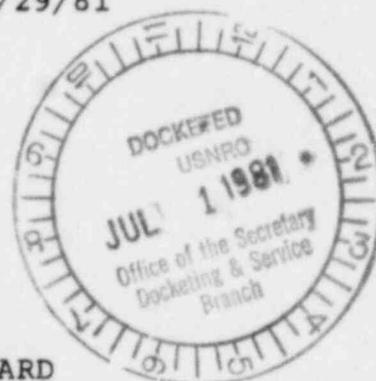


LIC 6/29/81

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION



BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
METROPOLITAN EDISON COMPANY ) Docket No. 50-289 SP  
(Three Mile Island Nuclear ) (Restart)  
Station, Unit No. 1) )

LICENSEE'S REPLY TO COMMONWEALTH OF PENNSYLVANIA  
AND AAMODI FINDINGS ON MANAGEMENT ISSUES

SHAW, PITTMAN, POTTS & TROWBRIDGE

George F. Trowbridge  
Ernest L. Blake, Jr.  
Deborah B. Bauser

Counsel for Licensee

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I. INTRODUCTION

1. Licensee herein submits its reply to the proposed findings on management issues filed by the Commonwealth of Pennsylvania and by the Aamodts.<sup>1</sup> Licensee has not attempted to respond here to each proposed finding and

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<sup>1</sup> Although the Board directed all participants in this proceeding to file proposed findings, only Licensee, TMIA, Commonwealth of Pennsylvania, Aamodts and the NRC Staff filed proposed findings and conclusions related to management issues. See e.g., Board Memorandum and Order on Schedule and Format for Proposed Findings, at 2 (April 22, 1981); Tr. 20,386 (Smith). Licensee is not replying to the NRC Staff's findings, which generally are consistent with Licensee's own findings filed on May 15, 1981. Licensee's reply to TMIA's findings were filed on June 15, 1981.

conclusion with which Licensee disagrees or to note in each instance where there is substantial disagreement among the parties. Nor is the Board required to expressly treat in its Recommended Decision each and every individual finding proposed by every party. See Public Service Company of New Hampshire, et al. (Seabrook Station, Units 1 and 2), ALAB-422, 6 NRC 33, 41 (July 26, 1977) (and cases cited therein). Where the disagreements are plain and the positions are accompanied by adequate citations to the record, for example, we have not repeated our position, but rely upon Licensee's Proposed Findings of Fact and Conclusions of Law on Management Issues, dated May 15, 1981. In some cases, where findings are common to one subject, or in Licensee's view suffer from a common fault, our reply may address a group of findings together.

2. Licensee's reply is set forth in the form of a proposed section of a proposed initial decision in which the Board addresses the proposed findings of fact and conclusions of law filed by the parties. Proposed findings of fact are cited as "PA, Staff, A. Adt or Licensee PF [paragraph number]."

3. The Commonwealth raised in its proposed findings the subject of burden of proof. PA PF 26-30.<sup>2</sup> Licensee has not contended, nor does it now contend, that Licensee does not bear the burden of proof in this proceeding, even though there is no

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<sup>2</sup> See also Licensee's Reply to TMIA Findings on Management Issues, dated June 15, 1981, at ¶ 3.

precedent in NRC cases for this restart proceeding. The Commission's August 9, 1979 Order and Notice of Hearing applies to Licensee the burden of meeting the NRC reasonable assurance standard. That burden of proof, or ultimate burden of persuasion, is met by convincing the trier of fact by a preponderance of the evidence that the reasonable assurance standard has been met on the issues presented in this case. See 42 U.S.C. § 2231; Steadman v. SEC, \_\_\_\_\_ U.S. \_\_, 101 S. Ct. 999, 1009 (1981); Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit 1), CLI-79-8, 10 NRC 141 (1979); Commonwealth Edison Company (Zion Station, Units 1 and 2), ALAB-616 (Oct. 2, 1980), slip op., at 3.

II. LICENSEE'S REPLY TO COMMONWEALTH  
OF PENNSYLVANIA FINDINGS

A. Additional Training Requirements

4. The Commonwealth of Pennsylvania participated as a representative of an interested state under 10 CFR 2.715(c).<sup>3</sup> In accordance with that provision of the Commission's Rules of Practice, the Commonwealth is not required to take a position on

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<sup>3</sup> Actually, three separate Commonwealth of Pennsylvania entities participated in the prehearing stages and during evidentiary sessions on management issues. Two of the three, the Pennsylvania Public Utilities Commission and the Consumer Advocate, filed no findings on management issues. The third, referred to herein as the Commonwealth of Pennsylvania or Commonwealth, represented the executive branch of the Commonwealth.

issues in the case. In its proposed findings on management issues, however, the Commonwealth "elect[ed] to exercise its right to advise the Commission on specific management issues on which the Commonwealth perceiv[ed] deficiencies that need to be remedied." PA PF at 2 (unnumbered paragraph). The findings also observed that the concerns identified by the Commonwealth were "the only deficiencies in Licensee's management capabilities that the Commonwealth finds need to be remedied," and that generally, in the Commonwealth's view, Licensee had met its burden on management issues. Id.

5. Following receipt by Licensee of the Commonwealth's findings on management, Licensee expressed surprise and requested an extension of time to consult with the Commonwealth before filing reply findings on the subjects addressed by the Commonwealth. Mindful of the Commission's general policies favoring negotiation and settlement, reemphasized most recently in CLI-81-8 (46 Fed. Reg. 28533, at 28534), the Board granted Licensee's request. Tr. 21,844-54 (Smith); see also Board Memorandum and Order of June 9, 1981. The outcome of discussions between Licensee and the Commonwealth of Pennsylvania initially was reported to the Board and parties by copy of a letter dated June 22, 1981, from Licensee's counsel to counsel for the Commonwealth confirming Licensee's understanding. In general, the letter reported that based on exchanges of information, the clearing up of misunderstandings, and additional commitments made by Licensee, Licensee understood

that the Commonwealth would withdraw many of its management findings (excepting those on financial qualifications and operational resources) and that Licensee would not object to the inclusion of any or all of its commitments, detailed in the same letter, as license conditions for restart of TMI-1. Lic. Ex. \_\_\_\_ (6-22-81).

5. Licensee's letter report was thereafter substantiated by both Licensee's and the Commonwealth's reply findings. Indeed, the Commonwealth withdrew in its reply findings many of its initially proposed management findings and recommended as conditions of restart Licensee's commitments related to training; Licensee expressed its willingness not to oppose the additional commitments as license conditions.<sup>4</sup> Licensee made its commitments a matter of record in the proceeding. Id. Those areas not resolved between Licensee and the Commonwealth are addressed by the Board in the following Sections II.B, C and D of this Recommended Decision.

7. The Board acknowledges the mutually agreed upon settlement between Licensee and the Commonwealth. We accept the Commonwealth's reply findings which withdraw certain of their initial findings on management issues on the representation that

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4 Licensee also followed through on an obligation to the Commonwealth to recommend to the Board that it encourage the Staff to include simulator testing in NRC individual operator examinations and to formalize NRC's I&E practice of observing and evaluating licensed operator emergency drills on shift. The Board strongly endorses these recommendations although they are not made a condition of restart of TMI-1.

their concerns are met by their discussions with Licensee and the additional commitments Licensee has made. In the Board's Conclusion, infra, these additional commitments by Licensee are included as recommended license conditions for restart of TMI-1.

B. Shift Staffing Requirements

8. The Commonwealth's concern as to the adequacy of Licensee's shift manning (PA PF 120-137) is with the number of senior reactor operators (SROs) required per shift. The concern centers on Licensee's capability to respond adequately at the onset of an emergency with less than two SROs. See particularly PA PF 127-130. We treat here the Commonwealth's general position on the requirement for two SROs. In Section \_\_\_\_\_, infra, of this Recommended Decision, we deal specifically with Licensee's capabilities to respond to an emergency, including the adequacy of Licensee's shift manning plans to cope with the onset of an emergency.<sup>5</sup>

9. The number of SROs required per shift is a matter of concern to all nuclear plants and a subject of revised NRC requirements since the TMI-2 accident. See Staff Ex. 14, at 23. Whereas the NRC requirement prior to the accident and the industry norm of currently operating plants is one SRO per shift,

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<sup>5</sup> Licensee in its Emergency Planning Findings following the completion of the record on this subject will address the Commonwealth's findings on the need for two SROs to cope with emergencies. See particularly, PA PF 127-130.

the NRC Staff in its post-TMI accident criteria is now requiring all NTOL's to have two SROs and all operating plants to have two SROs by a future date--currently July 1, 1982, established in NUREG-0737. Staff Ex. 14 at 22, 23. As the Commonwealth correctly points out, the Staff initially viewed TMI-1 as an NTOL plant for purposes of this and other TMI lessons learned requirements. Staff. Ex. 4, at 11; see generally Licensee's Proposed Findings of Fact and Conclusions of Law on Plant Design and Procedures Issues in the Form of a Partial Initial Decision (June 1, 1981) at ¶¶ 518-521. Following issuance by the Commission of CLI-81-3, in which the Commission expressed as its guidance that TMI-1 should be grouped with other operating plants unless the Board finds that the record dictates to the contrary, the Staff reexamined its positions on whether TMI-1 should be treated as an NTOL, including its position on minimum staffing requirements. Staff Ex. 14, at 22-23. The Staff determined that there is nothing unique to TMI-1 that requires a second SRO to be assigned on shift at restart. Id. at 23.

10. Licensee's position is that it intends at the time of restart to man its shifts with two SROs (plus two CROs about which there is no dispute). Tr. 11,666-68 (Hukill). The numbers of SROs which Licensee has certified for NRC's SRO examinations (13 individuals who are normally operators; 3 who are training instructors; 2 who are the Operations Supervisor and an assisting engineer; and 2 who are STAs) is more than sufficient to equip up to six shifts with two SROs each.<sup>6</sup> See Tr. 20,581-86 (Newton).

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6 It is clear that an STA who held an SRO license could not at the same time function both as an STA and as an

However, Licensee has resisted two SROs per shift as a fixed requirement of restart, and until it is imposed on other operating plants. Tr. 11,666-68 (Hukill). Licensee notes that it has exposed its entire complement of licensed personnel to unprecedented NRC reexamination (see Licensee PF 199). Without the results of NRC's examinations of all of Licensee's operators, and with no way to reliably assess potential attrition, there is presently no way to determine whether there is in fact an issue here which could affect restart of TMI-1 whether or not we accept the Commonwealth's position. If a sufficient number of Licensee's operators are successful on the NRC exams and remain in the Licensee's employ, then Licensee intends to man its shifts with two SROs each at the time of restart (and the Commonwealth's concerns are met); but if, on the other hand, there are so many failures or resignations that Licensee cannot man each shift with two SROs, then accepting the Commonwealth's position and singling out TMI-1 for treatment different from all other operating reactors by requiring Licensee to have two SROs on every shift could alone delay an otherwise authorized restart.<sup>7</sup>

11. The Commonwealth maintains that two SROs per shift is necessary for the safe operation of the plant.<sup>8</sup> PA PF 120.

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(continued)

SRO-licensed Shift Foreman or Shift Supervisor. Tr. 20,726-27 (Crocker).

7 Of course, if all or almost all of Licensee's candidates were to fail the NRC SRO examination, then restart could be delayed whether one or two SROs are required.

8 The Commonwealth also argues that the Commission regulations, 10 CFR §§ 55.2 and 55.4(e), proscribe ROs from

It cites not one single witness nor exhibit that directly supports its position. Rather, the Commonwealth grounds its position on several inferences and apparently its own intuition.<sup>9</sup> First, it faults Licensee for its intention and desire to man shifts with two SROs even though Licensee is not willing to accept as a condition of restart that two SROs must man every shift. PA PF 121-122. Licensee's position was quite clearly provided by Mr. Hukill, who heads TMI-1, in response to the Commonwealth's own questions. Tr. 11,666-68 (Hukill). The Commonwealth provides no citation, nor are we aware of one, where any Licensee witness stated or implied that two SROs are necessary for safe operation.

12. Next, the Commonwealth faults the NRC Staff for initially taking the position that TMI-1 should be treated like an NTOL for shift manning purposes (Staff Ex. 4, at 11), and following reexamination of this position based on Commission guidance in CLI-81-3, for changing its position to treat TMI-1

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(continued)

functioning as shift foremen. See PA PF 132. We disagree with this assertion because we do not find Licensee's description of the shift foreman's job to be beyond the scope of responsibilities included in the definition of an "operator" provided in 10 CFR § 55.4(d). See Hukill et al., ff. Tr. 11,617, at 18.

9 We note from the Commonwealth's July 31, 1980 Statement of Position that it intended to introduce evidence in areas of state expertise, and we note further that it has done so with respect to emergency planning. The Commonwealth's expertise in the area of shift manning is unclear. See Commonwealth of Pennsylvania's Report on Positions Formulated Based on Information Available as of July 25, 1980, at 2.

like other operating plants which are not now required to have two SROs per shift (Staff Ex. 14, at 22). PA PF 123. The Staff's approach was straightforward.<sup>10</sup> They reviewed TMI-1 and found no reason to treat it as an NTOL plant rather than as an operating plant.<sup>11</sup> Staff Ex. 14, at 22-23. Despite the Commonwealth's assertion (PA PF 125) that the Staff "did not give adequate weight" to TMI-1's having been shut down for two years, the Staff witness testified both at the time cited by the Commonwealth in its findings and during the Commonwealth's own cross examination (not cited by the Commonwealth) that the shutdown period specifically had been considered. Tr. 20,748, 20,768 (Crocker). Furthermore, again despite the Commonwealth's unsupported view to the contrary (see PA PF 134), the record is uncontroverted that Licensee's operational personnel have more operating experience than a new plant's operations personnel could be expected to have.<sup>12</sup> Staff Ex. 14, at 23; Tr. 20,768 (Crocker).

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10 The Staff's approach did result in their retaining as pre-restart requirements for TMI-1 those NTOL requirements which had safety significance. See Tr. 21,325-29 (Jacobs and Silver). The requirement for two SROs was not retained and no Staff witness or exhibit stated or implied that two SROs are necessary for safe operation.

11 One distinction, i.e., its proximity to TMI-2, was identified and considered; no party argues that this distinction supports different treatment for TMI-1 with respect to shift manning. See Staff Ex. 14, at 23.

12 The Commonwealth, for example, cites as a statistic supporting its position that 3 of Licensee's 6 incumbent shift supervisors and 3 of Licensee's 7 incumbent shift foremen have no operating experience in these positions. PA PF 134. While true as far as it goes, the Commonwealth ignores in its operating experience discussion that all 6 shift supervisors have operating

13. We reject the Commonwealth's proposal that we require as a necessary condition of restart that Licensee have a minimum of two SROs on every shift operating TMI-1.<sup>13</sup> In so doing, we expect Licensee to follow through on its own preference to have two SROs on shift, providing there are a sufficient number of qualified individuals available at the time of restart. We do not, however, based on the record, find a basis to differentiate TMI-1 from other operating plants in this respect and to make two SROs a short-term requirement for restart.

C. Operational Personnel

14. In its findings on Operational Personnel (PA PF 138-149), the Commonwealth proposes that the Board require as a condition of restart that Licensee maintain on its operational staff whenever the plant is critical a minimum of 13 licensed SROs and 16 licensed ROs, and further that Licensee as a long-term item have in operator training at all times an additional 12 individuals. In Licensee's view, such a stringent requirement is unnecessary and would be oppressive.

15. The Commonwealth's specific proposal for minimum numbers of licensed operators in Licensee's organization was not

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(continued)

experience as shift foremen and all 7 shift foremen have operated TMI-1 as control room operators. Hukill, et al., ff. Tr. 11,617, at 16-22. This operating experience of virtually every operator on the very plant now to be operated cannot be dismissed, nor conceivably matched by any plant operating for the first time.

13 See also our findings related to Emergency Planning in this respect, ¶           , infra.

advanced in the hearing. No witness advanced these numbers as requirements of restart or even as appropriate as long-term conditions. The NRC Staff position is that a sufficient number of operators is that which allows shifts to be appropriately manned bearing in mind the Staff's guidance on overtime restrictions; the Staff has no established policy on the minimum number of shifts, but judges each Licensee on an ad hoc basis. Tr. 20,723-25 (Crocker).

16. The Basis for the Commonwealth's proposal for a minimum number of licensed operators is not explicitly stated. We presume, however, that it assumes the need for two SROs per shift (consistent with the Commonwealth's position), assumes six-shift operation, and further assumes at all times the need for one additional SRO and four additional ROs. The Board does not view this proposal as a necessary restart item to protect the public health and safety. To begin with, there is an acknowledged industry-wide scarcity of licensed operators. See Tr. 12,062 (Crocker). These individuals are not obtained merely by diligent search; it takes years to train and qualify a licensed operator. See, e.g., Long, et al., ff. Tr. 12,140, at 25-28, 31-33; Tr. 20,745 (Crocker). The Board does not agree with the Commonwealth that it is necessary to single out TMI-1 among the operating plants for shift manning purposes. See ¶¶ 8-13, supra. Further, to the extent the Commonwealth's proposal (as it must) would dictate that Licensee employ a six-shift schedule at all times, the Board rejects this, too. All the record evidence

indicates that Licensee's proposed six-shift schedule is preferred. Tr. 20,724 (Crocker); see also, Tr. 11,655-56 (Toole, M. Ross). The record also is uncontroverted that five shifts more closely represents the industry norm and that plants are operating with NRC concurrence on less than five shifts. Tr. 12,063-64; 20,734-35 (Crocker, Allenspach). Six shifts is not a necessary requirement of restart.<sup>14</sup> Indeed, the Staff has reported to the Board that it would not necessarily enforce as a Licensee commitment even a five-shift schedule. See NRC Staff's Report on Licensee's Commitments that the Staff Will Not Attempt to Enforce, at 2 (June 10, 1981). On the basis of the record before us we are not in a position to interpose our judgment for that of the Staff as to the number of shifts which for some periods might be acceptable. The Staff has minimum shift staffing requirements. See Tr. 20,723 (Crocker). There exist very specific limitations on use of overtime. See Shovlin, et al., ff. Tr. 13,533, at Aft. 14. Together, these two requirements ensure sufficient shift manning by a sufficient

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14 Illustrative of the difference between six shifts and five is training. The Commonwealth points to training as one reason why six shifts should be maintained. With six shifts Licensee's operators receive some 200 hours of annual requalification training; with five or less shifts, that number would be reduced towards the 60-hour requirement. While this is not preferable, neither can it be said that for restart Licensee must maintain its current 200 hours per year. In the Board's view the 60-hour standard can be said to present the necessary and sufficient criterion, while Licensee's 200 hours exceeds the requirement and is preferable. See Long et al., ff. Tr. 12,140, at 34.

number of different individuals. The Board sees no need for the minimum staffing proposal advanced by the Commonwealth.<sup>15</sup>

17. The second element of the Commonwealth's proposal on operational resources is that as a long-term requirement the Board require, in order to account for future attrition, that Licensee maintain -- presumably so long as the plant operates -- twelve operator candidates in training at all times, and that that requirement initially be met by the time of restart.<sup>16</sup> PA PF 148. Licensee vigorously opposes this proposal as unsupported by the record and as not a necessary requirement for restart. We agree with Licensee and reject the Commonwealth's proposed finding. The Staff's approach, verifying that Licensee's "current, authorized manning permits 12 individuals to be in training," seems better to capture the need for Licensee to be prepared to cope with potential future attrition. See Staff Ex. 13, at 5. Licensee's authorized manning allows Licensee to have in training at any point in time an appropriate number of

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15 The specific proposal by the Commonwealth would require some five licensed operators be retained by Licensee beyond those that could be utilized even on a six-shift, 2 SRO/2 RO watch schedule. The record clearly does not support this as a necessary requirement for restart. No other numbers are before us.

16 We note in this regard that the Commonwealth posed no questions to Licensee's organization and staffing witnesses nor its training witnesses on the subject of attrition. There is no record which would even suggest that attrition exists or is expected of the magnitude which the Commonwealth's proposal presumably is designed to meet. The Commonwealth itself offered no evidence on this subject. See n. 9, supra.

trainees to ensure a sufficient supply of licensed operators. On the other hand, were we to accept the Commonwealth's proposal, then Licensee, who depending upon the NRC examination outcome may have 20 licensed SROs and 16 licensed ROs at the time of restart, would be required to have an additional 12 operators in training--a result we cannot square with the necessary and sufficient standard.

D. Financial Qualifications

18. In its Order of March 23, 1981 (CLI-81-3) the Commission ruled that "the issue of the licensee's financial qualifications should not be litigated in this proceeding." The Commission further stated that "[a]lthough the Commission is taking the financial qualification issue out of the hearing, the Staff is directed to continue to monitor the licensee's financial resources as long as is necessary and to report any health and safety implications to the Commission."

19. The Commonwealth would have this Board interpret the Commission's Order (and embody the interpretation in our recommended decision) to mean that the issue of financial qualifications has been removed only from the restart hearing but remains an issue to be considered by the Staff as part of its certification to the Commission on the completion of short-term items and reasonable progress toward the completion of long-term items. PA PF 155-162. In the Commonwealth's view the Staff must

still determine, prior to restart, that Licensee meets the financial qualification criteria embodied in the Commission's August 9, 1979 Order and Notice of Hearing and in its supplemental instructions on March 6, 1980 (CLI-80-5). PA PF 161.

20. We find no support in the wording of the Commission's March 23, 1981 Order for the Commonwealth's interpretation. We find further that the Commonwealth's interpretation is in fact inconsistent with the recommendations of the NRC Staff, the Commonwealth and the Board on which the Commission's Order was based, all of which were based on the conclusion that resolution of the question of financial qualifications need not be a prerequisite to restart of TMI-1.

21. The initiative for reconsideration of the financial qualifications issue came from the NRC Staff. On February 3, 1981, the Staff submitted to the Board a number of suggestions for expediting completion of the restart proceeding. NRC Staff's Suggestions on Methods to Expedite Completion of Restart Proceeding and Issuance of a Recommended Decision to the Commission, ff. Tr. 11,339. The Staff concluded that "financial qualification issues need not be decided as a condition for restart" and suggested that "the Commission may desire to eliminate the financial issue from those issues that must be litigated prior to reaching a decision on the restart of TMI-1." Id., at 3. Staff counsel subsequently explained that its intent was simply to defer litigation of the financial issue until after the decision on restart. Tr. 11,860 (Swanson).

22. While counsel for the Commonwealth was at first unclear as to whether the Staff was recommending that the issue of financial qualifications be eliminated altogether from the hearing (Tr. 11,855-56), he clearly understood that the Staff was recommending at a minimum that the issue be deferred until after restart, and on behalf of the office of the Governor of the Commonwealth he endorsed that recommendation. Tr. 11,854-56 (R. Adler).

23. After receiving the Staff's suggestion and hearing the comments of other parties, the Board made its own recommendations to the Commission. Memorandum to Commissioners from the TMI-1 Licensing Board, dated February 9, 1981. The Board first described to the Commission the Staff suggestion and the parties' reaction to it, including the fact that "the Commonwealth supports the Staff's conclusion that considering financial issues after restart would not pose a safety hazard." Id., at 4. The Board then added its own observation that it "cannot identify any need in the short term to require that long-term financial capability be demonstrated prior to restart."

24. The Board then made three alternative recommendations to the Commission for dealing with the issue of financial qualifications. One of these--and the one which the Commission apparently adopted--was to "remove financial issues from the order of the hearing, but direct the Staff to monitor continuously the Licensee's financial resources as long as is necessary." Id., at 5. We note particularly that our

recommendation was to remove the financial issues from the "order of hearing," not just from litigation. Thus it is reasonable to believe that in acknowledging that its March 23, 1981 Order was "contrary to the position it took in its August 9, Order," the Commission had in mind the entire order and not just the portion establishing a hearing and defining hearing issues.

25. In particular, we are unable to accept the Commonwealth's position that the Commission meant to leave intact the provision in its August 9 Order that the Director of Nuclear Reactor Regulation must determine prior to restart that "the licensee satisfies the financial qualification criteria imposed on an applicant for an operating license." We cannot reconcile this view of the Commission's March 23, 1981 Order with the Commission's own acknowledgement that "[i]n fact the Commission is of the view that the treatment of financial qualifications in the licensing process as a general matter needs reexamination and is undertaking that examination at this time." CLI-81-3, slip op., at 9.

### III. LICENSEE'S REPLY TO AAMODT FINDINGS

26. Intervenor Aamodt's Findings of Fact and Conclusions of Law on Management Issues deal primarily with the subject of the adequacy of Licensee's licensed operator training program, although Mrs. Aamodt also discusses other related subjects, such as Licensee's training management and instructor

qualifications. Our discussion groups Mrs. Aamodt's proposed findings topically.

A. Category T Test

27. Mrs. Aamodt's findings begin with a discussion of the "special test on the TMI-2 accident," Aamodt PF 8-15, called the "Category T" test by the Licensee. Licensee PF 125. In the following series of statements offered on this subject, Mrs. Aamodt inaccurately cites the record and, as a result, greatly confuses the position of the Staff, of which she is highly critical, with regard to the Category T exam.

28. Mrs. Aamodt states that, "NRC testified that the operators were not required to pass the special test on the TMI-2 accident. Tr. 20688-9 (Crocker)." Aamodt PF 8. Not only did Mr. Crocker not make this statement at the reference page, but it is contrary to the record developed on this subject. As Mr. Crocker explained,

At the time the SER was written, as I understand it, the special training programs were about finished, and the NRC licensing examinations were scheduled, and this was about a year ago now, April of last year, I believe they were scheduled. And at that time, the intent was to have the licensee's people that had completed the special training programs sit for the NRC examinations.

When the NRC licensing examinations were slipped, then the special training programs really evolved into more or less a requalification training program. People have come and gone since then, and the intent now, as I understand it, is that all of the licensed operators or the people to be licensed will ultimately have this special training, but not necessarily before the NRC examination.

Our operator licensing people do not feel that having the special training is a prerequisite to sit for the NRC exams.

Tr. 20,689-90 (Crocker); see also Tr. 20,635-36 (Newton). Thus, it is not true that the NRC testified that the operators were not required to pass the Category T test; rather, NRC's position is that they need not pass it prior to taking the NRC license examinations. See Licensee PF 173, n. 22; Staff PF 49; Tr. 20,596 (Swanson); see also Aamodt PF 14.<sup>17</sup> It is similarly false that "NRC stated they will not require further special training and testing on TMI-2 events for TMI operators. Tr. 20691-2 (Crocker)." Aamodt PF 15.<sup>18</sup>

29. Neither Mr. Crocker, at Tr. 20,706, nor Mr. Swanson, at Tr. 20,697, "indicated that no audits or certifications of competency were required." Aamodt PF 8. Here, it is not clear to what Mrs. Aamodt is referring. If Mrs. Aamodt intends by this statement that the Staff will not independently verify that operators who pass Licensee's Category T exam have

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17 Mrs. Aamodt focuses on this issue again in Aamodt PF 9 when she asserts that Mr. Swanson denied, at Tr. 20,596, that NRC "had changed their eligibility requirements for the operators to sit for licensing examinations." Rather, Mr. Swanson did not know why the statement in the SER about the timing of the Category T exam, which he described as "ambiguous," Tr. 20,596, see Aamodt PF 10, was originally drafted in the manner it was. Tr. 20,596-97 (Swanson). See also Aamodt PF 101.

18 The subject matter covered by the special Category T program will be incorporated into Licensee's regular training program and the NRC examinations include questions in this area. Tr. 20,691 (Crocker); Tr. 20,752 (Swanson).

received and understand the full training which this special program provides, she is correct, although the Staff does look at Licensee's Category T exam. Tr. 20,752 (Crocker); Tr. 12,825 (Boger). However, Mrs. Aamodt may be suggesting by this broad-sweeping statement that the Staff does not cover Category T subjects in its examinations, which is contrary to the evidence. Tr. 20,754 (Crocker).

30. At Aamodt PF 13, Mrs. Aamodt states that the "NRC made clearly conflicting statements regarding requirements that would be enforced prior to licensing," citing to Tr. 20,696, 20,705 (Crocker), and Tr. 20,752 (Swanson). A review of these transcript pages, however, indicates that there are no "conflicting" statements; rather, there was an initial misstatement by the Staff witness, which was corrected later that day.<sup>19</sup>

31. Mrs. Aamodt asserts at Aamodt PF 14 that the Staff will require auditing of the Category T exam by a contractor. The citations which Mrs. Aamodt provides do not support this proposition. See Tr. 20,572 (Crocker); Tr. 20,752 (Swanson). Moreover, one of the pages referenced (Tr. 20,572)

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<sup>19</sup> The witness who testified on this subject at the pages referenced by Mrs. Aamodt was not the original Staff witness on the subject of licensed operator training. See Tr. 20,688, 20,695 (Crocker). Mr. Crocker was filling in for the original witness who testified on operator training, Mr. Boger, during a reconvening of the parties after numerous days of hearing on the subject several months earlier. See Tr. 12,129-12,641 (Long, Knief, Newton, Ross, Christensen, Gardner, Kelly); Tr. 12,676-13,012 (Christensen, Gardner, Kelly, Long, Boger, Aamodt). Mr. Crocker corrected his testimony after prudently checking with Mr. Boger. Tr. 20,751 (Crocker).

does not include a statement by the individual to whom Mrs. Aamodt refers (Crocker).

32. In summary, in reviewing Mrs. Aamodt's proposed findings on the subject of the Category T exam, we find a number of errors in Mrs. Aamodt's citations to and understanding of the record. On the basis of these errors, Mrs. Aamodt concludes that "Licensee is not in compliance with Commission Order Item I E." Aamodt PF 15 (indented ¶). We do not agree.<sup>20</sup> See Board Finding \_\_\_ (Licensee PF 185). Similarly, we cannot agree with Mrs. Aamodt's position that Licensee's candidates who failed the ATT audit exams "were not eligible to sit for licensing under standards which implemented the Commission Order Item 1E." Aamodt PF 22 (indented ¶). We also find no basis in the record and know of no requirement that comports with Mrs. Aamodt's

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20 Order Item 1(e) in the August 9, 1979 Commission Order and Notice of Hearing to which Mrs. Aamodt refers, states:

1. The licensee shall take the following actions with respect to TMI-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 accident. All operators will also receive training at the B&W simulator on the TMI-2 accident and the licensee will conduct a 100 percent examination of all operators in these areas. NRC will administer complete examinations to all licensed personnel in accordance with 10 CFR 55.20-23.

10 NRC 141, 144 (August 9, 1979).

conclusion in Aamodt PF 15 (indented ¶) that certification of competence on TMI-2 events must be made by an auditor contractor within the view of the hearing. Cf. Tr. 20,754-55 (Smith). Finally, we note that Licensee has acknowledged its understanding that NRC will not issue licenses to any of Licensee's operators who have not passed with a 90% grade a Licensee-administered Category T examination which NRC has evaluated and determined to be acceptable for this purpose. Lic. Ex. \_\_\_\_, at 2 (6-22-81). Licensee has also committed to provide to its licensed operators prior to restart at least three additional days of training covering the TMI-2 accident subject matter. Id.

B. Operator Examinations

33. Intervenor Aamodt's second grouping of findings, which relates to the outcome of Licensee's mock operator examinations and the actual NRC operator examinations, Aamodt PF 16-22, also includes several statements which obscure the record. Mrs. Aamodt states that, "Eighteen of the 29 candidates for licensing failed [the ATT mock examination] at the present NRC standards. Tr. 20606 (Newton)." Aamodt PF 19. This statement is accurate insofar as it represents the number of on shift personnel who took the ATT examinations. Tr. 20,606 (Newton). It is inaccurate as a representation of the number of "candidates for licensing," as Mrs. Aamodt states, who participated in the ATT mock examinations, since it excludes three instructors, two non-shift Operations personnel (the Manager of Plant Operations

and an operations engineer). and two shift technical advisors who took the ATT SRO mock examinations. Tr. 20,584 (Newton).<sup>21</sup>

34. At Aamodt PF 20, Mrs. Aamodt states that "[a]udits by contractors are predictive of the outcome of NRC examinations." However, the citations to which she refers are inaccurate: in one case, there is no such citation, see Aamodt reference to Tr. 2,073 (Crocker) at Aamodt PF 20,<sup>22</sup> and in the other instance, Mrs. Aamodt has not accurately reflected the referenced witness's statement. See Tr. 12,725-26 (Kelly), which includes statements by Mr. Kelly related to the "modeling" of the PQS mock exam passing criteria after the NRC examinations.

35. We find no basis in the record for Mrs. Aamodt's conclusion that there is "no reason to expect that the operator candidates who failed the ATT audit will pass NRC licensing." Aamodt PF 22 (indented ¶). To the contrary, the evidence suggests that the mock exams are

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<sup>21</sup> Similarly, Mrs. Aamodt statement in Aamodt PF 19 that, "of the 11 passing [the ATT mock examinations], 5 were SRO candidates and 6, RO," citing Mr. Newton, only addresses the grades of normally on-shift personnel. Tr. 20,606 (Newton). Also, at Aamodt PF 18, Mrs. Aamodt states that fifteen of the 28 operators failed the PQS mock examination on the TMI-2 events (Category T) at the required 90% level. This is correct insofar as it represents the total number of on-shift personnel who took this exam, and the number who failed on the first try. (Subsequently, all but four had passed by the time the NRC written exam was administered; all will be required to pass prior to restart.) However, in addition, three TMI instructors passed the Category T exam, and two non-shift personnel failed that exam when it was initially taken. See Newton, ff. Tr. 20,580; see also Aamodt PF 102.

<sup>22</sup> Neither does this statement exist at Tr. 20,703 or Tr. 20,730.

intended to be more stringent than the actual NRC examinations in order to properly prepare candidates. Kelly, ff. Tr. 12,409, at 6, 7 ("The purpose of those [PQS mock] examinations was to exercise the operators with an examination of the type given by NRC to operator candidates in order to prepare the operators for such an exam and to provide the Company with a comprehensive examination of its licensed operators and candidates by an independent testing entity. . . . We sought to make the PQS exam, while similar to the anticipated NRC exam, more demanding"); Tr. 20,605 (Newton) ("The [ATT] audit was used to determine in our minds where the strengths and weaknesses were as a final preparatory device for the [NRC] examination"). See also Tr. 20,607, 12,335, 12,337 (Newton); Tr. 12,161, 12,163 (Long); Aamodt PF 21.

36. In her discussion of Licensee's certification of operators to sit for the NRC license examinations, Aamodt PF 23-25, Mrs. Aamodt's conclusion at Aamodt PF 25 (indented ¶) is that "the certification of competency by the highest level of management have not been based on the audits. The basis of certification needs to [be] established." This assessment is founded on a false premise. Certification by the Vice President of TMI-1 is not based on the audits alone, as Mrs. Aamodt suggests. Aamodt PF 23, 25. Nor is the basis for management's certification unclear. While Mr. Hukill bases his

judgment on whether to certify operators to take the NRC license exam in part on the results of the mock NRC examinations, he also receives express recommendations from the Supervisor of Operator Training, Tr. 12,234-35 (Newton), the O&M Director, Tr. 12,235, 12,178 (Newton), the Manager of Plant Operations, id., and has in hand the training records of the candidate operators. Id. From the Staff's vantage point, the certification requirement "is just one tool . . . to get [upper management] more involved in the operation of the plant and knowing the people that they have assigned to do specific jobs in the plant." Tr. 12,065-66 (Allerspach). The Staff expressed confidence in Mr. Hukill's ability to fully meet this responsibility. Tr. 12,066-67 (Haverkamp). We conclude that Licensee's certification of operators to take the NRC license exam is carried out properly, in accordance with Staff requirements.

37. Mrs. Aamodt next discusses the competency of the NRC to construct and administer operator licensing examinations. Aamodt PF 26-36. In addition to inaccurately representing the record throughout this series of proposed findings,<sup>23</sup> Mrs. Aamodt here reflects either her failure to

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23 Mrs. Aamodt's inaccurate paraphrasing of the record include the following statements: (1) Contrary to Mrs. Aamodt's assertion at Aamodt PF 26, Mr. Bruce Boger, the Staff witness from the Operator Licensing Branch of NRR who testified on the subject of NRC's license examinations and the adequacy of Licensee's training program, has both a Bachelor of Science (footnote continued next page)

understand or her unwillingness to accept the position of the Staff, which is clearly reflected in the citations to which

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and a Masters of Engineering degree in nuclear engineering. See Boger, ff. Tr. 12,770 (attached professional qualifications). (2) While it is true that Mr. Boger stated that he had not consulted with any experts in the field of test construction, see Aamodt PF 27, he also stated that his branch of NRR has hired two human factors psychologists to look at operator examinations, as well as the Staff's teaching and learning processes. Tr. 12,786 (Boger). (3) Mrs. Aamodt is totally mistaken when she states at Aamodt PF 33 that "[t]raining in mitigating core damage was not begun prior to the examinations. Staff Exhibit 13, at 12. Nor was training in abnormal transients (Abnormal Transient Operating Guidelines). Tr. 1287<sup>5</sup> (Boger)." Aamodt PF 33. With respect to training in mitigating core damage, Licensee's plant procedures and training program have been revised and taught to the operators to ensure that they understand the requirements for adequate core cooling and are provided the necessary information to evaluate core coolant conditions. See Licensee's Proposed Findings of Fact and Conclusions of Law on Plant Design and Procedures Issues in the Form of a Partial Initial Decision, June 1, 1981 (Licensee's Plant Design Findings), at PF 37-49. In particular, about 62 hours of the OARP alone related directly to the recognition of and response to approaching inadequate core cooling conditions. Id., at PF 45; Licensee PF 146. Also, phase three of the licensed operator program consists of six weeks of classroom instruction focusing, among other things, on mitigation of consequences of accidents resulting in core damage. See Licensee PF 134, citing Long et al., ff. Tr. 12,140, at 28, Licensee PF 137 and 141 n. 19. With respect to training in abnormal transients, while the so-called ATOG program is currently under development and when implemented will be accompanied by operator training on the use of the ATOG procedures which calls for a symptomatic rather than a diagnostic analysis of plant conditions, see Licensee's Plant Design Findings, at PF 92-99, Staff Exhibit 14, at 43-46, Lic. Ex. \_\_\_\_\_, at 4 (6-22-81), Licensee's CROs and SROs have received, and continue to receive in their requalification training, extensive training on abnormal transient analysis and the use of currently applicable procedures. See Licensee PF 134, 137, 141 n. 19, and 146. (4) While it is true that NRC has no test designed solely to test the capability of candidates to handle problems of an emergency in an emergency environment insofar as the Staff does not simulate the emergency environment during the exam, Tr. 12,857 (Boger), see Aamodt PF 34, the oral portion of the examination is conducted in a normal control room environment, e.g., with phones ringing. Tr. 12,857 (Boger). (5) Mrs. Aamodt's reference to Dr. Long's testimony in Aamodt PF 34 refers to "annual" drills (footnote continued next page)

Mrs. Aamodt refers. We, on the other hand, adopt the Staff's position, which in our view appears to be reasonable.

38. In Aamodt PF 27, Mrs. Aamodt states that Mr. Boger "does not determine reliability of validity of tests he constructs." While this statement may be Mrs. Aamodt's view of Mr. Boger's testimony, it is not a conclusion which is apparent from a review of the record. With respect to the concept of "validity," Mr. Boger testified that while he does not believe that the exams can be used as a predictor of performance after the exam, he considers the exams valid insofar as they test for demonstrated knowledge at the time of the exam. Tr. 12,797 (Boger); see also Aamodt PF 36. When Mrs. Aamodt interpreted this response by Mr. Boger to her question on cross-examination as an admission that there was no attempt by the NRC to determine whether the exams were valid or not, Mr. Boger responded that,

That is not exactly true. The examiners have had a lot of experience in the operation of nuclear power plants. We have seen how they operate. We understand what an operator has to know in order to perform his job, and we base the tests on that experience and knowledge. . . . [T]he NRC exams are designed to give us reasonable assurance that individuals can safely and competently operate the facility.

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in the control room, rather than bimonthly or weekly drills. Tr. 12,730-31 (Long). (6) Mrs. Aamodt criticizes Licensee's control room drills because they do not require the full-blown communications of an emergency, Aamodt PF 34. But see Tr. 14,275 (Giangi); Staff Exhibit 7, at 48, 72; Rogan et al., ff. Tr. 13,756, at 116-19.

Tr. 12,797-98 (Boger). It is these statements of Mr. Boger upon which Mrs. Aamodt relies in her statement that Mr. Boger does not determine the validity of tests he constructs. See Aamodt PF 27.

39. Similarly, with respect to the "reliability" of the NRC operator licensing exams, a term which Mrs. Aamodt defined as the ability of the exams to measure the same thing each time, Tr. 12,879-81 (Aamodt), Mr. Boger stated, "we consciously try to make the exams equivalent. . . . In the way we construct the tests, we would expect to find results that you suggest, that the same operator would receive an equivalent score on another exam." Tr. 12,850-51 (Boger). Thus, the record also does not support Mrs. Aamodt's position in Aamodt PF 27 that Mr. Boger does not determine the reliability of tests he constructs.

40. In Aamodt PF 30-31, Mrs. Aamodt asserts that "[t]he current NRC examinations are basically the same as those used prior to the TMI-2 accident," referencing testimony by Mr. Boger; Mrs. Aamodt then goes on to explain what she considers to be minor and, by inference, inadequate changes in the exams, i.e., there are now five or six questions rather than one question in the exam category on heat transfer and fluid mechanics. Aamodt PF 31.

41. In his prefiled testimony, Mr. Boger described the revisions to the scope and criteria of the NRC licensed examinations:

We increased the scope of the written examinations to include a new category dealing with thermodynamics, heat transfer, and fluid flow. Time limits to complete the examinations were imposed. Oral examinations for senior operators have been instituted. Finally, we have increased the passing grade criteria from 70% to 80% overall and have required a grade of at least 70% in each category.

Boger, ff. Tr. 12,770, at 3. See also Tr. 12,808, 12,809

(Boger expects that new questions related to the TMI-2 accident will be on the exam). Implicit in Mr. Boger's statement is the recognition of the fact that the NRC exams are "basically the same." At issue, however, is the sufficiency of the changes to the exam. While Mrs. Aamodt is not satisfied with the changes, see Aamodt PF 30-35, on the basis of a detailed review of the PQS-administered written and oral audit exams, which were modeled after the NRC's exams, Dr. Eric Gardner, on behalf of the OARP Review Committee, concluded that the examinations were effective and had achieved their major purpose. Gardner, ff. Tr. 12,409, at 7.

The examiners used a previously prepared set of topics to be covered, probed to determine depth of understanding, and used questions which required knowledge of important concepts in both theory and practice. Special emphasis was placed on safe operation, the safety devices built into the system, and the kind of action and diagnosis needed during transients.

Id. While the respective purposes of the NRC exams and the PQS mock exams are not identical, we believe it is reasonable to conclude that both tests are intended to verify that operators

achieve a certain specified level of proficiency in their understanding of plant systems and how they function, particularly in relation to each other. In view of the extensive experience of Dr. Gardner in educational and psychological measurement, psychometrics, test construction, and curriculum and program evaluation, we place particular significance on his conclusions in this regard. Id., at 2-4. In addition, we have had the opportunity to evaluate the Kelly exams ourselves, which are "formatted similar to NRC's techniques, and spanned all subject areas which NRC examinations of operators would be expected to encompass." Kelly, ff. Tr. 12,409, at 7; see also Kelly, ff. Tr. 12,409, at Appendices B and C. As Dr. Gardner suggests, the exams appear to be broad in scope, while at the same time demanding of detailed, thorough answers to questions which require the operators to understand both reactor theory and specific information about plant systems. On the basis of our review of the Kelly mock exams, which are described as similar to the NRC exams, as well as the testimony of the Staff and Licensee's expert witnesses, we are satisfied that the NRC exams encompass the necessary material and do so in an in-depth manner. Finally, we note that Licensee has made a commitment to have all of its operators who have not previously held NRC licenses take at the B&W simulator an NRC-administered examination, in addition to the written and operating examinations given at TMI-1. Lic. Ex. \_\_\_\_\_, at 3 (6-22-81).

42. In Aamodt PF 37-40, Mrs. Aamodt focuses upon what she terms the "coaching" effect of the mock NRC exams and Licensee's intensive two week training review program,

as well as the availability of past NRC exams, which she deems "an inadequate substitute for thorough learning." Aamodt PF 40 (indented ¶). Mrs. Aamodt's view is not shared by the expert witnesses. See Tr. 12,703 (Kelly); Tr. 12,849 (Boger).<sup>24</sup> We recognize that Licensee tries to train its operators to pass the NRC exam, and to that extent, "coaches" them. However, we are aware of no evidence which supports the proposition that Licensee's operators do not thoroughly learn the materials which they study during their regular training and continual retraining programs, as well as during the intensive review program prior to the NRC exams. Moreover, we find Mrs. Aamodt's interpretation of a Board statement<sup>25</sup> regarding the Staff's policy on staffing,

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24 Mrs. Aamodt cites to Tr. 12,733 (Kelly) in support of the proposition that, "Questions used by licensee and auditors may be identical to those on the NRC examination." Aamodt PF 37. The testimony on the referenced page, however, was by Dr. Gardner, in response to a question from the Commonwealth on the subject of control room operators having a college degree. But see Tr. 12,722-23 (Kelly: there is a likelihood that the questions included in the PQS exam could be encountered in the NRC exam, although he does not know what probability to assign to that "statistical happening").

25 The Board stated, in response to a statement by Mr. Crocker, of NRR, regarding the difficulties utilities are having "coming up with an adequate number of people to meet minimum requirements":

Will the staff be sensitive to that problem when you, as you state you will, assure that the Licensee has made adequate provisions of training additional SRO's and RO's? Your approach, then, is let's not put so much pressure on that we rob

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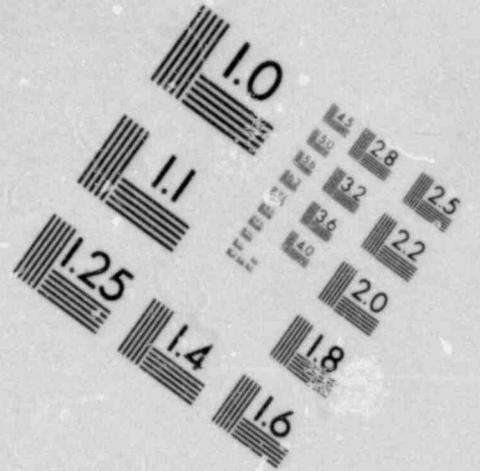
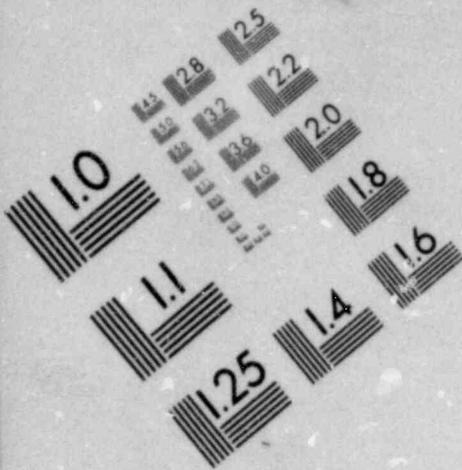
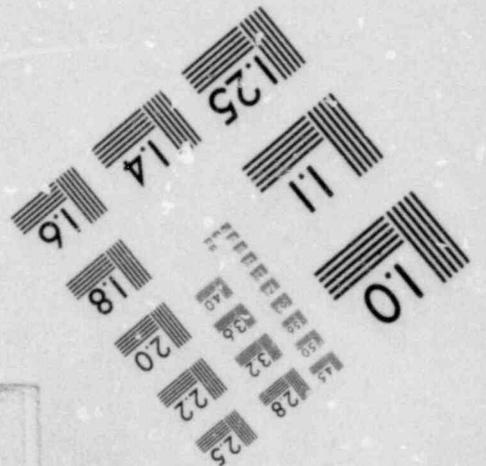
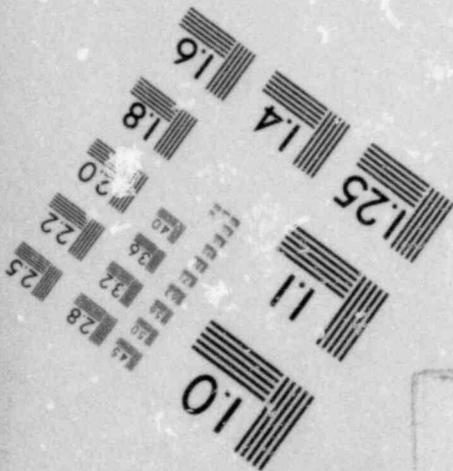
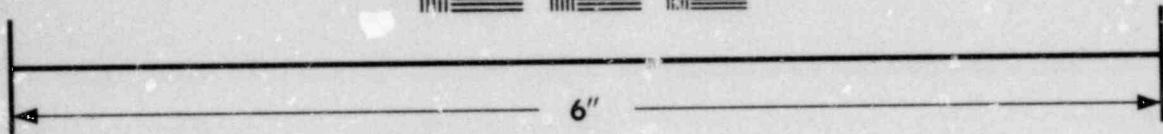
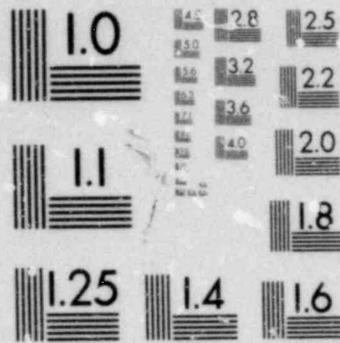


IMAGE EVALUATION  
TEST TARGET (MT-3)



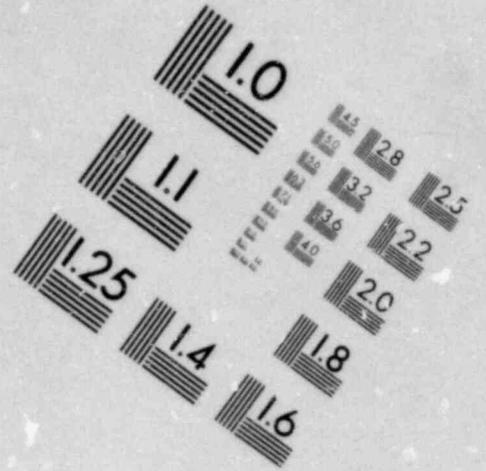
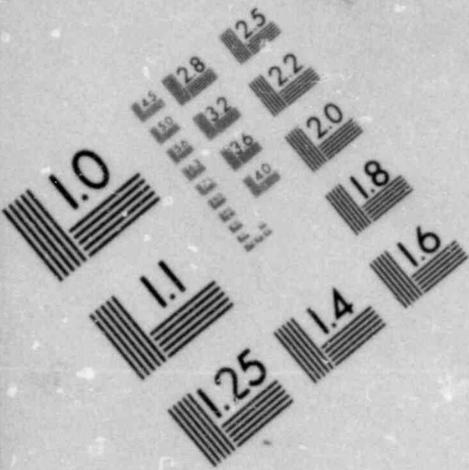
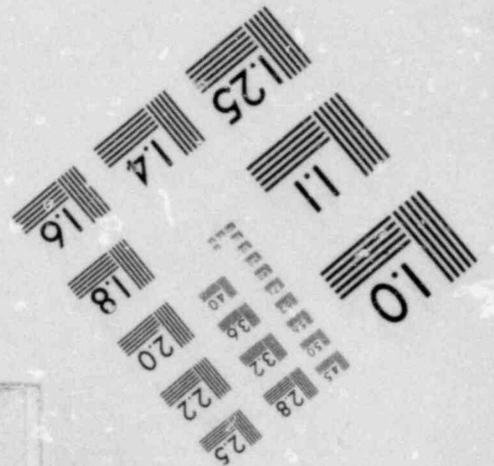
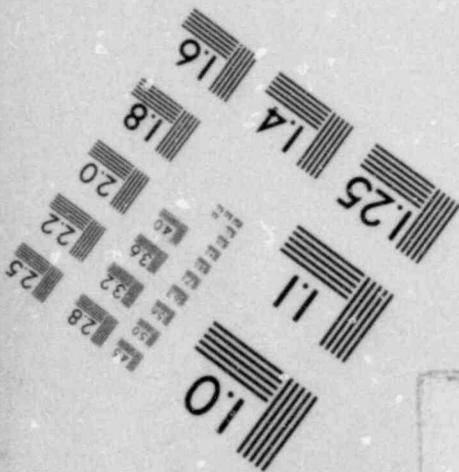
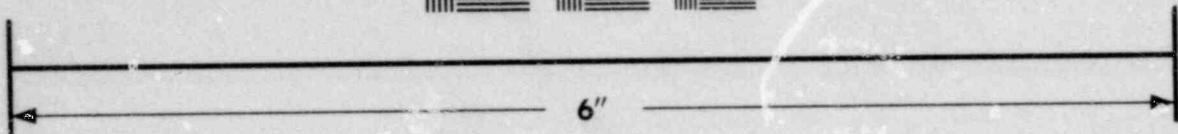
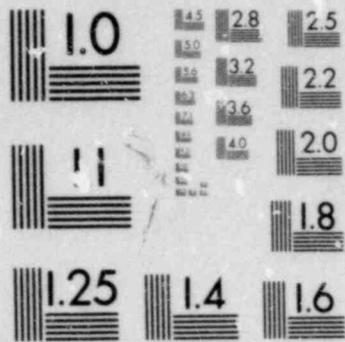


IMAGE EVALUATION  
TEST TARGET (MT-3)



and our concerns for industry-wide problems in addition to the issues involved in the TMI-1 restart hearing, to be a grievous abuse of the record, in view of the fact that the Board's statements, under any reasonable interpretation, did not even involve license examinations, much less the fact that "the examinations be made easier." Aamodt PF 39.

C. Shift Manning Requirements

43. Aamodt PF 41-54 pertain to NRC's shift manning requirements and, in particular, to the issue of whether Licensee ought to be required to have two SROs on duty during each shift.<sup>26</sup> As we discuss in connection with the proposed findings of the Commonwealth, see ¶¶ 8-13, supra, on the basis

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another utility and cause problems someplace else, but to assure that, at least with respect to this plant, that the resources are being manufactured -- are being produced.

Let me get directly to the point. Even though the jurisdiction of this Board is on the safe restart of TMI-1, we do not wish to ignore other industry problems. That is what I am getting to.

Tr. 12,062-63 (Smith).

26 This subject was not included in Mrs. Aamodt's originally filed proposed findings. With the concurrence of the Staff and Licensee, we agreed to permit Mrs. Aamodt to substitute a later draft of that document provided she only clarify her initial findings, and not substantively expand on them. Here, Mrs. Aamodt has not complied with this Board instruction.

of guidance from the Commission on the inapplicability to Licensee of the so-called Near Term Operating License (NTOL) requirements, including the requirement of "2+2" SROs and ROs on shift, the Staff concluded that "there is nothing unique to TMI-1 that requires a second SRO to be assigned on shift at restart." Staff Ex. 14, at 23; see also Tr. 20,744-75 (Crocker). We find no basis in the record to take issue with this Staff recommendation.<sup>27</sup> See Licensee PF 41. We also note

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27 We do take issue with the precision of Mrs. Aamodt's citations to the record in this portion of her findings.

Aamodt PF 41 states: "NRC admitted that if they had enforced the eligibility requirements to sit for licensing examination, the licensee would have been short of personnel. Tr. 20692 (Crocker)." In the context of this section of Mrs. Aamodt's findings, the reasonable inference here is that the shortness of personnel to which Mrs. Aamodt refers is based on the "2+2" requirement. However, the referenced discussion is actually about the number of operators who would have been eligible to sit for the NRC licensing exam if it were required that operators pass the Category T exam before taking the NRC licensing exam. (As previously discussed, this is not required. See ¶ 28, supra.) Mr. Crocker stated, in response to a question from Dr. Little, "I really have not compared those numbers, Dr. Little. I suspect they would have been on the short side as far as having what we would consider a bare minimum number of people to start the plant." Tr. 20,692 (Crocker). Furthermore, Mrs. Aamodt improperly characterizes Mr. Crocker's statement as an admission by the Staff that it was not enforcing the eligibility requirements to sit for the NRC licensing exam, a characterization which is not supported by the evidence.

Aamodt PF 42 states: "NRC has been concerned for some time that licensee has sufficient candidates for licensing to provide for attrition and overtime restrictions." Staff Ex. 13, at 4 & 5." First of all, this characterization of Staff Exhibit 13, as well as the earlier statements by the Staff in Staff Exhibit 5 (NUREG-0680, Supp. 1) which are referenced in the citation to which Mrs. Aamodt refers, is inaccurate. The

(footnote continued next page)

that while Mrs. Aamodt is correct that Licensee has not

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Staff did state in both documents that "prior to a recommendation for restart authorization, we would assure that the licensee had made adequate plans for training additional ROs and SROs for the long term." Staff Exhibit 13, at 4; Staff Ex. 5, at 11, 38. Whether this issue was of "concern" to the Staff is not clear. Moreover, nowhere in these citations does the Staff refer to the "overtime restrictions" which Mrs. Aamodt includes in her summary of the Staff's point of view. Finally, Mrs. Aamodt's reference to the record is very misleading because it fails to mention that in Staff Exhibit 13, at 5, the matter of Licensee having adequate plans for training of licensed operators for the long term is described as resolved to the satisfaction of the Staff.

Aamodt PF 43 states: "NRC found that the present number of candidates will probably not be sufficient to man a six-shift rotation. Lic. Ex. 13, at 4 & 5." Assuming Mrs. Aamodt is referring to Staff Exhibit 13, at 4 and 5, the Staff reached no conclusions with regard to manning a six shift rotation. The Staff did conclude that the number of operators taking the relicensing exam (17 individuals taking the RO exam, and 18 individuals, 5 of whom were not on shift, taking the SRO exam) "should be sufficient to assure that the licensee will have the minimum number of operators needed to staff a five-shift operation (10 ROs and 10 SROs)." Staff Exhibit 13, at 4-5. In reaching this conclusion, the Staff assumes a "2+2" shift, which the Staff subsequently found unnecessary prior to restart. See ¶¶ 8-13, supra. Consequently, although not stated therein, the number of personnel identified by the Staff in Staff Exhibit 13 as available for shift work is more than sufficient for manning six 2 RO, 1 SRO shifts.

Aamodt PF 46 states: "NRC found that the plant would be operated more safely with two SROs per shift. Tr. 20745 (Crocker)." Mr. Crocker did state at Tr. 20,745, that "In my view, a plant is in better shape with two SROs on-shift." However, he also stated, at Tr. 20,744, that "I am perfectly happy to settle for one SRO at startup for TMI 1, recognizing that a year from now, in July of 1982, they would add the additional SRO on-shift, as will be required for all operating plants at that time."

Aamodt PF 47 cites Mr. Crocker for the proposition that "to assure the overall safety," one of the two SROs originally required by NRC per shift at TMI-1 was to move around the plant. While the roving SRO plus control room SRO concept to which Mrs. Aamodt refers is an accurate representation of

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presented testimony on a five shift rotation, the rationale for this approach is the Licensee's expectation that it will utilize a six shift rotation. See, e.g., Licensee PF 37, 43, 118 and 138. However, we note that a six shift rotation is not an NRC requirement, see Licensee PF 138 n.18, and in the event Licensee chooses to change its shift rotation system, these changes must meet NRC's requirement for shift manning, overtime and requalification training. See NRC's Staff Report on Licensee's Commitments that the Staff will not Attempt to Enforce, at 2 (June 10, 1981).

D. Training for Stress in the Control Room

44. The next group of Aamodt findings, Aamodt PF 55-60, relate to communication requirements placed on control

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the record, Mr. Crocker did not state that this division of labor was necessary "to assure the overall safety." See Tr. 20,757 (Crocker).

Aamodt PF 50 states: "The backshift places an additional burden on the Shift Supervisor in that he is the senior person at the plant. Tr. 12663 (Allenspach)." While the evidence is clear that the Shift Supervisor is the senior person at the plant during the back shift and consequently, may need additional training to meet his responsibilities, there is no "additional burden" such as emergency-related duties, which are unique to the back shift. See Tr. 12,729 (Long). (Mrs. Aamodt's citation refers to the wrong witness. See Tr. 12,663 (Crocker).)

Aamodt PF 51-52 concern the relationship of the change from 2 to 1 SRO per shift to Licensee's emergency plan requirements. The concerns raised by Mrs. Aamodt have been addressed in detail, and to our satisfaction, in the Affidavit of Stephen Chesnut, dated May 29, 1981, at 2-5, ff. Tr. \_\_\_\_\_. See our findings on Emergency Planning, ¶¶ \_\_\_\_\_, infra.

room operators during an emergency, the impact of these requirements on operators, and the extent to which Licensee prepares its operators to cope with the stress inherent in emergency situations. While we understand Mrs. Aamodt's concerns in this regard, particularly her focus upon the measures taken by Licensee to prepare its operators for stressful conditions when those measures do not always include phones ringing in the background, we disagree with the substance of and the basis for her conclusion that "training has not provided for capabilities needed in the control room in emergencies." Aamodt PF 60 (indented ¶). As we have previously stated, see Board Finding \_\_\_\_, the measures taken by Licensee to prepare operators for the stress to which they will be subject in an emergency, and to minimize the stress experienced by operators, appear fully satisfactory. See Licensee PF 202, 204, 205. We believe Mrs. Aamodt misunderstands the importance of certain of the measures taken by Licensee, e.g., decision analysis training. See Aamodt PF 58. Mrs. Aamodt appears to conceive of this program as a method by which Licensee combines particular stressors, such as "the communications requirements" about which Mrs. Aamodt is concerned, and exposes supervisory personnel in the control room to these stimuli, thereby preparing them for actual conditions during an emergency. To the contrary, as Dr. Gardner explained, the purpose of decision analysis training is to provide to these individuals a method for approaching unknown, highly stressful

situations so that when a traumatic event occurs, they can use this method to systematically react to the event, rather than feel demoralized. Tr. 12,549 (Gardner); see also Tr. 12,540-43 (Kelly); Tr. 12,527-29 (Christensen). It is therefore irrelevant whether the decision analysis course is taught with phones ringing in the background.

45. We also find in this grouping of findings that Mrs. Aamodt's references to the transcript frequently do not support the statements which she uses them to support. For example, Aamodt PF 55 cites to Licensee Exhibit 30, the GPU Nuclear Emergency Plan for TMI-1, Revision 3, January 1981, for the proposition that "[d]uring an emergency, there are requirements to communicate with off-site officials who cannot be helpful in solving the emergency." While Licensee Exhibit 30 does review the control room communication function, including the use of the shift supervisor's office after the initial emergency notifications, nowhere in that document is there any suggestion, as Mrs. Aamodt asserts, that communications with unhelpful off-site officials take place.<sup>28</sup>

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28 Similarly, Mrs. Aamodt mischaracterizes the evidence in the following findings:

Aamodt PF 56 states: "Licensee's experts had not determined how the capabilities of the operators are affected by the burdens of communication. Tr. 12521 (Christensen); 12549 (Gardner); 23722 (Kelly)." This is not an accurate representation of the record. Mrs. Aamodt's citation to Dr. Christensen references the witness' explanation of the complex nature of the interrelationship of several stressors, such as stress produced in a reactor (footnote continued next page)

## E. Simulator Training

46. We disagree with Mrs. Aamodt's conclusion at Aamodt PF 72 (indented ¶) that Licensee's simulation training

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(continued)

operator from the onset of a transient and stress produced in a reactor operator from telephones ringing, and the fact that when stressors are combined, the result is not necessarily additive, but could be subtractive (i.e., counteract each other) or synergistic. Tr. 12,520-21 (Christensen). Dr. Christensen made clear that in his opinion, since the simulator in and of itself is stress inducing, operators at the simulator are evaluating and taking action during simulated transient events while feeling other stress. Tr. 12,519 (Christensen). At the same time, Dr. Christensen does not believe that the state of the art would enable anyone to state authoritatively that a particular stress in combination with another stress will be additive. Tr. 12,520-21 (Christensen). This viewpoint, however, is not concomitant to Mrs. Aamodt's assertion in Aamodt PF 56, unless Mrs. Aamodt intends to state that Licensee's expert, Dr. Christensen, cannot predict precisely how the capabilities of the operators are affected by the burdens of communication. Similarly, at Tr. 12,549, Dr. Gardner stated, in response to a question from Mrs. Aamodt, that the results of the decision analysis training cannot be used to predict reliably the performance of operators during an actual emergency, consistent with his view that no method exists to ensure that an individual will behave stably under virtually any stressful situation. See also Tr. 12,529, 12,552 (Gardner); Licensee PF 204. Dr. Gardner was of the view, however, that decision analysis training would effectively mitigate external problems such as phones ringing or anything else that could occur, in the event an operator was faced with a reactor emergency. Tr. 12,549, 12,553-54 (Gardner). Finally, the citation to Mr. Kelly at Tr. 23,772 in Aamodt PF 56 is incorrect; Mr. Kelly's entire testimony spans Tr. 12,406-750.

Aamodt PF 57 states, "The communications requirements were not simulated during training at the B&W simulator. Tr. 12730 (Long)." This is also an inaccurate citation. At Tr. 12,730, Dr. Long is discussing the regular emergency drills which are conducted, which include communication links.

Aamodt PF 59 references a statement by Dr. Long and several statements by Dr. Gardner to support the finding that "Licensee's expert and management were not confident that the week of training in Decision Analysis given to Shift Supervisors and other management was sufficient." This is a gross distortion of the record. Dr. Long testified that "[t]he decision analysis course in and of itself is not going to prepare TMI personnel to handle unanticipated events. The totality of the training program we believe is going to prepare them to handle unanticipated events. The decision analysis course is one part of that pro-

(footnote continued next page)

program is highly deficient, and Licensee must utilize a replica simulator. See generally Aamodt PF 61-72. While training on a replica simulator is a valuable experience, Aamodt PF 71, we are satisfied that training on the B&W simulator is also valuable, when accompanied with other aspects of Licensee's overall training program such as on-the-job training (OJT), extensive training in relevant subject areas, decision analysis training, and training as a shift team. See Tr. 12,512, 12,741-42; (Christensen); Licensee PF 131-151, 192-195, 204-205.<sup>29</sup> Mrs. Aamodt's position here is again supported by inaccurate citations to the record.<sup>30</sup>

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gram." Tr. 12,169 (Long). The Gardner testimony which Mrs. Aamodt cites in support of Aamodt PF 59 consists of a discussion by Dr. Gardner of the value of decision analysis as a method to systematically handle emergencies, not as a means by which Licensee can predict how well operators will respond during an emergency. Tr. 12,549, 12,522 (Gardner). See discussion of Aamodt PF 56, supra.

29 In any event, Licensee has committed to prepare for bids and distribute prior to April 1, 1982, specifications for a TMI-1 exact replica simulator anticipated to be installed in 1985. In the interim, our conclusion is further substantiated by Licensee's commitment to (i) have available for use at TMI-1 prior to restart the cathode ray tube (CRT) part-task simulator which displays temperature and pressure as described by Dr. Long at Tr. 12,258-63; and (ii) contract, prior to restart, for a basic principles trainer for TMI-1 anticipated to be installed in 1982 and, following its availability, to provide for each operator as a part of annual requalification training at least one week of training per year on this trainer in addition to the week each year at B&W's simulator, at least until Licensee's exact replica simulator is available. Lic. Ex. \_\_\_\_\_, at 3 (6-22-81)

30 Aamodt PF 62 mischaracterizes the testimony of Mr. Michael Ross, Manager of Plant Operations at TMI-1. While Mr. Ross did (footnote continued next page)

F. Operator Attitude

47. Aamodt PF 74-77 relate to the sense of responsibility of Licensee's operators and the use of the

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(continued)

state that a first look would tell you that the control room of the B&W simulator is much smaller and much more limited in scope than the TMI-1 control room, fr. 12,250 (M. Ross), he also stated:

But to compare its effectiveness in training, I think it simulates well anything that we would see on the nuclear steam supply system, and it simulates well all accidents and training that we need to mitigate those accidents. I think it is acceptable the way it is.

Id.

In Aamodt PF 63-66, concerning the appropriate number of simulator hours to which operators ought to be subject as part of a regular training program, and the number of hours Licensee's operators spend at the B&W simulator, Mrs. Aamodt's understanding of the record does not comport with ours. See Board Finding \_\_\_\_\_ (Licensee PF 194). The evidence indicates that Licensee's operators have received one full day of training on the simulator on the TMI-2 event, during which the accident was simulated, followed by a practice session, Tr. 12,158 (M. Ross), Long et al., ff. Tr. 12,140, at 29-30; 16 hours on the simulator during the OARP; and, 20 hours on the simulator during annual requalification training, Tr. 12,156-57 (Long). Like amounts of time were spent in classroom sessions at the Lynchburg facility. Id. As we understand the recommendations of the experts in this field, the special program outlined above, as well as Licensee's regular simulator programs for new candidates and requalifying operators is sufficient. See Licensee PF 196.

Aamodt PF 67 states that "Licensee's experts strongly recommended the acquisition of a replica simulator of the TMI-1 control room. Lic. Ex. 27, at 144." While full replica simulators were endorsed by the OARP Review Committee, acquisition of a full replica simulator was not considered necessary in the "short term," that is, within the next two years. See Lic. Ex. 27, at 103, 142, 144.

Aamodt PF 68 states that "[t]he experts also recommended that an employee or two be specifically trained to coordinate the simulator program. Lic. Ex. 27, at 98." In fact, the OARP Review Committee Report states, in connection with its discussion of a full-replica simulator for TMI-1, "Special skills are required of simulator instructors if maximum return for time and money inves- (footnote continued next page)

simulator to develop that attitude. While we agree with Mrs. Aamodt that the paging system at TMI-1 has been misused, Aamodt PF 74, and that a personal sense of responsibility is needed by control room personnel, Aamodt PF 74, we do not believe that "the licensee has not seriously considered the evidences of serious lack of responsibility of management and personnel to each other and to the public." Aamodt PF 77 (indented ¶). To the contrary, our own impressions of Licensee's staff who testified during the course of this hearing, including senior level management and TMI-1 staff members, is that Licensee is well aware of the responsibilities of operating a nuclear

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ted is to be realized. Met-Ed may wish to send at least one qualified person to a suitable training course for simulator instructors." Lic. Ex. 27, at 98 (emphasis added). In connection with its use of B&W's simulator, Licensee's training staff are actively involved in the simulator programs which Licensee's operators attend. Long, ff. Tr. 12,140, at 29-31. In Aamodt PF 68, Mrs. Aamodt also states that the B&W simulator program has been severely criticized by recognized authorities. The reference to which she refers is the criticisms of a member of the technical staff report to the Kemeny Commission Report, written in the aftermath of the TMI-2 accident. However, Mrs. Aamodt does not indicate that these criticisms antedate the measures taken by Licensee to improve the TMI-1 simulator training program at the Lynchburg facility. See Tr. 12,500 (Christensen); Tr. 12,149 (Long); Long et al., ff. Tr. 12,140, at 29-31; Licensee PF at 192-195.

Finally, in Aamodt PF 72, Mrs. Aamodt references the OARP Review Committee Report, Licensee Exhibit 27, at 98, for the proposition that "[t]he mock [up] of the control room is a completely inadequate training devise." There is nothing on the referenced page which in any way supports or is even topically related to this statement.

reactor. This impression is supported by uncontroverted evidence that Licensee conveys this sense of responsibility specifically in its training programs, and, generally, in the manner it conducts its nuclear business. See, e.g., Licensee PF 21-23, Tr. 12,308-12, 12,326-28, 12,635-36 (Long); Arnold, ff. Tr. 11,434, at 34-35. This view was shared by virtually all of the witnesses who testified on the subject. See Licensee PF 21-23, 206.<sup>31</sup>

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31 Mrs. Aamodt's position is not supported by the record.

Aamodt PF 75 cites Dr. Long for the proposition that Licensee does not call to the attention of the training crews the real world consequences of errors that are committed by operators at the simulator. This statement is absolutely at odds with the statements of Dr. Long, who explained that at the simulator, when operators have proceeded to a point in a sequence which leads to fuel failure, that fact is clearly identified and discussed with them. Tr. 12,635 (Long). While the instructor may not explain the environmental consequences of that fuel failure, this is because the operators have that training in the classroom and know what the consequences of failed fuel are and where that leads and how radiation would be released into the containment structure. Tr. 12,636 (Long).

Aamodt PF 76 states: "Licensee assumes knowledge of accident potential by operations personnel. Tr. 12310, 12326-7 (Long). Accident potential is not included in general employee training. Id." This paraphrasing of the testimony severely distorts it. Dr. Long indicated that part of the General Employee Training and employee briefings administered by supervisory personnel is imbuing Licensee employees with a responsible attitude, and a concern and a knowledge of their responsibilities for their own radiation protection, the protection of their fellow workers and the protection of the general public. Tr. 12,308-09 (Long). Dr. Long also stated that a recognized training goal and objective is instilling the employee with motivation, esprit d'corps, and a sense of responsibility, although he would not describe it as a program, but rather an element in the General Employee Training program. Tr. 12,309 (Long). While General Employee Training does not (footnote continued next page)

G. Qualifications of Training Managers

48. Aamodt PF 77 states, inter alia, that "[t]he Director of Training and Education was not aware if a conservative approach used in biological laboratories was required" of

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address accident analysis and possible consequences of accident. Dr. Long believes that this training is not necessary in GET in view of the fact that the program has presentations on the biological effects of radiation, the potential hazards of radiation to pregnant women, and the kinds of concerns that are specifically the responsibility of every individual on the island, whether they are a secretary, utility worker, or a manager. Tr. 12,310 (Long). With respect to the training given to operators, Dr. Long specifically stated that "[t]he people who are responsible for understanding the details of the technical operations of the plant and the consequences of the accident are our operations personnel and they are indeed trained very thoroughly in those aspects." Tr. 12,310-11 (Long). Later on in his testimony, Dr. Long did state that he believed one could make certain valid assumptions about individuals who have been trained in the nuclear engineering field, namely, that they are going to have studied as part of their education WASH-1400 consequences, and safety analyses. Licensee does not teach this material unless it perceives a weakness in that area. Tr. 12,327 (Long). However, the control room operators are trained in Chapter 14 of the FSAR, which is the accident analysis section. Tr. 12,328 (Long).

Finally, in this section of her findings Mrs. Aamodt ignores the following statement by Dr. Long:

I do not see that it is possible at this point in time for anybody associated with TMI to not understand the consequences and potential consequences o[f] serious accidents. Our personnel, from the bottom to the top, are very sensitive to that and it is certainly part of our whole operational philosophy. People must understand the possible consequences of a nuclear accident both in terms of the risk to the company as well as the risk to the public. It seems to me that this is a fundamental element of our training program.

Tr. 12,312 (Aamodt).

TMI-1 chemists in their handling of samples. While this assertion is true insofar as it is intended to reflect the unfamiliarity of Dr. Long and other individuals not involved in chemistry technician training with the TMI-1 chemistry procedures, it does not take into account Dr. Long's awareness of the fact that the training curriculum for the chemistry technicians includes a large component on how to handle samples which are potentially radioactive. Tr. 12,303 (Long).

49. Aamodt PF 78-90 pertain to the qualifications of Licensee's training staff, particularly the Director of Training and Education, Dr. Long, the Manager of Training at TMI, Dr. Knief, and the Supervisor of Operator Training at TMI, Mr. Newton. We reject Mrs. Aamodt's view, implicit in these paragraphs, that Drs. Long and Knief and Mr. Newton are unqualified to serve in the positions in which they have been placed by Licensee. See Board Findings \_\_\_ (Licensee PF 120, 122, 124). We also reject Mrs. Aamodt's conclusion, Aamodt PF 90 (indented ¶) that the Training Department lacks resources to communicate with operators they are training, which we find unsupportable. Finally, we abhor Mrs. Aamodt's use of the record in this section of her findings to discredit these individuals through misquotations to and misrepresentations of the record.

50. For example, Mrs. Aamodt suggests that training is not given sufficient importance in Licensee's organization,

since "[t]he Department of Training and Education for GPU Nuclear is not represented on the organization chart. Arnold at Att." Aamodt PF 78. While the formal name of the Department is not listed on the GPU Nuclear Corporation or Group charts attached to Mr. Arnold's testimony, the training function is specifically identified in both the charts and in the body of Mr. Arnold's testimony. Arnold, ff. Tr. 11,434, at 15, 21-22, 32, Figures 1 and 3, and attached charts 8 and 9.

51. Mrs. Aamodt also states that Dr. Long's background has been "essentially academic," Aamodt PF 82, which is simply not true. Dr. Long's background, in fact, offers a rather unique and impressive blend of both academic experience as a university department head and technical knowledge due to his practical experience as a reactor operator. See Licensee PF 120 n.14.

52. Aamodt PF 82 avers that Dr. Long denied the importance of thorough training of nuclear power plant personnel. To the contrary, the first sentence of Dr. Long's testimony, and the thrust of the 54 pages that follow, along with Dr. Long's oral testimony, is that "[t]he operation and maintenance of a nuclear facility such as Three Mile Island Unit 1 must be supported by an extensive and diversified training program, including formal classroom instruction as well as on-the-job training activities." Long et al., ff. Tr. 12,140, at 3.<sup>32</sup>

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32 Mrs. Aamodt relies, here, on Dr. Long's statement that (i) the training program does not cover WASH-1400 consequences, (footnote continued next page)

53. There is no evidence at the citation referenced in support of Aamodt PF 85 that Dr. Knief "is unfamiliar with safety procedures in the Chemistry Department." See Tr. 12,300 (Knief). Contrary to Mrs. Aamodt's statements in Aamodt PF 85, Dr. Knief did not state at Tr. 12,188 that he "did not consider the academic qualifications of the instructors important";<sup>33</sup>

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unless a weakness is perceived and identified in this subject area, Tr. 12,327, discussed in n. 14, supra; (ii) there is no specific training in the use of the page system, Tr. 12,308; (iii) he does not know in detail the chemistry procedures, Tr. 12,303, discussed in ¶ 48, supra; and (iv) training in accident consequences varies according to who is involved, e.g., secretaries taking GET, operators taking operator training, Tr. 12,310, 12,326-27. We find none of these references supportive of Mrs. Aamodt's characterization of Dr. Long's views on the importance of training.

33 Rather, in explaining his satisfaction with the qualifications of the TMI instructors, Dr. Knief stated:

. . . I consider the specific academic qualifications and the particular schedule [of how intensively classes are scheduled over a period of time] to be among the least important aspects of what I call the university education principles. I consider the most important to be the delivery of appropriate material.

And I have been extensively involved in continuing education activities where we teach people out of the normal classroom rotation. And I think one of the most important things is to fit the training program to the schedule upon which the individuals are available, rather than trying to force-fit the individuals into something that has been preconceived for the convenience of the university or the faculty member.

I think the things that I can bring from my university background have more to do with the quality of the education than with the format. I

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neither did Dr. Knief make "unclear distinctions between training and education." See Tr. 12,186-87, 12,190-91. Mrs. Aamodt's reference to Dr. Knief's "limited formal training in teaching principles," Aamodt PF 86 (first)<sup>34</sup> ignores Dr. Knief's extensive educational and technical credentials. See Licensee PF 122 n.15. It also ignores the testimony given by Dr. Knief in response to the question proffered by Mrs. Aamodt, which is referenced in Aamodt PF 86 (first), that he has been critiqued by educational specialists during the course of his on-the-job training as a teacher, and that the TMI Training Department includes individuals with "some pretty good expertise, both along the lines of the on-the-job training, of which I am speaking happens so frequently at the university, in addition to those who are well steeped in the theory of educational processes." Tr. 12,183 (Knief).

54. Mr. Aamodt is correct that Dr. Long is not planning to attract degreed engineers to TMI-1 and bring them

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have some extremely capable instructors, and the fact that the majority of my licensed operator instructors do not have degrees bothers me very little, because I believe that in almost all cases they are very good instructors. They are very well suited to the kind of education that they need to provide to the operators.

Tr. 12,188-89 (Knief).

34 Page 10 of Mrs. Aamodt's proposed findings initially skips PF 83, then includes a PF 83 after PF 84-86. Following the second listing of PF 83 is a second PF 84-86, which consist of different findings than the first PF 84-86.

through a program which parallels that of the regular operator trainees, who have a high school education. See Aamodt PF 83 (second). However she fails to mention the fact that Licensee is pursuing aggressively ways to upgrade the formal education of its operators. Tr. 12,294-95 (Long); Long et al., ff. Tr. 12,140, at 50-51.

55. Mrs. Aamodt's characterization of Mr. Newton's qualifications at Aamodt PF 84 (second) and 87 unfairly distorts Mr. Newton's credentials.<sup>35</sup>

56. Aamodt PF 88 states, inter alia, that "it is difficult to find appropriate people who will come to the plant site to teach." The referenced passage, Tr. 12,223 (Knief), does not support this assertion, and we are not aware of any other evidence which does so.

#### H. OARP

57. Aamodt PF 91-109 discuss perceived inadequacies of both the OARP, and the qualifications of Licensee's operators and certain specified managers. Many of the facts and

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35 Mr. Newton's credentials include B.S. and M.S. degrees, attendance at the U.S. Navy's Basic Nuclear Power School, Nuclear Power Prototype School, submarine school, and Submarine Officers Advance Course, Navy qualifications which are roughly comparable to the NRC SRO qualification and the qualifications necessary to serve as Supervisor of Plant Operations, several years of training experience, and experience as the Chief Engineer responsibility for all facets of operation and maintenance aboard a nuclear propulsion submarine, including the training and qualifications of its operators. Licensee PF 124; Long et al., ff. Tr. 12,140, at 17.

citations upon which Mrs. Aamodt relies in this section of her findings are inaccurate.<sup>36</sup> Moreover, unlike Mrs. Aamodt, we

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36 Included in this portion of Mrs. Aamodt's findings are the following errors: (1) Contrary to Mrs. Aamodt's assertion, Aamodt PF 91, Mr. Ronald J. Toole, the Operations and Maintenance Director, has been at TMI much longer than a year, that is, for over 3 1/2 years from 1971 to 1974 (at TMI-1), for over four years from 1974 to 1979 (at TMI-2), and for over a year from 1980 to 1981 (at TMI-1). See Hukill, ff. Tr. 11,617, at 9-10. (2) In Aamodt PF 92 and 94 (there is no Aamodt PF 93), Mrs. Aamodt's statements are accurate, but the citations to the record are not. Specifically, her citation in Aamodt PF 92 to Mr. Newton at Tr. 12,345 is wrong; the correct citation is Tr. 12,234-35 (Newton). Similarly, Mrs. Aamodt's citation to "Lic. Ex. ff. 20755, at 1" in support of Aamodt PF 94 is wrong; the testimony in question follows Tr. 20,580. (3) Aamodt PF 99 states: "The record indicates the amount of change is about once in six weeks, and doesn't count a change from day to evening shift." However, the citation to which Mrs. Aamodt refers in no way supports this assertion. To the contrary, in his discussion of the shift rotating schedule, Mr. Ross indicates at Tr. 12,245 that "[a]s a clarification, we have six rotating shifts. The work hours for three of those shifts are seven to three, and they are back-to-back, so the guy really does not change hours every week." (4) Aamodt PF 97 (second sentence) and Aamodt PF 98 are not supported by any citations to the record. (5) In Aamodt PF 102, Mrs. Aamodt states that six candidates failed or marginally passed the oral examination, citing Licensee Exhibit ff. Tr. 20,577, at 1. The referenced chart indicates that five candidates failed or marginally passed the oral exam. Moreover, two of these individuals are no longer licensed operators or trainees. (6) Aamodt PF 104 cites Dr. Long for the proposition that the OARP Review Committee concluded that there were no accreditation criteria to follow. Here, Mrs. Aamodt is taking Dr. Long's testimony entirely out of context in order to criticize the OARP and/or its Review Committee. As Drs. Long and Gardner explained to Mrs. Aamodt at the transcript page which she references, the OARP Review Committee was not trying to accredit to an engineering curriculum criteria, but was examining the OARP in order to assess the program, give some indication of its quality, and determine in what ways the Committee would make suggestions that would improve the program. Tr. 12,589 (Long, Gardner). These objectives are the basic objectives of any accreditation program. Tr. 12,589-90 (Gardner). The OARP Review Committee therefore based its review on accreditation principles. See (footnote continued next page)

are satisfied that the OARP was a thorough training program, and find that it, along with Licensee's subsequent requalification training program, fulfills the Commission's requirement in its August 9, 1979 Order, section II.1.(e), that Licensee retrain its reactor operators, including training in certain specified subject areas pertinent to the TMI-2 accident and at the simulator, and re-examine the operators on the material covered in this training program. See Board Finding \_\_\_\_ (Staff PF 36-40, 43; Licensee PF 138-49, 199). As we stated earlier,

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also Long et al., ff. Tr. 12,140, at 42. (7) Mrs. Aamodt cites the OARP Review Committee Report, Licensee Exhibit 27, at 146 in support of Aamodt PF 105 (first sentence) which states: "The committee found that the instructors were lacking in teaching ability." This is not an accurate representation of the record. At the cited passage, the Committee is discussing its recommendations for improving instruction. Furthermore, Mrs. Aamodt continues the practice of ignoring testimony given in response to her own questions. As Dr. Gardner explained during his cross-examination by Mrs. Aamodt, these specific recommendations reflect the fact that in Dr. Gardner's view, instructors should be continually educating themselves and should study teaching-learning principles, although they need not take formal courses in education or psychology. Tr. 12,618 (Gardner). When Mrs. Aamodt asked Dr. Gardner whether these recommendations indicate to him that the instructor qualifications needed to be improved, he responded that in his view, that is always the case. Tr. 12,617 (Gardner). (8) It is strictly Mrs. Aamodt's interpretation of the record that "Licensee explained that ratings [of instructors] have little validity. Tr. 13220-1 (Long)." Aamodt PF 108. The citation to which Mrs. Aamodt refers is Dr. Long's rebuttal testimony to Attachment 2 to Mrs. Aamodt's testimony, entitled "OARP Quiz Results as a Function of Instructor Ratings." Tr. 13,219 (Long). In particular, Dr. Long does not believe that the scattering of data used by Mrs. Aamodt reflects adversely on the instructional capabilities of the instructors in the TMI training department. Id.

Board Finding \_\_\_\_, our viewpoint is shared by all of the witnesses who testified on the subject with the exception of Mrs. Aamodt, including experts who reviewed the OARP and evaluated its format and content. See Staff PF 41-42; Licensee PF 150-51, 175-82. We also do not agree with Mrs. Aamodt that the individuals in charge of TMI-1 operations are unqualified as managers. See Aamodt PF 91-96. Our conclusion is based on the extensive experience of Messrs. Hukill, Toole and Ross in the nuclear technology field, including their previous management experience. See Licensee PF 36, 38, 39.<sup>37</sup> Finally, we find inconsistent Mrs. Aamodt's assertions about the deleterious effects of Licensee's six shift schedule, compare Aamodt PF 98 with Aamodt PF 99, and at best, inconclusive. See Aamodt PF 97-100. The evidence is clear that during three of the five shifts TMI-1 workers are on duty (with a sixth shift off), the shift operating staff work from 7 a.m. to 3 p.m., i.e., the shift "rotates" functions but the working hours remain the same. Tr. 12,245 (M. Ross). Moreover, one of the remaining two on-duty shifts is from 3 p.m. to 11 p.m., which

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37 In addition, we are further assured of the capability of Licensee's TMI-1 managers by Licensee's commitment to provide, prior to restart, to the members of Licensee's senior management who have joined Licensee in the last two years and who are designated to act as Emergency Directors or as Emergency Support Directors, a formal training course addressing site-specific plant design features. Lic. Ex. \_\_\_\_\_, at 4 (6-22-81).

does not impact regular sleeping hours. Id. While the record does not indicate whether Licensee's six shift schedule is the optimum system for rotating shift operating personnel, it is the shift schedule which the operators themselves prefer -- not an irrelevant consideration -- and we have no reason to believe that it is not perfectly satisfactory. Tr. 11,656 (M. Ross).

I. Conclusion

58. Based on our evaluation of the bases upon which Mrs. Aamodt's findings of fact rely, as well as our own independent consideration of the record evidence, we reject the conclusions of law proffered by Mrs. Aamodt. In particular, in connection with Mrs. Aamodt's contention on training, we conclude that (1) Licensee's accelerated and requalification training programs satisfactorily augment the training of all TMI-1 reactor operators and senior reactor operators; (2) prior to restart, Licensee will have conducted a 100 percent examination of all licensed operators in the areas of natural circulation and small break loss of coolant accidents, including revised procedures and the TMI-2 accident; and (3) Licensee has made ample provision for sufficient numbers of capable reactor operators and senior reactor operators to man TMI-1, taking

into account overtime restrictions and attrition. See Aamodt  
Conclusions of Law 1-3.<sup>38</sup>

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE

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Dated: June 29, 1981

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38 Similarly, we reject Aamodt conclusions of Law 4 and 5, which encompass the entire management issue. Aamodt Conclusions of Law 4 and 5 state:

4. The Licensee does not have the management or technical resources to operate the plant safely.
5. The Licensee should not be allowed to restart the plant.