1) Whether the facts (concerning quality deficiencies) set forth in Part II of the Order are correct; and
- (2) Whether that Order should be sustained.

II. Facts Underlying Modification Order

One of the bases for the Modification Order was the allegation that there had been a breakdown in quality assurance related to soils. Another

⁶ Modification Order, Part V.

⁷ Modification Order, Part IV.

basis was that Consumers had not provided the information which the Staff and its consultants required to permit a thorough safety review of proposed remedial actions.⁸ As a result of these deficiencies, the Staff concluded that it did not have reasonable assurance that the safety-related portions of the Midland facilities would be so constructed that they could be operated without undue risk to public health and safety.

With regard to the first basis, Consumers and the Staff entered into a stipulation on June 5, 1981, in which Consumers conceded that prior to December 6, 1979 there were quality assurance deficiencies related to soil construction activities. Consumers agreed not to contest the Staff's conclusion that these deficiencies constituted a breakdown in quality assurance with respect to soils placement at Midland, and it acknowledged that the deficiencies constituted an adequate basis for issuance of the Order.⁹ With regard to the second basis for the Order, the Staff and Consumers entered into two additional stipulations in which Consumers agreed not to contest that, as of December 6, 1979, the NRC Staff had insufficient information to evaluate the proposed remedial actions for the auxiliary building, for the borated water storage tanks and underground piping.¹⁰

As a result of these stipulations, we are able at an early stage of our review to conclude, with respect to the first hearing issue, that the facts set forth in Part II of the Modification Order (to the extent they relate to soils QA deficiencies and the adequacy on December 6, 1979 of the Staff's information to review remedial actions) are correct and constituted an adequate basis for issuance of the Order. Consumers, the NRC Staff, and intervenor Barbara Stamiris each submitted proposed findings to this effect.¹¹

III. Facts Giving Rise to Interim Requirements

We have not yet completed our review of the second hearing issue — *i.e.*, whether and, if so, to what extent, the Modification Order should be

⁸ We are here making no findings and reaching no conclusions with respect to a third basis for the Order, an alleged material false statement. Hearings on that subject are not yet completed although we have heard testimony on the management-attitude aspects of the alleged statement.

⁹ Applicant/Staff Joint Exh. 1, following Tr. 1175, admitted at Tr. 1188.

¹⁰ Applicant/Staff Joint Exhs. 2 and 3, dated December 1, 1981 and February 9, 1982, respectively (Tr. 5447, 7164).

¹¹ Consumers Proposed Findings ¶ 35; Staff Proposed Findings, ¶¶ 236-237; Stamiris Proposed Findings, ¶ 10.

sustained. Consumers has described this issue as "whether the safety issues [giving rise to the facts set forth in Part II of the Modification Order] have been resolved so that the quality assurance program with respect to soils is now being properly implemented and there is reasonable assurance such implementation will continue through the construction process."¹² Ms. Stamiris has described it somewhat similarly, as "whether as a result of revisions, improved implementation, and other factors, this Board has reasonable assurance that the QA and QC programs will be appropriately implemented with respect to future soils construction and remedial activities".¹³ However, they reach different answers to this question.

Consumers asserts that, as a result of organizational and procedural changes which it has put into effect since the issuance of the Modification Order, its QA program is now being properly implemented. It urges us to find reasonable assurance that the future soils construction activities including the remedial actions taken as a result of inadequate soils placement will be accomplished in accordance with QA principles of public health and safety.¹⁴ On the other hand, although Ms. Stamiris concedes that Consumers' organizational changes represent a "positive response",¹⁵ she nonetheless concludes that the implementation of QA at Midland is inadequate¹⁶ and that the same kind of problems and weaknesses currently exist as had lead to problems in the past.¹⁷ She would have us put the Modification Order into effect and shut down soils-related construction immediately.¹⁸ The NRC Staff also gave its reasonable assurance that the QA program would be properly implemented,¹⁹ although at least one of its witnesses expressed some reservations (Tr. 2441-42 (Gallagher)).²⁰

We do not at this point in our review express any opinion with respect to those positions—except to note that none of them is baseless and all have evidentiary support. The resolution of this broad issue will, as we have seen, affect the degree to which and the manner in which soils-related

¹² Consumers Proposed Findings, ¶ 37 [*sic*; should be 36].

¹³ Stamiris Proposed Findings, ¶ 10.

¹⁴ Consumers Proposed Findings, ¶¶ 81-83.

¹⁵ Stamiris Proposed Findings, ¶ 222.

¹⁶ Stamiris Proposed Findings, ¶ 221.

¹⁷ Stamiris Proposed Findings, ¶ 225.

¹⁸ Stamiris Proposed Findings, ¶ 254; Part III.C.

¹⁹ NRC Staff Proposed Findings, ¶ 375.

²⁰ Mr. Gallagher stated that he supported Mr. Keppler's conclusions concerning implementation of the QA program "entirely" but added that he "would like to see some other things to be included" (Tr. 2455). See also fn. 4, *supra*, ¶ 2.

construction activities (and particularly remedial actions) will be permitted to continue.²¹

As background for our approach to this question, we deem it important to note that the QA/QC deficiencies which are addressed by the Modification Order are not the first instances where Consumers has experienced difficulty in properly implementing its QA/QC program. The Appeal Board pinpointed one such instance in ALAB-106 (fn. 4, *supra*), and it imposed conditions designed to alleviate the deficiencies which it found to exist. Later, questions were raised concerning the QA/QC organization being utilized for this facility. ALAB-132, 6 AEC 431 (1973); ALAB-147, 6 AEC 636 (1973); ALAB-152, 6 AEC 816 (1973). Subsequently, the Staff issued a show-cause order which was founded on other QA/QC deficiencies, and additional corrective actions were mandated. ALAB-283, 2 NRC 11 (1975), *clarified*, ALAB-315, 3 NRC 101 (1976). During that show-cause proceeding, the Appeal Board remarked that "non-compliance with the Commission's quality assurance regulations is * * * a problem which has plagued the construction of this facility." ALAB-270, 1 NRC 473, 476 (1975).²²

With this history before us, early in this proceeding we expressed concern about the adequacy of the potential safety impact of ongoing construction activities (Tr. 754-55). On the opening day of the hearing, the Staff responded to our inquiry by presenting testimony regarding soils-related construction of the type that would be going on during the period of time before we could issue a decision governing construction encompassed by the Modification Order.²³ From that testimony, it appeared to us that consumers was at that time consulting with and seeking approval of the Staff before engaging in any of the construction activities there under consideration—*i.e.*, installation of 20 permanent back-up interceptor wells in the area near the Service Water Structure and the Circulating Water Intake Structure, and surcharging of the two valve pits which are adjacent to each of the Borated Water Storage Tanks.²⁴ Although all of the

²¹ As we have pointed out (pp. 4-5, *supra*), the most stringent condition we could impose on those activities under the Modification Order would be to prohibit such activities pending submission of an amendment to the applications and issuance of construction-permit amendments authorizing remedial action. All or any portion of that condition could be put into effect. *Cf. Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), CLI-80-10, 11 NRC 438 (1980); *Wisconsin Electric Power Co.* (Point Beach, Unit 1), CLI-80-38, 12 NRC 547 (1980).

²² See also Board Exhibits 1A and 1B (Tr. 1875), which contain a summary of problems experienced at Midland since the start of construction.

²³ Testimony and Supplemental Testimony of Darl S. Hood, both following Tr. 1097.

²⁴ Hood, prepared testimony, p. 2. Those were the only two soils-related activities then under way or planned to be undertaken by Consumers in the near term (Tr. 1112).

outstanding questions raised by the Staff concerning those proposed remedial activities had not then been resolved, the Staff expressed its "reasonable assurance" that the activities would be performed in an acceptable manner.²⁵ We interpret that reasonable assurance conclusion as premised upon Consumers' affording the Staff the opportunity to review the proposed resolution of the unresolved questions.²⁶

In addition, Consumers advised us that, in February, 1980, it had voluntarily committed not to proceed with further remedial actions without Staff review and concurrence.²⁷ (Insofar as the record reflects, this commitment appears to have been an oral one, not reduced to writing prior to its incorporation into testimony in this proceeding.) That Consumers will provide the Staff with sufficient information to permit a thorough safety review is inherent in this commitment.

We find no indication in the record that Consumers has failed to honor this commitment. For its part, the Staff agreed that it would accept information through meetings and presentations rather than an amendment to the application. Beyond the two matters about which the Staff initially testified, the Staff has utilized this arrangement to approve such activities as construction of access shafts and a freezeway in preparation for underpinning the auxiliary building and feedwater isolation valve pits,²⁸ and any drilling activities near seismic Category I underground utilities and structures (Tr. 5485-86). During the hearing, Consumers agreed that the commitment would be extended to the matter of crack evaluation, a question which Consumers judged to be less important than does the Staff (Tr. 5735-38). As far as we are aware, certain additional remedial actions to which the commitment is being applied are currently under review or in progress.

From the present stage of our review, it appears that Consumers' voluntary agreement has resulted in adequate Staff surveillance of the proposed remedial actions covered thereby, prior to Consumers' commencement of the remedial actions. Consumers itself has acknowledged the usefulness to it of its consultation with the Staff prior to the initiation of remedial activities (Tr. 5660-61). At this time, we are making no changes to the procedures utilized under this arrangement.

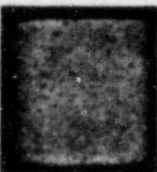

It is important to note, however, that Consumers' commitment does not

²⁵ Hood, supplemental testimony, p. 3. Subsequently, on December 10, 1981, the Staff approved the installation of 5 additional temporary dewatering wells. Staff Exh. 13 (Tr. 6901).

²⁶ Hood, prepared testimony, p. 3; supp. test., pp. 2, 3; Tr. 1113-14, 1119.

²⁷ Testimony of Gilbert S. Keeley, fol. Tr. 1163, p. 13.

²⁸ Letter dated November 24, 1981, from Darl Hood (NRC) to James W. Cook (CPC) (Staff Exh. 5, Tr. 5467).



extend to all the activities which Part IV of the Modification Order would have prohibited (Tr. 1202-1212, 1390). The scope of the oral commitment is not clearly defined. While it appears essentially to cover those major remedial actions within the scope of Section 1(b), but not activities falling within Sections 1(a) and 1(c), of Part IV of the December 1979 Order (Tr. 1420-1422), there is some ambiguity whether certain activities may fall within Section 1(b) or one of the other categories.

Although we have no objection to the Staff/Consumers working relationship for those portions of the remedial work to which the commitment applies, several matters of record cause us to be dissatisfied with the limited scope of activities covered. More specifically, as a result of the matters described in this section of this Memorandum and Order, augmented by the related information appearing in Part IV, we are of the view that certain activities outside the scope of Consumers' commitment but within the coverage of the prohibition in the Modification Order should be subject to prior Staff review and approval.

The first of these matters which gives us concern is that of underground piping. Consumers proceeded with work associated with underground piping which carries cooling water essential to safety without seeking or receiving formal Staff concurrence (Tr. 7784, 7788a). This work would clearly have been prohibited under Part IV, Section 1(c) of the Modification Order, and it could also be interpreted as falling within Section 1(b)(Tr. 7788c). The record is confusing as to whether the Staff regarded Consumers' commitment as in fact covering that type of remedial action (Tr. 7781-7783, 7788a-7790, 7894-7901).²⁹ The Staff expressed the opinion that underground piping should be covered by the commitment (Tr. 7788c, 7789, 7899). Underground piping was of concern to the Staff prior to its issuance of the Modification Order.³⁰ One reason we believe it essential that safety-related activities such as the rebedding of piping should have prior full Staff review and concurrence is that once such work is performed and the piping then recovered with earth, it is no longer accessible for inspection for such concerns as have been identified during the course of this hearing—e.g., corrosion (Tr. 7683-86, 7827-35), deformation (Tr. 7913-14), quality of foundation soils (Tr. 7911), pipe welds (Tr. 7652-56), and condition of pipe wrapping materials (Tr. 7860, 7914-15). Therefore, adequate QA/QC surveillance is fundamental to assuring safety. The Staff has expressed its desire, in fact, to review such matters as compaction criteria and procedures prior to the work taking place, and to be able to inspect the work while being performed (Tr. 7899). Moreover, the Staff

²⁹ We disagree with Consumers' response to Ms. Stamiris' Proposed Findings and Conclusions, ¶ 8, pp. 6-7.

³⁰ I.E. Rept. 79-06, dated April 4, 1979 (Stamiris Exh. 3, Att. 8, at p. 5).

has stated that it had insufficient soil-profile information to evaluate distortion in pipes buried in soils which have settled.³¹

The second reason for our requiring further Staff review and approval prior to the start of soils-related construction differs from the first in that it does not stem from a single type of construction activity. Rather, it pervades the entire spectrum of soils-related construction activities. As a result of Board questioning, we have some doubt whether, in the absence of Staff review and approval, Consumers would carry out certain remedial soils activities using appropriate QA procedures and principles. Its witnesses presenting the remedial plans for the auxiliary building were unsure of the manner in which QA principles would be applied to that operation (Tr. 5530-32). With respect to the engineering of the remedial actions, Consumers was able to describe the QA procedures it had already followed (Tr. 5718-20), but it also indicated that it did not consider the engineering a problem area and was therefore not applying any specialized procedures to those activities (Tr. 5622)—despite the fact that it had to formulate and rework its plans four different times before it obtained a system acceptable to the Staff (Tr. 5647-58). Consumers does not appear to have obtained Staff approval with respect to the engineering QA procedures which it had followed (Tr. 5750). Furthermore, Consumers seems to have a tendency to treat as many structures as possible as non-Q-listed (and, hence, as not subject to QA controls) (Tr. 5626, 5671-72).

For these reasons, we are not completely satisfied as to the extent to which QA plans and controls are to be applied by Consumers to underpinning activities. In particular, we are concerned about areas adjacent to, but not necessarily directly under, safety-class structures. These activities include boring of large diameter, closely spaced holes for soldier piles which would penetrate low shear-strength soil layers at elevations below the foundations of adjacent safety-class structures (Tr. 5674-79; 5765-71), and essentially all underpinning activities beneath the turbine building the failure or tilting of which might influence the safety or future seismic resistance of the adjacent safety-class structures (Tr. 6083-85; 7125-27). These potential QA/GC gaps lead us to believe that, at least in the near future, the commencement of safety-related activities of this type should be subject to the Staff's approval—particularly as to whether specific activities are to be covered or not covered by an appropriate QA plan.³²

³¹ Kane, prepared testimony, fol. Tr. 7752, p. 3.

³² We understand that Consumers later indicated that monitoring instruments would be placed before commencing underpinning activities to measure horizontal movements between the turbine building and adjacent structures "in response to questions raised by the Atomic Safety and Licensing Board". Memorandum dated March 11, 1982 from Darl Hood, Summary of March 8, 1982 Telephone Conversation Regarding Soil Spring Stiffnesses for Auxiliary Building Underpinning and Phase II Construction.

IV. Related Matters Substantiating The Need for Interim Conditions

Certain matters which have been the subject of notifications by various parties to the Board tend to accentuate what we regard as the need for the interim conditions we are imposing. These matters have not yet been the subject of evidentiary hearings, and we express no final view as to their accuracy or import. Nonetheless, we regard these matters as closely relevant to the facts on which we have taken evidence and pertinent to our determination that interim conditions should be imposed.

As one example of this type, representing an activity we believe should be covered by the commitment, the Board has been informed by way of a Consumers' Non-Conformance Report that a 42-inch diameter hole was drilled to a depth of 40 feet within the "Q" fill area, apparently without proper authority; without the development of, or adherence to, written procedures; without the participation of the On-Site Geotechnical Engineer; and without adequate QA/QC surveillance, if any.³³ We hasten to point out that we have not yet heard evidence on this report and express no view as to its accuracy. It appears, however, to describe the type of activity which is encompassed by the prohibition in Part IV, Section 1(a) of the Modification Order. Moreover, if the NCR is accurate, the activity would constitute a prime example of the kind of work which we believe should be subject to prior Staff review and concurrence.

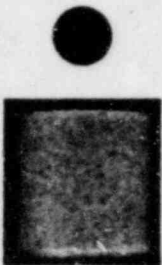
Additionally, we have also recently been notified of loose sands located in the plant fill north of the Service Water Structure and Circulating Water Intake Structure. This loose sand reportedly underlies about 500 feet of seismic Category I pipe. We understand that Consumers has decided to remove and replace this material to avoid potential liquefaction problems.³⁴ Once again, we express no view as to the validity of this information. But considering the vagueness as to the limits of Consumers' commitment and the apparent potential effect on public safety of these construction activities should the plant later be allowed to operate, we deem it necessary at this time to eliminate any uncertainty and to require that any remedial actions intended to rectify this matter receive full Staff review and concurrence before being undertaken.

Finally, the Board notes that the Staff has disagreed with Consumers³⁵

³³ NCR # M01-4-2-008 Rev. 1, dated February 25, 1982, transmitted to the Board and parties by letter dated March 12, 1982, from James E. Brunner, CPC. The Board requested that it be provided with audit reports of this type (Tr. 5975-76).

³⁴ Memorandum from Darl Hood, Notification of Loose Sands Beneath Service Water Piping, March 16, 1982. See also letter from James W. Cook to Harold R. Denton, Additional Information Concerning Safety Grade Buried Piping, March 16, 1982.

³⁵ Memorandum dated March 12, 1982, from Darl Hood, subject: Summary of March 10, 1982 Meeting Concerning Quality Assurance To Be Applied To Remedial Foundation Work.



over the extent of QA coverage and control of the underpinning activities beneath the safety-class and adjacent non-safety class buildings. The disagreement apparently has been resolved by Consumers' agreeing that essentially all underpinning activities would be subject to Q-controls, except for certain already completed activities and certain agreed-upon non-critical activities.³⁶

Although the Board recognizes that these disagreements may reflect genuine differences of interpretation of requirements in Appendix B to 10 CFR 50, we deem it important to public safety that, pending the completion of our QA review, the Staff's more conservative interpretation should apply to remedial work activities, some of which are, or shortly will be, in progress. Accordingly we have made the elements of that agreement part of this Interim Order. Again, while we express no views as to the validity of those matters brought to our attention outside the actual hearings, they represent the kinds of issues that were alleged in the December 6, 1979 Modification Order, and that were the subject of ongoing efforts by the Staff and Consumers to resolve them.

V. Description of Interim Requirements

As a result of the various safety problems which we have described in Section III, above, the potential and related problems described in Section IV, above, and the imminence of the commencement of additional safety-related work activities on remedial measures for the soils settlement problems which we have been considering, we find it necessary to act now to remove ambiguities in Consumers' commitment to obtain prior Staff approval for remedial measures. Pending the completion of our review of the record and issuance of a partial initial decision, we are requiring that the construction permits be amended to prohibit (in the absence of Staff approval) the same activities as would have been prohibited by Section IV of the Modification Order. (We are updating the requirement to take account of certain developments which have occurred since December 6, 1979.) This requirement would not apply to any of the activities as to which the NRC has already given its approval. Nor does it dictate the manner in which the Staff may exercise its review—*i.e.*, whether piecemeal (individual construction steps) or as an integrated package. In addition, for the reasons we have outlined, we are requiring that certain of these

³⁶ Letter, James W. Cook (CPC) to J. G. Keppler (NRC), dated April 5, 1982, subject: Quality Assurance for Remedial Foundation Work.

activities be governed by a QA plan.³⁸ We have pointed out that some of the material which we have considered in this order has not yet been the subject of a completed evidentiary hearing; indeed, the scope of our QA requirement is premised in part upon an apparent agreement between Consumers and the Staff contained in material of this sort. Letter of James C. Cook, fn. 36, *supra*. We expect Consumers and the NRC Staff to present testimony on these open items at a later evidentiary session.

We stress that in our forthcoming Partial Initial Decision we will reexamine the terms and conditions which we are here imposing on an interim basis. At that time, we may reaffirm, expand or remove them. Until such time, however, we find that the Modification Order should be made effective to the extent which we have described. We stress that we are *not* at this time requiring the submission or approval of any amendments to the applications for construction permits (as provided by the Modification Order). In our opinion, the Staff consultation and approval which we are requiring will achieve the substantive results we believe necessary without adding certain procedural requirements of an application for a construction permit amendment which, in the present context, do not appear to be necessary to attain the safety goals which we believe should be achieved.

VI. Order

Based on the foregoing, it is, this 30th day of April, 1982

ORDERED

That the Director of Nuclear Reactor Regulation, in accordance with 10 CFR §2.764(b), is authorized to amend Construction Permits CPPR-81 and CPPR-82 as follows:

- (1) Construction Permits CPPR-81 and CPPR-82 shall be amended to require that the permit holder obtain explicit prior approval from the NRC Staff (to the extent such approval has not already been obtained) before proceeding with the following soils-related activities, and that these activities, with the exception of those already approved by the NRC, and those that the Staff agrees are not

³⁸ To require a QA plan for safety-related remedial soils construction activities is consistent with the requirements of 10 CFR §50.34(a)(7). We note that the large-scale underpinning and other remedial activities which are being undertaken are sufficiently distinct from the activities contemplated during the construction-permit review as to warrant a supplementation of the applicable QA program.

critical, shall be controlled by a Staff-approved Quality Assurance Plan:

- (a) any placing, compacting, excavating, or drilling soil materials around safety-related structures and systems;
 - (b) physical implementation of remedial action for correction of soil-related problems under and around safety-related structures and systems, including but not limited to:
 - (i) dewatering systems
 - (ii) underpinning of service water building
 - (iii) removal and replacement of fill beneath the feedwater isolation valve pit areas, auxiliary building electrical penetration areas and control tower, and beneath the turbine building
 - (iv) placing of underpinning supports beneath any of the structures listed in (iii) above
 - (v) compaction and loading activities;
 - (c) construction work in soil materials under or around safety-related structures and systems such as field installation, or rebedding, of conduits and piping.
- (2) Paragraph (1) above shall not apply to remedial actions approved by the NRC Staff prior to the effective date of this Order, nor to any exploring, sampling, or testing of soil samples associated with determining actual soil properties on site which has the approval of the Director of Region III, Office of Inspection and Enforcement. These testing activities, however, shall be controlled by a Staff-approved Quality Assurance plan which includes procedures for controlling excavation or drilling activities more than 6-feet deep in "Q" areas.

In accordance with 10 CFR 2.760, 2.762, 2.764(a), 2.785 and 2.786, this Memorandum and Order shall be effective immediately upon issuance and shall constitute the final action of the Commission on the matters considered herein forty-five (45) days after issuance, subject to any review pursuant to the above-cited Rules of Practice. Exceptions to this Memorandum and Order may be filed by any party within ten (10) days after its service. A brief in support of the exceptions shall be filed within thirty (30) days thereafter (forty (40) days in the case of the NRC Staff). Within thirty (30) days of the filing and service of the brief of the

appellant (forty (40) days in the case of the NRC Staff), any other party may file a brief in support of, or in opposition to, the exceptions.

THE ATOMIC SAFETY AND
LICENSING BOARD

Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE

Dr. Frederick P. Cowan, Member
ADMINISTRATIVE JUDGE

Ralph S. Decker, Member
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland
this 30th day of April, 1982.

Judge Jerry Harbour, who has served as a technical interrogator and an alternate Board member during portions of the hearings concerning management attitude and quality assurance matters, and who has replaced Judge Decker for the forthcoming segments of the consolidated OL-OM proceeding (with the exception of the first Partial Initial Decision and orders, such as this one, which are integral to that Decision), supports the rulings and reasoning included in this Memorandum and Order.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Lawrence Brenner, Chairman
Dr. Jerry Harbour
Dr. Peter A. Morris

In the Matter of

Docket No. 50-201 OLA

NUCLEAR FUEL SERVICES, INC.,
AND
NEW YORK STATE ENERGY RESEARCH
AND DEVELOPMENT AUTHORITY
(Western New York Nuclear
Service Center)

April 30, 1982

The Licensing Board rules on two independent hearing requests on license amendment No. 31. The Board grants the motion of Nuclear Fuel Services, Inc. to withdraw its request for hearing, concluding that even though subsequently issued license amendment No. 32 clearly affected the same subject matter as license amendment No. 31, the Board's exercise of its power to modify amendment No. 32, pursuant to 10 CFR §2.717(b) was unnecessary on these facts. The Board also denies the hearing request of Dr. Irwin D. J. Bross, in its entirety, concluding that under the West Valley Demonstration Project Act, the Commission lacks the subject matter jurisdiction to consider those issues related to the Department of Energy's conduct of the West Valley Project which Dr. Bross seeks to litigate.

LICENSING BOARDS: JURISDICTION

Pursuant to 10 CFR §2.717(b), a licensing board may modify, as appropriate for purposes of pending proceeding, any order or action of staff related to the proceeding's subject matter (*Cincinnati Gas and Electric Co.* (Wm. H. Zimmer Nuclear Station), LBP-79-24, 10 NRC 226, 229-230 (1979)).




RULES OF PRACTICE: STANDING

A license amendment which grants a co-licensee precisely the relief which it seeks as a party to a pending adjudicatory proceeding deprives that party of standing to assert its claims in the adjudicatory proceeding. Such a licensing amendment is integrally related to the subject matter of the pending adjudicatory proceeding and may be modified by the Licensing Board hearing that proceeding, as it deems appropriate.

LICENSING BOARDS: JURISDICTION; NOTICE OF HEARING

Where it has been held that 10 CFR §2.717(b) applies, a notice of hearing relating to a licensing amendment need not be explicitly expanded as a prerequisite to the licensing board in that case exerting jurisdiction over a subsequent license amendment related to the same subject matter as the earlier proceeding.

RULES OF PRACTICE: STANDING

In determining hearing and/intervention rights under section 189(a) of the Atomic Energy Act of 1954, the Commission will apply judicial concepts of standing. *Public Service Company of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), CLI-80-10, 11 NRC 438, 439 (1980).

RULES OF PRACTICE: STANDING

To have "standing" in a court, one must allege both an interest arguably within the zone of interests protected by the statute and an injury that either has occurred or would arguably result from the action complained of. Under this "injury in fact" test a mere academic interest in a matter, without any real impact on the person asserting it, will not confer standing. *Portland General Electric Company* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610, 613 (1976).

NUCLEAR REGULATORY COMMISSION: JURISDICTION

The NRC lacks subject matter jurisdiction to consider the conduct of the West Valley Demonstration Project by the Department of Energy in formal licensing proceedings. Pursuant to Section 2(c) of the West Valley

Demonstration Project Act, Pub. L. No. 96-368, 94 Stat. 1347 (1980), NRC's review of the Department of Energy's conduct of the demonstration project is to be conducted on an informal basis.

ENERGY REORGANIZATION ACT: NRC LICENSING OF DOE FACILITY

Section 202 of the Energy Reorganization Act of 1974 specifically limits NRC jurisdiction over DOE-operated high-level radioactive waste storage facilities to those which will be operated on a "long-term" basis, meaning "tens to hundreds of years."

WEST VALLEY DEMONSTRATION PROJECT ACT: RIGHT TO HEARING

While DOE's conduct of the West Valley Demonstration Project itself may not be the subject of formal NRC licensing proceedings, DOE's conduct of the subsequent decontamination and decommissioning of the West Valley facility may be subject to full NRC regulation and licensing requirements. West Valley Demonstration Project Act, §2(a)(5), Pub. L. No. 96-368, 94 Stat. 1347 (1980).

APPEARANCES

Nuclear Fuel Services, Inc.:

Orris S. Hiestand, Jr., George L. Edgar, Frank K. Peterson, Esquires, Morgan, Lewis & Bockius.

New York State Energy Research and Development Authority:

Carmine Clemente, Howard A. Jack, Esquires; Phillip H. Gitlen, Esquire, White, Osterman & Hanna.

Dr. Irwin D. J. Bross, pro se.

United States Department of Energy:

R. Tenney Johnson, Warren E. Bergholz, Jr., Gregory Fess, Esquires.

United States Nuclear Regulatory Commission Staff:

James R. Wolf, John F. Klucsik, Esquires.

**MEMORANDUM AND ORDER
RULING ON REQUESTS FOR HEARING ON
OPERATING LICENSE AMENDMENT**

The Board rules on the separate requests for hearing by Nuclear Fuel Services, Inc. (NFS) and Dr. Irwin D. J. Bross. The Board grants the withdrawal of its request for hearing by NFS, and finds that it lacks jurisdiction to consider the claims of Dr. Bross regarding the conduct by DOE of a radioactive waste management demonstration project.

Background

This proceeding relates to a license amendment (Change No. 31) issued by the NRC Staff on September 30, 1981,¹ which was to permit the New York State Energy Research and Development Authority (NYSERDA) and Nuclear Fuel Services, Inc. (NFS) to transfer temporarily their respective interests in the Western New York Nuclear Service Center at West Valley, New York² to the United States Department of Energy (DOE) in accordance with the West Valley Demonstration Project Act, Pub. L. No. 96-368, 94 Stat. 1347 (1980) (West Valley Act).³

NFS, which was co-holder with NYSERDA of the license for the West Valley facility,⁴ opposed Change No. 31 as being detrimental to its legal and economic interests. NFS asserted that while the amendment deprived it of any rights which it may have had under its license to control activities at the Center during DOE's performance of the demonstration project at the site, it had not terminated its obligations or liabilities as a licensee for

¹ 46 Fed. Reg. 49237 (October 6, 1981).

² The Western New York Nuclear Service Center, located about 30 miles south of Buffalo, was the earliest effort in commercial nuclear fuel reprocessing in the United States. NFS leased and operated the site, which was then owned by the New York State Atomic and Space Development Authority. NYSERDA is the successor to that agency's interests in the Center. H.R. No. 96-1100(1), 96th Cong., 2d Sess. 6 (June 12, 1980), *reprinted in* [1980] U.S. Code Cong. & Ad. News 6017, at 6020. NFS, however, owned those portions of the facility in which actual chemical processing was to occur. Provisional Operating License No. CSF-1, §2.

³ The West Valley Act authorized the Department of Energy to carry out a high level radioactive waste management demonstration project at the Center, for the purpose of demonstrating solidification techniques which can be used for preparing high level radioactive waste for disposal. West Valley Act, *supra*, §2(a).

⁴ Provisional Operating License No. CSF-1, issued by the Atomic Energy Commission on April 19, 1966.

any danger or harm to the public health and safety which might arise during or as a result of DOE's activities at the West Valley site.⁵

On October 6, 1981, NFS submitted an application for a further license amendment, which, if granted, would have terminated all of NFS's rights and responsibilities under the license upon DOE's assumption of exclusive possession and control of the facility.⁶

Subsequently, on October 13, 1981, NFS filed with the Commission a request for hearing with respect to the conditions imposed by Change No. 31, asserting that the amendment had altered its rights and responsibilities under its license and had adversely affected its interests. Stating its concern that its transfer of the West Valley facility to DOE, as required by Change No. 31, would be in violation of Federal law, NFS sought to have the Commission determine both "NFS's rights and responsibilities under its license and NRC's authority to issue the amendment effectuating the transfer"⁷

At the same time, NFS moved that the Commission postpone the effectiveness of the license amendment, asserting that, as a licensee, it had an absolute right, pursuant to 10 CFR §2.204 (1981), to a prior hearing before the amendment could be made effective.

Through a letter to NRC Secretary Samuel J. Chilk dated October 16, 1981, Dr. Irwin D. J. Bross, Director of Biostatistics at Buffalo's Roswell Park Memorial Institute, also requested that the Commission hold a hearing with respect to Change No. 31. Dr. Bross stated his concern as a resident and a "health bureaucrat" the "misguided" DOE efforts to clean up the highly radioactive sludge contained in steel tanks at the West Valley site by "violent agitator action" could endanger the health and safety of residents of Western New York State. He further asserted that DOE is unable to police its own operations and that there would be no Federal protection of the public health and safety if NRC determines that,

⁵ Letter from NFS President Ralph W. Deuster to Richard E. Cunningham, Director, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, dated September 11, 1981.

⁶ Notice of receipt of this proposed amendment was published at 46 Fed. Reg. 56086 (November 13, 1981).

As set out in the October 6, 1981 letter from NFS President Ralph W. Deuster to John G. Davis, Director of the U.S. NRC Office of Nuclear Material Safety and Safeguards, the proposed amendment provided for the termination of all NFS's rights and responsibilities under License No. CSF-1 upon DOE assuming exclusive possession and control of the facility.

Deuster further stated his understanding that NYSERDA was willing to join in this proposed amendment, provided that a settlement of NFS's and NYSERDA's contractual disputes was reached and signed simultaneously with the issuance of the proposed amendment.

⁷ "Licensee's (NFS's) Request For Hearing," October 13, 1981, at 6.

pursuant to the West Valley Act, it has no responsibility for supervising DOE cleanup operations.

In its November 6, 1981 Order and Notice of Hearing, CLI-81-29, 14 NRC 940 (1981), the Commission denied NFS's motion for a stay of the effectiveness of the license amendment. It further directed that the Chairman of the Atomic Safety and Licensing Board Panel establish a Licensing Board "to conduct an adjudicatory hearing in accordance with 10 CFR Part 2, Subpart G pursuant to the request of NFS and to review Dr. Bross' request for a hearing."⁸ By an order dated November 17, 1981, this Board was established for those purposes.

To aid the Board in understanding the relationship of this proceeding to collateral proceedings pending before both the Commission and the Federal Courts,⁹ and to clarify those issues on which a hearing had been requested, we directed, through our December 31, 1981 order (unpublished), that the parties provide us with information in the form of responses to a series of Board questions.

On January 11, 1982, the NRC Staff denied NFS's October 6, 1981 license amendment application, without prejudice, stating that the Staff wished to abstain from deciding matters which were at that time the subject of litigation before the United States District Court for the Western District of New York.¹⁰

⁸ 14 NRC at 943.

⁹ At the time, three connected matters were pending before the Federal Courts. The first was an action commenced by NFS on December 24, 1980 in the District Court for the Northern District of New York, seeking to enforce its asserted right to have NYSERDA accept its surrender of possession of the West Valley facility pursuant to their lease agreement.

The second action was commenced by NYSERDA in New York State Supreme Court in Cattaraugus County six days later, seeking to enjoin NFS from abandoning the low-level waste storage facilities at the Center (which were not to be transferred to DOE pursuant to the West Valley Act) and directing it to continue to maintain those facilities. The State court action was promptly removed to the U.S. District Court for the Western District of New York, and the Northern District case was subsequently transferred to the Western District.

On September 30, 1981, NYSERDA changed its position and moved for partial summary judgment to require NFS to vacate that portion of the Center which was to be occupied by DOE. The District Court granted this motion, holding that under New York law, NYSERDA has the right to *repossess* the Center upon the termination of its lease on December 31, 1980, and that no reasonable interpretation of this lease supported NFS's claim that NYSERDA was required to accept NFS's *surrender* of possession after that date. On December 8, 1981, the U.S. Court of Appeals for the Second Circuit reversed that decision and remanded the matter to the Western District for trial or settlement.

The third Federal proceeding involved a petition filed by NFS in the District of Columbia Circuit of the U.S. Court of Appeals seeking to vacate the Commission Order issuing Change No. 31 on September 30, 1981, to declare the amendment a nullity, and to remand the case to the NRC with directions requiring that NFS be granted an opportunity for a prior hearing before any amendment to its license would become effective.

¹⁰ Letter from Richard E. Cunningham, Office of Nuclear Material Safety and Safeguards, U.S. NRC to Ralph W. Deuster, NFS, dated January 11, 1982.

Change No. 32

Subsequent to the Staff's denial of this license amendment application, however, we received letters dated February 4, 9, and 12, 1982 from NFS, NYSERDA, and the Staff, respectively, transmitting proposed and then issued Change No. 32. The effect of this license amendment was to terminate the authority and responsibility of NFS under the license, effective upon (1) NYSERDA's acceptance of NFS's surrender of the West Valley facility; (2) DOE's assumption of exclusive possession of the facility; and (3) settlement of those civil actions pending in the United States District Court for the Western District of New York.¹¹

Both NFS and Staff Counsel assert in their letters, using precisely the same language, that the Board was being provided with a copy of this license amendment merely "to keep the Board abreast of matters relating to license No. CSF-1" and that the "... amendment is not an issue before the Board."

NFS withdrew its October 13, 1981 request for a hearing on Change No. 31 the day before the Staff issued Change No. 32.¹² On February 18, 1982, NFS and NYSERDA signed the settlement agreement referenced in Change No. 32 and the Court approved this agreement on the following day. DOE assumed exclusive possession and control of the West Valley facility¹³ in accordance with the terms of Change No. 31 on February 25, 1982, thus accomplishing all preconditions to the effectiveness of Change No. 32.

In our February 19, 1982 memorandum and order (unpublished), we directed the participants to this proceeding to submit comments as to the

¹¹ See Notice of Issuance of Amendment to Facility License No. CSF-1, 47 Fed. Reg. 7352 (February 18, 1982).

¹² On the same day (February 11, 1982) NFS also moved for voluntary dismissal of its Petition for Review of the Commission's September 30, 1981 order (issuing Change No. 31) before the U.S. Court of Appeals (D.C. Circuit).

NFS's February 11, 1982 Withdrawal of Request for Hearing stated that "An additional amendment to that license, recently issued by the Nuclear Regulatory Commission, has removed NFS's objections to Change No. 31." NFS was apparently referring to Change No. 32 but seems to have beaten the NRC Staff to the punch.

¹³ While NFS surrendered the low-level radioactive waste burial ground to NYSERDA pursuant to their Settlement Agreement, it is not clear from those materials before this Board who, if anyone, is to be in possession and control of that area of the West Valley site during DOE's conduct of the demonstration project.

Although the matter is not squarely before us, since these license amendments relate only to high-level waste and ancillary facilities, the NRC Staff should ensure that the various transfers have not neglected the need that a qualified licensee be in possession and control of the low-level waste site and that appropriate license conditions be implemented with respect to that site, so as to reasonably assure the health and safety of the public.

The Commission may wish to obtain a status report from the Staff with respect to this matter. The Board respectfully suggests that the Commission do so.

effect of the issuance of Change No. 32 upon this proceeding, in addition to their responses to this Board's December 31, 1981 order. Among other matters, we specifically requested that the Staff and any other participant wishing to state its views explain why and to what extent Change No. 32 "is not an issue before this Board," noting that it "accords the very relief sought by NFS in this proceeding," and citing 10 CFR §2.717(b) (1981).

Pursuant to Section 2.717(b), the Director of Nuclear Reactor Regulation or the Director of Nuclear Material Safety and Safeguards, as appropriate, is specifically empowered to issue orders or to take any otherwise proper administrative action with respect to a licensee who is a party to a pending proceeding. The section specifically grants the presiding officer of a pending proceeding the power to modify, as appropriate for purposes of the proceeding, any order related to the proceeding's subject matter.¹⁴

The Staff, in its March 8, 1982 filing, asserts that Change No. 32 is unrelated to the subject matter presented by NFS's hearing request. In its view, the issuance of Change No. 32 does not, "by itself," grant NFS the relief which it sought, resolve the factual or legal issues which NFS had sought to litigate with respect to Change No. 31, or deprive NFS of standing to seek a resolution before the Board of the issues raised in its request for hearing. It is unclear what meaning, if any, the Staff attached to the words "by itself."

In support of its argument, the Staff asserts that the circumstances of the transfer of the West Valley facility under Change No. 31 were not modified by the issuance of Change No. 32, hence, ". . . if NFS had decided to pursue its claims, and if the arguments of NFS were found to be meritorious, it would still be entitled to relief, notwithstanding issuance of Change No. 32."

¹⁴ In *Cincinnati Gas and Electric Co.* (William H. Zimmer Nuclear Station), LBP-79-24, 10 NRC 226, 229-230 (1979), a licensing board analyzed those situations when a board might modify an order or action of the Staff:

. . . On the one extreme, an activity may be so closely related to the subject matter of a proceeding, as in the *Diablo Canyon* proceeding [*Pacific Gas and Electric Company* (Diablo Canyon Nuclear Power Plant, Units 1 and 2, CLI-76-1, 3 NRC 73, 74, n. 1 (1976) (consideration of materials license authorizing delivery and storage of fuel assemblies held to be "integral" to licensing board's consideration of operating license)], that any Staff order may normally not be issued (or, if issued, must be stayed pending resolution to [sic] the contested issue). At the other extreme, a particular subject may be so far removed from a pending proceeding that its consideration is inappropriate — such as the antitrust issues sought to be raised in the Marble Hill safety and environmental proceeding [*Public Service Co. of Indiana, Inc.* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-316, 3 NRC 167 (1967)]. Finally, there are matters with respect to which independent Staff action is entirely appropriate but which bear enough relationship to the subject matter of a pending proceeding that review by the Licensing Board in that proceeding is appropriate (Emphasis in original.)

We disagree. The Staff's conclusion that the issues which NFS had sought to litigate were neither modified nor resolved by the issuance of Change No. 32 is incorrect.¹⁵ It is clear that the issuance of that license amendment effectively removed NFS's "standing" to assert its claims by granting it the relief sought in this proceeding.

In determining hearing and intervention rights under Section 189(a) of the Atomic Energy Act of 1954, 42 USC §2239, the Commission will apply judicial concepts of standing. *Public Service Company of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), CLI-80-10, 11 NRC 438, 439 (1980). To have "standing" in a court, one must allege first an interest arguably within the zone of interests protected by the statute and second, an injury that has occurred or arguably would result from the action complained of. "Under this 'injury in fact' test, a mere academic interest in a matter, without any real impact on the person asserting it, will not confer standing," *Portland General Electric Company* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610, 613 (1976).

In this proceeding, the "injury in fact" asserted by NFS in its October 13, 1981 Request for Hearing is that Change No. 31 terminated its rights without terminating its responsibilities and thereby threatened its legal and economic interests. As NFS questioned the validity and effect of the license amendment under various Federal laws and NRC regulations, it sought a clarification of its rights and responsibilities from this Board. The effect of Change No. 32, however, was to terminate NFS's responsibility under Provisional Operating License No. CSF-1, upon the happening of certain conditions, including its signing of the Settlement Agreement with NYSERDA.

In our opinion, any need for us to consider NFS's claim that its responsibilities under its license should have been terminated after Change No. 31 was rendered moot by the termination of NFS's interests in the license by Change No. 32.

This also seems to be the conclusion of NFS, although stated by it, for reasons unclear to the Board, as an argument that Change No. 32 does *not* relate to the subject matter of this proceeding. At page 9 of its March 8, 1982 filing, NFS states that "(t)he potential issues before this Licensing Board relate only to the appropriateness of Change No. 31" NFS

¹⁵ For example, the Staff asserts, at page 6 of its March 8, 1982 submission, that Change No. 32 "(d)oes not modify the continuing licensee obligation during the period when the facility is in the possession of DOE." While this statement appears true for NYSERDA, we believe that Change No. 32 plainly altered the licensee obligation of NFS during DOE's possession of the West Valley facility, as it terminated all of NFS's rights and responsibilities under the facility's license upon the happening of certain conditions.

goes on to state, however, that its concerns regarding potential legal and economic consequences "now have been alleviated" and that "(s)ince the transfer has already occurred, . . . NFS's objections are now moot." Similarly, as we observed above at n. 12, NFS's withdrawal of its hearing request itself stated that Change No. 32 "removed NFS's objections to Change No. 31."

In arguing that Change No. 32 does not accord NFS the very relief which it sought in this proceeding, the Staff acknowledges, at page 11 of its March 8, 1982 submission, that NFS had indicated in its October 13, 1981 letter to the Commission that it would withdraw its request for hearing if its October 6, 1981 application for a license amendment terminating the responsibility of NFS under its NRC license were granted. The Staff concludes, however, that this amendment was not the relief requested in this hearing, but a collateral matter addressed to the NRC Staff. It further concludes that the denial of this NFS application for a license amendment by the Staff on January 11, 1982 was dispositive of the matter in any event.

In this Board's opinion, however, it is clear that NFS saw both this adjudicatory hearing and the Staff's administrative license amendment process as merely two paths leading to the same objective *i.e.*, termination of its responsibilities under its NRC license.

We read NFS's statement that it would withdraw its October 13, 1981 request for hearing if its October 6, 1981 license amendment application were granted as just one indication of NFS's intent to terminate its license responsibilities by any available legal course of action. For example, even after the Staff denied NFS's October 6, 1981 license amendment application on January 11, 1982, NFS appended this proposed license amendment to its January 22, 1982 response to our December 31, 1981 order, proposing, at 6, to have this Board consider the terms of this amendment "as a means of correcting the deficiencies and problems inherent with the September 30th amendment [Change No. 31]." As the terms of the license amendment granted by Staff on February 12, 1981 effectively grant NFS the same release from its rights and responsibilities under its NRC license as it had sought from this Board, we conclude that Change No. 32 is addressed to the same subject matter as this proceeding; and that it would thus be within our power, pursuant to 10 CFR §2.717(b), to modify that license amendment as we deem appropriate for purposes of this proceeding.

We do not deem such a modification to be necessary or appropriate in this proceeding, however. The differences between NFS and NYSERDA, which apparently existed long before the issuance of Change No. 31 and which apparently prompted NFS to originally oppose this license amend-

ment, seem to have been resolved pursuant to the Settlement Agreement signed by these parties on February 18, 1982.

Additionally, the Commission's November 6, 1981 decision in this case held that prior hearing is not required before DOE takes possession of the facility. Therefore, even though Change No. 32 does affect the subject matter of the NFS request, it does not affect any rights of Dr. Bross. He would not be entitled to a hearing prior to the effectiveness of Change No. 31, even if he had requested such a prior hearing. (He did not.)

Furthermore, in light of our ruling, *infra*, below that the West Valley Act and other statutes preclude an NRC licensing board from adjudicating the conduct of DOE of the demonstration project, we conclude we are precluded from hearing Dr. Bross' claims under either Change No. 31 or 32.

Dr. Bross, in his letter to the Board of February 16, 1982, states that he requests a hearing on Change No. 32 because it clears the way for DOE to take possession of the facility to conduct that demonstration project. Dr. Bross reiterates in summary from his claims in connection with Change No. 31 that DOE's conduct of the project will cause hazards. Thus, the matter which Dr. Bross seeks to litigate would be the same under either Change No. 31 or 32. If we had found below that an NRC licensing board has jurisdiction to adjudicate Dr. Bross' claims regarding DOE's conduct, then we believe the Board would have been able to consider the effect of Change No. 32, if any, on Dr. Bross' claims pursuant to 10 CFR §2.717(b), based on our discussion above. Where Section 2.717(b) applies, there is no need for the Commission's Order and Notice of Hearing, which refers only to Change No. 31, to be explicitly expanded to refer to the subsequent Change No. 32 as a prerequisite to jurisdiction to consider that subsequent license amendment. *See Diablo Canyon, supra*, 3 NRC at 74, n. 1. Otherwise, the authority conferred by Section 2.717(b) would be severely limited and could be easily avoided by the form in which an amendment to a license is cast.

Hearing Request of NFS

On February 11, 1982, NFS filed a "Withdrawal of Request for Hearing" which, on its face, appeared to be addressed to the Commission.

In response to a question we posed in our February 19, 1982 order, NFS, in its March 8, 1982 filing, clarified that its Withdrawal was intended to be addressed to this Board.

We deem this Withdrawal, as clarified, to be a motion to dismiss this proceeding, insofar as it relates to those issues presented by the NFS request for hearing, and this motion is hereby granted.

Hearing Request of Dr. Irwin D. J. Bross

We turn our attention now to the hearing request of Dr. Bross, and the question of whether it is within this Board's jurisdiction under the November 6, 1981 order of the Commission and the West Valley Act to consider the public health and safety matters upon which he has requested a hearing and/or to grant the relief which he has requested.¹⁶

At the outset, we note that while the Commission's November 6, 1981 Order specifically delegated the authority for a licensing board to "conduct an adjudicatory hearing" with respect to NFS's Request for Hearing, it empowered this Board only to "review" Dr. Bross' Request for Hearing.¹⁷ The Staff asserts in its March 8, 1981 Answer to our December 31, 1981 and February 19, 1982 orders (Staff's March 8, 1981 Answer), at 15, that this distinction should be read as limiting our jurisdiction to making a determination of whether a hearing should be granted with respect to Dr. Bross' request, while precluding us from holding such a hearing even if we were to deem it necessary. While we believe that the Commission's intent in using this language is not altogether clear, we conclude that the Staff's interpretation of this language is possibly correct. Had this Board determined a hearing to be necessary pursuant to Dr. Bross' request, we might have sought confirmation of our authority to conduct it.

In the view of the Staff, however, those issues which Dr. Bross seeks to litigate in this proceeding are specifically removed from consideration by the Commission by virtue of the provisions of the West Valley Act, and are, hence, beyond the subject matter jurisdiction of this Board. In support of this conclusion, the Staff's November 27, 1981 Response to Request of Dr. Irwin D. J. Bross for Hearing, at 4-6, relies on several sections of the West Valley Act, particularly Section 2(c), and portions of that statute's legislative history which were asserted to demonstrate that there was "no doubt" that Congress did not intend that DOE's activities be subject to formal NRC licensing or regulation.

In our February 19, 1981 memorandum and order, at 4, n. 5, we observed that the attachment describing the Act's legislative history which the Staff had appended to its November 27, 1981 filing contained references to legislative history which appeared to be contrary to the Staff's position. We further noted that the identical attachment which the Staff provided to this Board had been submitted as part of an informational memorandum to the Commissioners by the NRC Office of General Coun-

¹⁶ Dr. Bross' Request for Hearing on Change No. 31 is addressed to issues other than those raised by NFS. As such, it is an independent request for a hearing, not a petition to intervene in the hearing granted to NFS.

¹⁷ 14 NRC at 943. See text accompanying n. 8, *supra*.

sel.¹⁸ This memorandum, which we appended to our February 19, 1982 order for use by the participants, concluded that it was "uncertain" whether Congress had intended that DOE be an NRC licensee.¹⁹ Both our footnote and the accompanying text stated that the Board had not yet determined the permissible scope of its inquiry into DOE's conduct of the West Valley Demonstration Project, but was instead awaiting the pending submissions of the participants. No subsequent submission of any party attempted to explain the apparent inconsistencies in the Act's legislative history.²⁰ The Board therefore deems that allowing the participants a further opportunity to brief this point is unwarranted.²¹

NRC Jurisdiction Over DOE Under The West Valley Act

Congress itself has long struggled with the question of whether DOE should become an NRC licensee for purposes of the West Valley Demonstration Project prior to the enactment of the West Valley Act. A bill comparable to the West Valley Act had in fact passed both houses of Congress the year before this statute was enacted, but was never reported out of the conference committee due to what one Senator described as "jurisdictional uncertainties."²² Furthermore, an earlier version of the bill which eventually evolved into the West Valley Act had required that DOE and NYSERDA submit jointly an application for a license amendment, "if necessary,"²³ apparently evincing an attempt to leave to the NRC the question of whether, under existing law, DOE was required to become an NRC licensee. This provision was never approved by either house of Congress, however.

¹⁸ SECY-81-24 (January 13, 1981).

¹⁹ *Id.*, at 4.

²⁰ The Staff's March 8, 1982 filing did not address the Commission's jurisdiction over DOE activities, other than to recite sections of the West Valley Act and to state that the basis for its position on the Commission's lack of jurisdiction is explained in its November 27, 1981 response to Dr. Bross' request for hearing.

NYSERDA states, in its February 16, 1982 answer to our December 31, 1981 order, that it concurs in the views expressed in Staff's November 27, 1981 pleading, but provides us with little analysis in support of that conclusion in either that answer or its March 8, 1982 filing.

²¹ NYSERDA's February 16, 1982 answer, at 9-10, and Staff's March 8, 1981 pleading, at 18, each request three weeks to respond to any further opportunity given to Dr. Bross to brief this matter. We conclude that the parties have already been given sufficient opportunity to address this issue.

²² See discussion of Senator Javits at 126 Cong. Rec. S6732 (June 12, 1980).

²³ See H.R. Rep. No. 96-1100 (1), 96th Cong., 2d Sess. 9 (June 18, 1980), reprinted in [1980] U.S. Code Cong. & Ad. News 6017, 6022.

As initially passed by the Senate on June 12, 1980, the West Valley Act contained language identical to that finally enacted as Section 2(b)(4)(D) which provides for:

(D) Submission jointly by the Department of Energy and the State of New York of an application for a licensing amendment as soon as possible with the Nuclear Regulatory Commission providing for the demonstration.

As reported by the House Committee on Interstate and Foreign Commerce on September 15, 1980, however, this language had been deleted in favor of a provision which became Section 2(b)(4)(B) of the Act:

(B) The Secretary shall provide technical assistance in securing required license amendments.

The House passed this bill on the same day it was reported out of Committee, and then proposed an amendment to the Senate bill which substituted the language of the House-passed bill for that which the Senate had earlier approved.²⁴

On September 17, 1980, the Senate approved the substitution of the text of the House bill for that of its own bill, but made two additions to the House text: First, the requirement now contained in Section 2(b)(4)(D) that DOE join NYSERDA in applying for an NRC license amendment, which the House had rejected, was reinserted; second, a proviso was added to Section 2(c) of the Act requiring that NRC review and consultation with regards to the demonstration project be conducted "informally" and not include or require formal procedures or actions by the Commission pursuant to the Atomic Energy Act of 1954, as amended, 42 U.S.C. §§2011, *et seq.*, or the Energy Reorganization Act of 1974, as amended, 42 U.S.C. §§5801, *et seq.*

As passed by the Senate, Section 2(c) provided, in pertinent part:

(c) Within one year from the date of the enactment of this Act, the Secretary shall enter into an agreement with the Commission to establish arrangements for review and consultation by the Commission with respect to the project: Provided, That review and consultation by the Commission pursuant to this subsection shall be conducted informally by the Commission and shall not include nor require formal procedures or actions by the Commission pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, or any other law

.....
The House passed this bill, as amended by the Senate, later that same day.

²⁴ 126 Cong. Rec. H8771 (September 15, 1980).

In support of its conclusion that DOE's conduct of the West Valley Demonstration Project is not a proper subject before this Board, the Staff's November 27, 1981 filing quotes from portions of the Congressional Record of September 15, 1980 in which Congressmen McCormack and Lundine conclude that the bill which they were debating on the floor on that date was not intended to make DOE an NRC licensee. The Staff also relies on that portion of Section 2(c) of the West Valley Act which mandates that review and consultation by the Commission be conducted "informally".

We note initially that the comments of Congressmen McCormack and Lundine quoted by Staff were made on September 15, 1981, prior to the Senate's reinsertion of the above-quoted language of Section 2(b)(4)(D) requiring that DOE and New York State submit "jointly" an application for an NRC license amendment. The September 15, 1980 report of the House Committee on Interstate and Foreign Commerce had specifically rejected this Senate-passed language, substituting the requirement that DOE provide New York State with "technical assistance" in applying for this license amendment. The Committee stated that it had made this change so as to avoid potential "legal consequences" extending beyond the scope of the program which it feared might be raised if DOE were required to become a co-applicant for the license amendment (which the Committee had believed to be required by the language which is now Section 2(b)(4)(D)).²⁵ The statements of these two Congressmen therefore do not necessarily reflect the proper interpretation of the provisions of the West Valley Act as finally enacted.

We further note that both of the comments quoted by the Staff were drawn from the statements of these Congressmen after they had been given permission to revise and extend their remarks.²⁶ Therefore, these quotations do not necessarily reflect what was said on the House floor on that date, or the intent of Congress.

However, even though the subsequent reinsertion and final enactment of Section 2(b)(4)(D) undercuts the remarks of Congressmen Lundine and McCormack, the contemporaneous addition and final enactment of the apparently inconsistent proviso to Section 2(c) providing for informal review and consultation supports the view that Congress did not intend DOE to be an NRC licensee, at least not in the traditional sense of being subject to formal procedures such as hearings. There is language in the

²⁵ H.R. Rep. No. 96-1100 (II), 96th Cong. 2d. Sess. 16-17 (September 15, 1980), reprinted in [1980] U.S. Code Cong. & Ad News 6028, 6041-6042. (Hereinafter, "September 15, 1980 House Committee Report.")

²⁶ 126 Cong. Rec. H8765 and H8766 (September 15, 1980).

September 15, 1980 House Committee Report to the effect that the version of Section 2(c) before the Senate proviso was added was intended "to establish a mechanism for communication and not define the legal scope of the relationship" between DOE and NRC.²⁷ We do not believe that interpretation of Section 2(c) to be controlling as to the Senate's intent in its subsequent addition to Section 2(c) of the above-quoted proviso precluding formal procedures or actions by the Commission pursuant to the Atomic Energy Act or the Energy Reorganization Act.

Nor does the Congressional Record clarify the Senate's intentions. The summary of the legislative history of the West Valley Act which was annexed as an attachment to Staff's November 27, 1981 filing attempts to reconcile the Senate's September 17, 1980 adoption of both Section 2(b)(4)(D) and the proviso to Section 2(c) by reciting that Senator Jackson stated on the Senate floor that the requirement that the Secretary of DOE join New York in applying for a license amendment was intended to ensure protection of the Federal Government's interest as a supplier of 90 percent of the project's costs. It concludes from this statement that the Senate's reinstatement of this provision, when viewed with the Senate's characterization of the review and consultation procedures as informal, was not intended to make DOE an NRC licensee, but merely to protect the financial interests of the Federal Government.

The Board does not believe the Senate's purposes in its September 17, 1980 amendments to the House bill to be so clear. We observe that the sentence of Senator Jackson immediately preceding that which was noted refers to DOE as being "party" to the license amendment to be sought by New York State and specifically states that the provision being inserted is drawn from the earlier Senate-passed version of the bill.²⁸ In our view, Senator Jackson's statement that this provision was being reinstated so as to protect the Federal Government's financial interest in the West Valley Project can also be read as supporting an interpretation that Section 2(b)(4)(D) requires that DOE become an NRC licensee; requiring that DOE become a co-licensee with NYSERDA would seem to afford the

²⁷ September 15, 1980 House Committee Report at 22-23, *reprinted in* [1980] U.S. Code Cong. & Ad News at 6047.

²⁸ . . . The Senate-passed version of S.2443 contained, under the provision for a cooperative agreement with the State of New York, a requirement that the Department of Energy be party to the licensing amendment which will be required in order to conduct the project. I believe that reinserting this provision will insure that the interests of the Federal Government, which will bear 90 percent of the project, will be protected . . ." 126 Cong. Rec. H12762 (September 17, 1980).

Federal Government at least as much protection of its financial investment as it would the Staff's interpretation of this provision.²⁹

The congressional statement which came closest to reconciling the apparent inconsistencies in the provisions of the West Valley Act occurred during the debates on the floor of the House after the final Senate-passed version of the bill was returned for House approval. In a discussion of the Senate-passed amendment to subsection 2(c), Congressman Ottinger states his understanding of this amendment as meaning that "... formal procedures such as licensing procedures ..." will not be required "... but it does not preclude the Commission from taking any action that otherwise would be authorized by law."³⁰ No Congressperson challenged Mr. Ottinger's understanding of these amendments as meaning that DOE should not be subjected to formal licensing procedures.³¹

In this Board's opinion, Congressman Ottinger's interpretation of Section 2(c) is the only way in which this section can be read consistently with the other provisions of the West Valley Act. We therefore need not resolve whether Congress intended DOE to be an NRC licensee; whether or not Congress intended DOE to be nominally an NRC licensee, its relationship with NRC during the conduct of the West Valley Demonstration Project is to be conducted informally, including any licensing proceedings under the Atomic Energy Act or the Energy Reorganization Act.³² We

²⁹ The House's comments on the Senate's addition of Section 2(b)(4)(D) do not clarify how this provision was intended to be reconciled with the proviso added to Section 2(c). On the floor of the House, Congressman Lundine explained, in response to a question from Congressman Lujan, that the Senate-passed amendment to the bill requiring that DOE join NYSERDA in seeking a license amendment was intended to ensure DOE's agreement to the amendment, rather than allowing New York State to seek such an amendment alone. 126 Cong. Rec. H9052 (September 17, 1980).

In this Board's view, this statement is consistent with Senator Jackson's earlier remark that the provision was added to protect the Federal Government's financial investment in the demonstration project. Similarly, we conclude it is not dispositive as to whether Congress intended DOE to be an NRC licensee. We note, however, that on the House floor, Congressman Lundine identified the language of this provision to be identical to that which the Subcommittee on Energy and Power of the House Committee on Interstate and Foreign Commerce had previously eliminated from the bill, having concluded that it would require that DOE become an NRC licensee. See n. 25, *supra*, and accompanying text.

³⁰ 126 Cong. Rec. H9053 (September 17, 1980).

³¹ Congressman Dingell, in his extended remarks, concluded that the House's adoption of the Senate amendments makes DOE an NRC licensee. *Id.* The weight which should be given to these extended remarks not necessarily made in the course of on-the-floor debate is unclear.

³² What other NRC actions might be "otherwise authorized by law" during DOE's conduct of the demonstration project are not clear to this Board.

While Section 5(a) of the West Valley Act states that "... Nothing in this Act shall be construed as affecting any applicable licensing requirement of the Atomic Energy Act of (CONTINUED)

therefore conclude that the West Valley Act, particularly the clear language of Section 2(c), the meaning of which is not controverted by the legislative history analyzed above, precludes a formal hearing with respect to DOE's conduct of the project itself.³³ Because we conclude that this Board lacks subject matter jurisdiction over this matter, we rule that Dr. Bross' hearing request must be denied.

It is therefore

ORDERED that the request of NFS to withdraw its October 13, 1981 request for hearing is granted; and it is


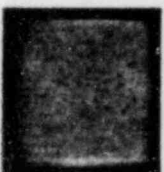
ORDERED that Dr. Irwin D. J. Bross' October 16, 1981 request for hearing on Change No. 31 is hereby denied. In the light of our ruling above that Change No. 32 is addressed to the same subject matter as Change No. 31, Dr. Bross' February 16, 1982 request for hearing on Change No. 32 is also denied.

Pursuant to 10 CFR §2.714a, Dr. Bross is advised that this order wholly denying his request for a hearing may be appealed on the question of whether his hearing request should have been granted in whole or in part by the filing (placing in the first class mail) of a Notice of Appeal and Supporting Brief with the Atomic Safety and Licensing Appeal Board

1954 or the Energy Reorganization Act of 1974 . . .", Section 202 of the Energy Reorganization Act, 42 U.S.C. §5842, specifically limits NRC jurisdiction over DOE-operated high-level radioactive waste storage facilities to those which will be operated on a "long-term" basis.

The legislative history of that Act defines "long-term" as meaning "tens to of hundreds of years," and specifically excluded short-term research and development activities. S. Rep. No. 93-707, 93d Cong., 1st Sess. (December 7, 1973), reprinted in [1974] U.S. Code Cong. & Ad. News at 5521. While the West Valley Project is to last "at least 15 years" [H.R. No. 97-273, 97th Cong., 1st Sess. at 18 (October 15, 1981)], it is not a "long-term storage facility" within the meaning of that Act.

³³ We concur with Staff's position in its March 8, 1982 filing at 17, however, that pursuant to Section 2(a)(5) of the West Valley Act, DOE's conduct of the subsequent decontamination and decommissioning of the West Valley facility may be subject to full NRC regulation and licensing requirements.

within ten days after service of this order (with the allowance of five additional days for time taken by mailing of the order).

**THE ATOMIC SAFETY AND
LICENSING BOARD**

**Lawrence Brenner, Chairman
ADMINISTRATIVE JUDGE**

**Dr. Jerry Harbour, Member
ADMINISTRATIVE JUDGE**

**Dr. Peter A. Morris, Member
ADMINISTRATIVE JUDGE**

**Dated this 30th day of April, 1982
Bethesda, Maryland.**