UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

MAY 1 0 1981

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

COMMONWEALTH OF PENNSYLVANIA'S
PROPOSED FINDINGS OF FACT AND
CONCLUSIONS OF LAW ON MANAGEMENT ISSUES

A. INTRODUCTION AND EXPLANATION OF THE COMMONWEALTH'S APPROACH TO FINDINGS AND CONCLUSIONS IN THIS PROCEEDING

The Commonwealth's general plan of participation in this proceeding was set forth in the "Commonwealth of Pennsylvania's Report on Positions Formulated Based on Information Available as of July 25, 1980." In relevant part, the Commonwealth stated that:

> (4) Pennsylvania will adopt a strong position on all questions of burden of proof. The general rule established by 10 C.F.R. §2.732 is that 'the applicant or the proponent of an order has the burden of proof.' Essentially, Metropolitan Edison is seeking an order permitting it to restart the Unit 1 reactor. The burden of proof thus is clearly on the licensee to demonstrate that such an order would be consistent with the public health, safety and interest. ....
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> (5) The unique status afforded to state agencies by §274 of the Atomic Energy Act and 10 C.F.R. §2.715(c) enables Pennsylvania to reserve judgment on any question of fact or issue of law on which it currently elects not to adopt a position. Pennsylvania hereby reserves its right to file proposed findings of fact and exceptions and to participate actively in the Commission review regardless of the position it adopts on a particular issue at this stage of the proceeding.[5]

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5. See In re Gulf States Utilities Co., ALAB-317, March 4, 1976, reprinted in 2 NUC. REG. REP. (CCH) ¶30, 053.02.

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Pennsylvania adopts this position due to its status as a representative of the public interest[6] and its desire to reserve judgment regarding issues on which there currently exists insufficient evidence to render a rational decision.

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6. See In re EXXON Nuclear Co., Inc., ALAB-447, Dec. 13, 1977, reprinted in 2 NUC. REG. REP. (CCH) ¶30, 255 (concurring opinion of Salzman, Member, ASLAB).

In its proposed findings and conclusions on management issues set forth below, the Commonwealth takes advantage of its right to adopt positions and "advise the Commission" on a number of discrete issues. 42 U.S.C. §2021(1); 10 C.F.R. §2.715(c). The Commonwealth does not, however, propose findings and conclusions on all relevant management issues in the proceeding. The Commonwealth assumes that the Staff and the adversary parties will submit comprehensive proposed findings and conclusions on management issues.

The Board should not infer from the Commonwealth's decision to propose findings and conclusions only on discrete issues that the Commonwealth has not reviewed the entire record on management issues. Rather, the Commonwealth simply elects to exercise its right to advise the Commission on specific management issues on which the Commonwealth perceives deficiencies that need to be remedied. The Board may infer from this procedure that these are the only deficiencies in Licensee's management capabilities that the Commonwealth finds need to be remedied. In general, the Commonwealth does find that Licensee has met its burden of proof on management issues other than those cited below. However, this does not mean that the Commonwealth adopts specific findings and conclusions proposed by any other party. Moreover, the Commonwealth reserves its right to participate as a full party on all issues on

appeal. Gulf State Utilities Co. (River Bend Station, Units 1 and 2) ALAB-317, March 4, 1976, 2 NUC. REG. REP. (CCH) ¶30,053.[1]

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1. The Commonwealth has participated actively in all phases of this proceeding, thus meeting the requirements stated in ALAB-317.

B. PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

I. Burden of Proof on Management Issues

26. The Board places a very heavy burden of persuasion upon Licensee to demonstrate its management capabilities with respect to all management issues raised by the Commission. A similar burden of persuasion is imposed on issues raised in contentions once the intervenor has met a threshold burden of production necessary to require reasonable minds to inquire further into the issue.

27. The general standards for burden of proof on management issues was set forth in Carolina Power and Light Co. (Shearon Harris Nuclear Power Plant, Units 1, 2, 3, and 4) Supplemental Initial Decision, July 13, 1979, 2 NUC. REG. REP. (CCH) ¶30,406: (Emphasis added.)

> 194. It is, of course, fundamental to Commission licensing law that an applicant seeking a construction permit carries the burden of proving that it is entitled to one. 10 C.F.R. §2.732. This is true even where the issue in controversy has not been raised by the applicant. Tennessee Valley Authority (Hartsville Nuclear Plant) ALAB-463, 7 NRC 341, 356, 360 (1978); Union Electric Co. (Callaway Plant) ALAB-348, 4 NRC 225, 227-231, 233. The burden on particular issues may be triggered by a showing sufficient to require reasonable minds to inquire further. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 486, 55 L.Ed. 2d 460 (1978). With respect to specific issues where the burden is one of persuasion, the magnitude of the burden upon a litigant to whom the burden is assigned should be influenced by the gravity of the matter in controversy. Virginia Electric & Power Company (North Anna Power Station) ALAB-256, 1 NRC 10, 17 n. 18.
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> 195. The managerial and technical qualifications to operate a nuclear power plant safely is an issue of the greatest gravity and we place a large burden of persuasion upon the Applicant to convince the Board by a preponderance of the evidence that it has prevailed on the issue.

28. The Shearon Harris case involved a construction permit application. The Board does not believe, however, that Licensee bears any less stringent burden of proof in this proceeding. In fact, the Board feels for a number of reasons that Licensee bears a more stringent burden of proof in this case.

29. First, the Shearon Harris decision itself stated that "we regard plant operation to require a greater showing of technical qualification and management capability compared to plant construction." Id. The issues in the instant case, of course, involve the ability of Licensee to operate the plant safely. Moreover, the nature of the proceeding does not affect the fundamental principle that the burden of proof is on the utility to demonstrate that operation of the plant is consistent with the public health and safety. Consumers Power Co. (Midland Plant, Units 1 and 2) ALAB-315, February 27, 1976, 2 NUC. REG..REP. (CCH) ¶30,050.

30. Second, and more fundamentally, one of the very focuses of this proceeding is to review potential deficiencies in Licensee's management capabilities raised as a result of the TMI-2 accident. In the August 9, 1979 Order and Notice of Hearing, the Commission wrote: "the unique circumstances at TMI require that additional safety concerns identified by the NRC staff be resolved prior to restart. These concerns result from...(2) questions about the management capabilities and technical resources of Metropolitan Edison, including the impact of the Unit 2 accident on these..." See also id., short-term item 6; March 6, 1980 Order (CLI-80-5), slip op. at 1. These concerns arose from the findings of a number of special investigations on the causes of the TMI-2 accident, many of which were critical of Licensee's management capabilities.

See, e.g., Staff Ex. 4, at 2-4; app. A. These findings impose a particularly heavy burden on Licensee to demonstrate that the deficiencies in Licensee's management capabilities have been remedied.

II. Additional Training Requirements

31. In addition to short-term items 1(e) and 6 in the August 9, 1979 Order and Notice of Hearing and items 1 and 2 in the March 6, 1980 Order, a number of contentions were admitted relating to the adequacy of Licensee's personnel training programs:

SHOLLY CONTENTION 14(b)

> The Licensee's management capability, in terms of organizational, staffing, and technical capabilities, is not sufficient. Specifically, the following deficiencies in Licensee's management capability are contended:
>
> ....
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> (b) Licensee's operations and technical staffs are not sufficiently qualified to safely operate TMI-1.

AAMODT CONTENTION NO. 2

> It is contended that TMI-1 should not open until the performance of licensee technicians and management can be demonstrated to be upgraded as certified by an independent engineering firm. This upgrading should include 100% test performance of job description with provision for retraining and retest, or discharge of those who cannot consistently and confidently master all necessary information for safe conduct of their job descriptions under all anticipated critical situations as well as routine situations.

CEA CONTENTION NO. 13

> CEA contends that there is a specific need for the establishment of training for operators that addresses the problem of a 'mindset' that denies information indicative of serious problems.

32. The Board finds a number of deficiencies in Licensee's training programs for both operational and management personnel.*

33. The Commission has clear authority to impose additional training requirements for Licensee's operational personnel. The general requirements for operators and senior operators are set forth in 10 C.F.R. Part 55. In addition to the specific requirements set forth in Part 55, the Commission may "require further information in order to enable it to determine whether the application should be granted or denied...," 10 C.F.R. §55.10(b), and may "by rule, regulation, or order, impose upon any licensee such requirements in addition to those established in the regulations in this part, as it deems appropriate or necessary to protect health and to minimize danger to life or property." 10 C.F.R. §55.8.

34. The Board makes findings below related to the training of Licensee's senior management personnel as well as operational personnel. While management personnel are not covered by 10 C.F.R. Part 55, this Board nevertheless possesses the authority to reach findings and conclusions on the adequacy of Licensee's management personnel. In particular, the Commission noted that "it has not established definitive standards for management organization and operation for nuclear power plants... The Board should apply its own judgment in developing the record and forming its conclusions on these questions." CLI-80-5, March 6, 1980, slip op. at 4.

Licensed Operator Reexamination

35. Short-term item 1(e) of the Commission's August 9, 1979 Order

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* Training related to emergency planning will be dealt with in the emergency planning section of this order.

and Notice of Hearing requires augmented training and 100% reexamination of all operators in the areas of natural circulation, small break loss of coolant accidents, and the TMI-2 accident. Licensee attempted to meet this requirement through its Operator Accelerated Retraining Program (OARP). Staff Ex. 1, at C6-5 to C6-7.

36. Licensee relies very heavily on operator action to ensure the safe operation of the plant. As noted in the Board question on UCS 8: "It appears from the small break LOCA analysis that there is a large amount of reliance upon operator action..." See, e.g., Clark, et al., ff. Tr. 6225, at 4-12 (see especially id. at 4); Jones & Broughton, ff. Tr. 5038, at 5-11; Tables 2-8. The Board views this reliance on operator performance as imposing an extremely heavy burden on Licensee to demonstrate the adequacy of its operator training program.*

37. Licensee has conducted an extensive retraining program for its reactor operators, and has significantly upgraded its ongoing training program. However, based on the results of Licensee's testing programs, the Board is not convinced that an adequate improvement in operator performance has been demonstrated, particularly in the TMI-2 accident subject matter. In addition, NRC Staff review of Licensee's testing programs has been inadequate. Consequently, the Board cannot conclude that the requirements of short-term order item 1(e) have been met.

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* As a licensee or applicant relies more heavily on a hardware system or component to ensure plant safety, logically the need to focus on the reliability of that hardware increases. See Virginia Electric and Power Co. (North Anna Power Station, Units 1, 2, 3, and 4), ALAB-256, 1 NRC 10, 17 n.18 (1975). The same principle should apply to reliance on operator performance. This principle, in fact, was recognized by Licensee's OARP Review Committee, which found that "the training program is another sub-system of the nuclear power plant system. It is as important that the requirements for the training sub-system be clearly defined as it is that the hardware requirements of the plant be so defined." Licensee Ex. 27, at 95.

38. The reexamination of Licensee's operating personnel was initially conducted by PQS Corporation. Kelly, ff. Tr. 12, 409, at 6. The PQS examination was specifically intended 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..." Kelly, ff. Tr. 12, 409, at 6 (emphasis added). In order to accomplish this objective, the exams were "developed based on ...knowledge and experience with NRC operator examinations, were formatted similar to NRC's techniques, and spanned all subject which NRC examinations of operators would be expected to encompass." Id. at 7. The Board notes that Mr. Kelly spent 7 years as the Chief of the NRC's Operator Licensing Branch, where he was responsible for the formulation and evaluation of the NRC's operator and senior operator examinations. Id. at app. A.

39. A significant number of Licensee's operating personnel failed the [illegible] lication examinations. Six out of 33 individuals failed the overall written reactor operator examination. Three of these individuals were licensed reactor operators, and one was a licensed senior reactor operator at the time of the test. Newton, ff. Tr. 20, 577. This leaves some doubt regarding the adequacy of Licensee's QARP in general subject matters.

40. More significantly, 15 out of 33 individuals failed the initial QARP examination on special post-TMI-2 subject matter. Nine of these individuals were licensed reactor operators, and five were licensed senior reactor operators at the time of the examination. Moreover, two reactor operators failed two subsequent reexaminations in this area, and one senior reactor operator failed one subsequent reexamination. Newton, ff. Tr. 20, 577. This high failure is particularly disturbing since

Licensee's OARP focused heavily on accident-related material. Licensee Ex. 27, at 36-41. The test data demonstrate deficiencies in Licensee's OARP for post-TMI-2 subjects, an item expressly covered by the Commission's August 9, 1979 Order and Notice of Hearing. In fact, Licensee's witness attributed the repeated failures in the post-TMI-2 subjects to the training program rather than the individual operators. Tr. 20, 639 (Newton).

41. A 90% passing grade on the TMI-2 accident subject matter was mandated by the NRC, due to the importance of operator knowledge in this area. Staff Ex. 1, at C1-16; Tr. 12, 699; 12, 701-02 (Kelly). Yet the validity of Licensee's OARP examination on the TMI-2 accident and related sequences was not reviewed by the NRC Staff. Tr. 12, 702-03 (Kelly). Therefore, the Staff has no assurance that the examination was a valid indicator of operator knowledge at the 90% level. Licensee's educational psychology expert acknowledged that the meaning of the score on an examination is related to the difficulty of the test. Gardner, ff. Tr. 12, 409, at 8.

42. Licensee's own training staff subsequently conducted reexaminations of individuals who failed the POS examination, and of individuals who did not participate in the OARP program. Newton, ff. Tr. 20, 577. Tr. 20, 591; 20, 599-600 (Newton). Apparently, the Staff did not review this examination process either. Therefore, there is no evidence that the reexaminations conducted by Licensee were of a comparable level of difficulty to the POS examinations.

43. Finally, Licensee employed a second independent auditing firm, Associated Technical Training Services, Inc. (ATT), which administered practice examinations to Licensee's operating personnel prior to the NRC

written license examinations. Tr. 20, 593-609 (Newton). Again, there is no evidence of the comparability of the ATT exams to either the PQS or Licensee exams. Nevertheless, the results of the ATT audit further call into question Licensee's operator training program. Thirty-six individuals took the audit, 29 of whom were operating personnel (16 ROs and 13 SROs). Tr. 20, 581-83; 20, 632 (Newton). Only 5 operating personnel passed the SRO exam, while 6 operating personnel passed the RO exam. Tr. 20, 606 (Newton). Moreover, there was not a perfect correlation between the personnel who passed the ATT audit and the personnel who passed the PQS exam. Tr. 20, 614 (Newton).

44. The ATT audit was conducted during the first two weeks of April, one to two weeks prior to the NRC examination. Tr. 20, 607; 20, 586 (Newton). Despite the high failure rate and the short time interval between the audit and the examination, Licensee's witness expressed confidence that these same operators would pass the NRC examination. Tr. 20, 607 (Newton).

45. The Board cannot reach the same conclusion. Based on the record outlined above, the basis on which Licensee certified its operators as competent to take the NRC examination pursuant to 10 C.F.R. §55.10(a)(6) is not clear.

46. Even less clear is the basis for the Staff's determination that the operators were competent to take the NRC licensing examination. For example, the Staff originally conditioned eligibility for the NRC licensing examinations on successful completion of the OARP and audit exams. Staff Ex. 1, at C1-16. Yet a significant number of Licensee's personnel who failed various audit exams were obviously permitted to take the NRC examination.

47. The Staff explains this changed position as due to the delayed restart and consequently the delayed administration of the licensing exams. Tr. 20, 695 (Crocker). The Board finds this argument to be disingenious. The delayed NRC exams should have permitted more time for Licensee's personnel to pass audits on all required subject areas.

48. The Board does not read short-term Order item 1(e) as imposing an express requirement that Licensee reexamination preclude NRC examination, although this would seem to be the logical progression. Nor will the Board recommend that the April licensing exams be repeated merely for the sake of this logical order.

49. However, the Board concurs with the Staff's position that passing the TMI-2 subject matter examination at the 90% level remains a prerequisite to licensing. Tr. 20, 690 (Crocker). Moreover, the Board is not satisfied with the haphazard use of various examinations that are not necessarily comparable and that have not been reviewed for adequacy by the NRC Staff in meeting this requirement.

50. Neither the ATT audit nor the NRC examination satisfy the need for a comprehensive examination on the TMI-2 subject matter. While both exams contained some questions in this area, neither separated the TMI-2 questions into discrete sections that could be graded separately. Tr. 20, 594; 20, 635 (Newton); 20, 705 (Crocker); 20, 752 (representation by Staff counsel). Moreover, the NRC exam tests only at the 70% level for discrete subject areas. Boger, ff. Tr. 12, 770, at 3.

51. Therefore, the Board directs that a complete reexamination of Licensee's operating personnel in the TMI-2 subject matter occur prior to restart. This examination should be evaluated by the Staff to ensure its validity at the 90% level. The Board is not receptive to the argument

that many operators passed examinations in this subject matter over a year ago. First, these examinations were not reviewed by the Staff. Second, it is important that the operators be judged by consistent and appropriate standards. Finally, if Licensee's QARP and requalification programs have been successful, all operators should be able to pass such an examination again.

52. The Board's concerns regarding the inconsistent performance of Licensee's operators on general subject matter audits are addressed in the following section.

NRC Evaluation of Operator Performance

53. Short-term item 1(e) of the Commission's August 9, 1979 Order and Notice of Hearing requires the NRC to "administer complete examinations to all licensed personnel in accordance with 10 C.F.R. 55.20-23."

54. Prior to taking an NRC licensing exam, applicants are required to provide "evidence that the applicant has learned to operate the controls in a competent and safe manner..." 10 C.F.R. §55.10(a)(6). The rule further provides that the "Commission may accept as proof of this a certification of an authorized representative of the facility licensee..." Id. The Board has already expressed some doubts as to the preparation of Licensee's operators to take the NRC examinations. See Findings 35 to 52, supra. Moreover, the specific provisions of the Commission's August 9, 1979 and March 6, 1980 Order dictate a special burden on Licensee in this case to demonstrate the proficiency of its operators. The Board believes that this increased burden places a similarly heavy burden on the Staff to evaluate the ability of Licensee's operational personnel to operate the plant safely. Consequently, it is not appropriate

in this case for the Staff merely to accept the certification by Licensee that its operators are qualified "to operate the controls in a competent and safe manner."

55. The operating tests administered to Licensee's candidates require the applicant "to demonstrate an understanding of," inter alia, procedures, manipulations, instrumentation, the behavior characteristics of the facility, abnormal and emergency plans and procedures, plant operations, radiation monitoring systems and the significance of radiation hazards. 10 C.F.R. §55.23. For the reasons stated below, the Board concludes that the standard NRC oral examination is not sufficient to provide a reasonable assurance that the TMI-1 operating staff can operate the plant safely. In order to provide such assurance, the Staff is directed to expand its standard oral examination of TMI-1 operators to include formal evaluations of on-shift drills and simulator exercises. This will provide a more realistic appraisal of the ability of Licensee's operating shifts to perform under normal operating and emergency circumstances.

56. The NRC intends to administer oral examinations to all licensed operators approximately 30 days prior to restart. Boger, ff. Tr. 12, 770, at 2 (Aamodt 2). NRC written examinations were administered to 36 of Licensee's personnel, including 29 operational personnel, between April 21-24, 1981. Tr. 20, 581-86 (Newton). The results of these examinations will not be available for a number of months. Tr. 20, 586 (Newton).

57. The Board finds that the current NRC review of Licensee's operator training and certification program is inadequate.

58. The Staff has not yet reviewed Licensee's program for certifying

candidates as qualified to take the NRC examinations. Thus, the Staff did not know the extent to which the certification takes into account drill performance, walk-throughs, etc., although they stated a general intent to do so in the future. Tr. 12, 066 (Keimig, et al.). The Staff has not produced evidence on the extent or timing of this review.

59. The Staff conducted only a limited review of Licensee's training program, including training materials, lesson plans, etc. Tr. 12, 829 (Boger).

60. The Staff takes the position that no review of Licensee's Requalification Training Program is required prior to restart, since Licensee's operating personnel will be required to pass NRC examinations. Staff Ex. 4, at 21. The Staff views a comprehensive evaluation of Licensee's training program as a long-term program, for which no implementation schedule has been established. Staff Ex. 1, at C6-7.

61. Expert witnesses for Licensee, the Staff, and the Aamodts agree that evaluation of operator performance during realistic exercises is preferable to written and oral examinations.

62. The Staff's witness agreed that NRC licensing exams cannot be used a a predictor of operator performance after the examination. Tr. 12, 797 (Boger). The Staff currently does not administer simulator examinations, but is intending to do so in the future. Tr 12, 874 (Boger).

63. Licensee's expert witnesses agree that there are benefits to evaluation of operator competence based on simulator performance. Tr. 12, 264-65 (Long). In fact, one of Licensee's witnesses testified that performance on-shift is a better indicator of an operator's competence than scores on an examination. The witness recommended that both the

Licensee and the NRC provide a more structured approach to evaluating operator competence on-shift and during simulator training. Tr. 12, 732 (Gardner).

64. Moreover, Licensee admits that its practice exams are often geared to prepare applicants for the NRC examinations. Mock NRC examinations are used in preparing Licensee's applicants. Tr. 12, 174 (Long). This further calls into question the adequacy of the Staff's examination approach, which relies heavily on the written examination.

65. Ms. Aamodt, testifying as an expert witness based on her qualifications as an educator and based on her education and professional career in experimental psychology, also agreed that the most valid test of operator performance is accomplished by creating as close a simulation as possible to actual operational circumstances. Ms. Aamodt would choose on-shift drills and simulator performance over written and oral examinations as indicators of operator competence. Tr. 13, 173-74 (Aamodt).

66. The Staff's oral examination does not satisfy this need for an evaluation of operator performance. The regulations governing the NRC operating tests only require applicants to "demonstrate an understanding of" procedures and other identified information. 10 C.F.R. §55.23. Actual performance of manipulations and procedures is not <u>required</u>.

67. The NRC oral examination does include some actual operation and walk-through of procedures. Tr. 12, 868 (Boger). This does not, however, encompass performance during a comprehensive drill or during an emergency scenario. Although the Staff witness "believed" that the Office of Inspection and Enforcement observes operator performance on-shift, he was not certain how formal this program is. Tr. 12, 870 (Boger).

68. The Staff formally observes and evaluates only the major annual emergency exercise. Tr. 12, 872 (Boger). This is not, however, a part of the licensed operator evaluation program. Licensee performs emergency drills routinely on-shift. Tr. 12, 328 (Ross). These drills are observed and graded by Licensee's instructors. Tr. 12, 329 (Ross). The NRC Staff could schedule formal evaluations of these drills as well.

69. On-shift evaluations alone, however, are not adequate to judge operator performance during transients or other abnormal events. As stated by Licensee's witness, on-the-job training is not extremely useful in training for transients or abnormal operating procedures. Simulator training is necessary to walk through emergency and abnormal procedures. Tr. 12, 226 (Newton). Similarly, it is not clear how the NRC's written and oral examinations adequately test operator performance during transients and other abnormal events.

70. Licensee's witnesses testified that one of the benefits of the B&W simulator program was to enable the instructors to "evaluate the ability of candidate CROs to respond to stressful situations." Long, et al., ff. Tr. 12, 140, at 31. Simulator manipulations are also observed and evaluated by the B&W training staff. Id. at 36. The Staff is directed to make use of this technique to conduct an independent evaluation of the performance of Licensee's operators under transient conditions.

Simulator Training

71. Licensee's operating personnel receive simulator training at the B&W Nuclear Training Center in Lynchburg, Virginia. The B&W simulator is a close, but not exact, replica of the TMI-1 control room. Licensee Ex. 27, at 104, 109; Tr. 12, 250-51 (Ross).

72. The Board finds that Licensee's operator training program is somewhat deficient in the amount of emphasis on simulator training. Licensee asserts that the number of simulator hours provided to Licensee's operators is approximately equal to the industry average. Tr. 12, 155 (Long). The record, however, does not completely support this finding.

73. Simulator training is an invaluable component of the overall training program for reactor operators, providing skills that cannot be provided in the classroom. Tr. 12, 201 (Knief). Licensee's expert witness testified that simulator training is useful in reducing the stressfulness of transients and in promoting effective responses. Gardner, ff. Tr. 12, 409, at 8. According to Licensee, "simulator training is an essential element of both initial and requalification training programs." Long, et al., ff. Tr. 12, 140, at 29.

74. One of Licensee's contractors reached a similar conclusion. PQS Corporation was hired by Licensee in April, 1979, to conduct a review of the operator training and requalification program. One of PQS' recommendations was that Licensee increase usage of the B&W simulator. A PQS representative testified that this recommendation had been incorporated into the TMI training program. Kelly, ff. Tr. 12, 409, at 3. The Board does not find that this assertion was adequately supported on the record.

75. Experts vary on the appropriate amount of simulator training. Dr. Johnson of TVA recommends two full weeks of simulator training per year. This translates to 80 hours of simulator time per crew per year. Tr. 12, 467 (Christensen). Some experts recommend as much as six weeks per year. 12, 507-08 (Christensen). A report issued by Oak Ridge National Laboratory reports an average of approximately 30 to 60 simulator

hours per trainee per year across the country. Tr. 12, 156 (Long). Licensee's OARP report provides a lower bound TVA estimate of approximately 37 to 50 hours per trainee per year, as interpreted by Licensee's witness. Tr. 12, 154 (Long). As reported by the OARP Committee, other experts would require 50 to 67 hours per year per trainee, using the same calculation employed by Licensee's witness.*

76. According to Licensee's witnesses, no formal studies have been conducted on the number of simulator hours needed for adequate operator training. The numbers cited above are merely opinions. Tr. 12, 677 (Christensen). Moreover, the Board notes that none of the sources of these opinions were available for cross-examination. Thus, while there is no firm evidence that the upper-bound estimates are necessary to train operators adequately, neither has Licensee provided any evidence that providing less simulator training than suggested by the experts is adequate. The burden of proof is clearly on Licensee to "demonstrate his managerial capability and resources to operate until..." Short-term order item 6.

77. Licensee claims an equivalent amount of simulator hours per trainee because each shift receives one week at the simulator site per year. Tr. 12, 156; 12, 263 (Long). However, the time spent at the simulator is split approximately equally between classroom time and simulator time. Therefore, one week at the simulator site represents 20 hours of simulator time. Tr. 12, 156 (Long); 12, 157 (Ross). This is confirmed by the fact that Licensee's operators have had 40 hours of simulator time in the two years since the accident. Tr. 12, 157 (Long). Moreover, approximately 50 to 75% of this time was spent studying the TMI-2 accident, leaving only 10 to 20 hours of simulator time for

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* 2000 hrs./30 trainees = 67 hrs.; 2000 hrs/40 trainees = 50 hrs.

general training in two years. Tr. 12, 159 (Ross).

78. Licensee's control room operators have been sent to the B&W simulator twice in the two years since the TMI-2 accident. One consisted of a short practice session on the TMI-2 incident. At the second simulator training session, operators performed 16 hours of simulator operations. Long, et al., ff. Tr. 12, 140, at 29. A more precise description of the B&W simulator program contained in the OARP Report describes the simulator training module as comprising 16 hours of classroom time and 16 hours of simulator operations. Licensee Ex. 27, at 105.

79. There is also some evidence that the initial time periods spent at the B&W simulator are not highly productive due to differences between the simulator and the TMI-1 control room. One operator indicated that the first day and one-half at the simulator were relatively unproductive. Licensee Ex. 27, at 109.

80. Licensee's expert witness testified that "while no operator can conceivably be exposed to every possible emergency situation, it helps to expose each to a wide variety of such situations." Such training was cited as a means of improving operator performance under stressful conditions. Christensen, ff. Tr. 12, 409, at 9-10. During a crew's week at the B&W simulator, 10 of 28 prepared scenarios are performed. Tr. 12, 470 (Christensen). No evidence was produced which adequately explained why each crew is not required to perform each scenario. Three weeks at the simulator would allow a crew to be trained in each scenario.

81. Licensee does not provide more hours of simulator training due to a lack of available hours at the B&W simulator. Tr. 12, 265 (Newton). The B&W simulator is booked through 1982. Id. Licensee's witnesses

feel, however, that sufficient training is accomplished in one week. Id. The Board does not feel that scheduling difficulties at B&W should affect the judgment as to the appropriate amount of operator training. In any case, Licensee's OARP report noted that additional B&W simulator time would be needed to meet proposed increased simulator requirements of NUREG-0660. Licensee Ex. 27, at 110.

82. Another means of increasing the number of simulator hours available to Licensee's operators would be to purchase an exact replica simulator for TMI-1. Licensee Ex. 27, at 110. Licensee's OARP Committee concluded that such "full-mission" simulation would improve Licensee's overall operator training. Consequently, Licensee would use the simulator more in its training programs. Id. at 109, 144; Tr. 12, 257-58 (Long). However, the lead time for purchase of an exact replica simulator is approximately four years. Tr. 12, 145 (Long).

83. Finally, Licensee can provide additional plant condition simulator training through the use of computer terminals (CRT's) installed onsite. Licensee hopes to have such a system in place by the end of 1981. Tr. 12, 258-63 (Long).

84. Based on the record outlined above, the Board finds that greater emphasis should be placed on the amount of simulator training provided to Licensee's operators, both in the short-term and the long-term. Without the corrections noted below, the Board concludes that Licensee has not demonstrated compliance with short-term item 6 with respect to operator training. Such compliance is necessary to provide reasonable assurance that TMI-1 can be operated without endangering the health and safety of the public.

85. In the short-term, Licensee should supplement its simulator

training to all operating personnel prior to restart. An additional week of training at the B&W simulator will permit operating shifts to perform a larger percentage of the 28 evolutions described in the OARP Report. Licensee Ex. 27, at 105-06. Since the Board has already directed the Staff to conduct an evaluation of simulator performance prior to restart, the additional training can be coordinated with the Staff evaluation.

86. In the long-term, Licensee should be required to increase its annual requalification simulator training to a minimum of two weeks per year. In the absence of firm evidence on this point, Licensee's program should fall at least in the middle of the requirements suggested by the experts.

87. Finally, the Staff should monitor Licensee's progress toward providing onsite simulator training as a long-term requirement. Based on Licensee's own estimates, reasonable progress should be measured by an expected late-1981 implementation date for CRT facilities and approximately 4 years for an exact replica simulator.

Training for Senior Management Personnel

88. Five out of twelve of GPU Nuclear's senior management personnel are new to the organization, including the Vice-Presidents of TMI-1 (Mr. Hukill) and TMI-2 (Mr. Hovey). Tr. 11, 451-52 (Arnold) (explaining supplementary charts entitled "GPU Nuclear Group/Corporation Organization," p. 7). Licensee's witness testified that there are some disadvantages to having senior management personnel who lack a broad range of experience. Tr. 11, 516 (Arnold). The Board is also concerned that some of these personnel may not have an adequate familiarity with the specifics of TMI-1 design, operation, and procedures.

89. The Board does not believe that lack of familiarity with TMI-1 should preclude Licensee from seeking management personnel with diverse backgrounds. This practice, in fact, should result in significant management benefits. The Board also believes, however, that deficiencies in the backgrounds of key new management personnel should be corrected with specific, formal training programs, as would be required for lower-level employees.

90. This concern is particularly important for personnel with responsibilities under Licensee's emergency plan. Since an emergency cannot be controlled remotely, the capability to assess accident conditions and to determine what actions are necessary to control and mitigate the accident must exist onsite. Tr. 11, 520-21 (Arnold). Therefore, Licensee management personnel who make on-the-spot safety decisions during emergency conditions need detailed personal knowledge of the design and operation of TMI-1. Tr. 11, 520-21 (Arnold).

91. One example of a key management employee with insufficient familiarity with TMI-1 is Mr. Phillip Clark, who joined the GPU Nuclear Croup in January, 1980, as Deputy Chief Operating Executive. Prior to joining GPU, Mr. Clark spent approximately 25 years in the navy nuclear program. Arnold, ff. Tr. 11, 434, at 9; Figure 1. Due to Mr. Clark's lack of experience with commercial pressurized water reactors, Mr. Clark will need to rely on the technical expertise of other members of Licensee's organization. Tr. 11, 520 (Arnold). This reliance may not be highly inappropriate for Mr. Clark's normal functions. Under some circumstances, however, Mr. Clark may be called to TMI-1 during an emergency, particularly when Mr. Arnold is not available. Tr. 11, 448-90 (Arnold). It may reasonably be inferred that an official of Mr.

Clark's rank would be relied on heavily in the course of an emergency. See, e.g., Keaten and Long, ff. Tr. 13, 242, at 10.* In Mr. Arnold's absence, Mr. Clark apparently would serve as Emergency Support Director. In this role, Mr. Clark would be responsible for "directing the offsite emergency support organization, and for providing advice and guidance to the Emergency Director on accident management responsibilities." Regan, et al., ff. Tr. 13, 756, at 33.

92. A more significant example is the Director of TMI-1, Henry Hukill. Mr. Hukill is responsible for the day-to-day operation of TMI-1, and compliance with TMI-1 Technical Specifications and regulatory requirements. Arnold, ff. Tr. 11, 434, at 10. Mr. Hukill joined TMI-1 in September, 1980, after over 22 years in the U.S. Navy. Mr. Hukill's only experience with large land-based reactors was a 13-month tenure working on the Clinch River Breeder Reactor project. Hukill, et al., ff. Tr. 11, 617, at 6-7.

93. As Vice-President of TMI-1, Mr. Hukill is responsible for all aspects of plant operation and maintenance. Mr. Hukill "oversees the plant's operation, and evaluates, institutes, and modifies policies affecting activities at Unit 1," serves as liaison for all engineering, design and analysis, nuclear assurance, maintenance and construction, radiological and environmental controls and administrative services provided to TMI-1 by GPU Nuclear, and has the authority to shut down the plant "whenever it is appropriate to do so." Hukill, et al., ff. Tr. 11, 617, at 4-5. In order to perform these duties and to make these decisions, Mr. Hukill should have an intimate knowledge of TMI-1 plant design and operation.

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* The decision to repressurize the plant during the TMI-2 accident, which led to plant stabilization on the evening of March 28, 1979, was made by Mr. Arnold.

94. While Mr. Hukill has extensive experience in the operation of nuclear power reactors, essentially all of his experience is in the operation of naval reactors, which are significantly smaller than TMI-1. Tr. 11, 522-23 (Arnold). Although general principles of navy nuclear experience are applicable to the operation of commercial nuclear power plants, the details of the practice differ. Tr. 11, 813 (Clark).

95. In addition to Mr. Hukill's day-to-day responsibilities, he also plays a critical role during emergencies. During an emergency, the Vice-President of TMI-1, the Manager of TMI-1, or a designated alternate serves as the Emergency Director. The Emergency Director "has the authority and the responsibilities to immediately and unilaterally initiate any emergency action, including providing protective action recommendations." Rogan, et al., ff. Tr. 13, 756, at 26-27. The Emergency Director is responsible for making decisions on protective action recommendations to offsite response agencies and for controlling the flow of information to the NRC and other agencies. Tr. 11, 693-94 (Toole).

96. Licensee has failed to demonstrate the qualifications of Mr. Hukill to perform these functions.

97. As of February, 1981, Mr. Hukill had not yet become familiar with Licensee's emergency procedures and plans, and what he would be required to do during an emergency. Tr. 11, 621 (Hukill). Mr. Hukill testified that he was not qualified to judge the offsite consequences of an accident at a commercial power reactor. Tr. 11, 622-23 (Hukill). Mr. Hukill has no experience in judging the magnitude of releases from commercial nuclear plants, nor in synthesizing this information with meteorological conditions, demography, or other factors necessary to

formulate a public health decision. To date, Mr. Hukill has had only a 3-hour briefing in this area. Tr. 11, 699 (Hukill). Although Mr. Hukill acknowledges the need to acquire more extensive personal knowledge, Tr. 11, 699, he intends to base his decisions on the judgment of various plant experts. Tr. 11, 621; 11, 694; 11, 696-97. This expressly contradicts Mr. Arnold's judgment that management officials who make on-the-spot decisions during an emergency have personal knowledge of critical plant-specific information. Tr. 11, 520-21 (Arnold).

98. Licensee has committed to conduct emergency planning training up through the top levels of management. Tr. 12, 242 (Knief). Presumably, this will include senior GPU management personnel who may respond to an emergency at the site. It is intended that emergency directors will receive training in mitigating accidents similar to that given to operators. Tr. 12, 249 (Long). It is not clear, however whether this training will include simulator training. Further, the emergency directors will receive only two weeks of training. Tr. 11, 675 (Hukill). Thus, while the emergency planning program undoubtedly will assist Licensee's top management personnel during an emergency, it is not an adequate substitute for a thorough training program in the design and operation of TMI-1.

99. As another example, Mr. Hukill has not taken the decision analysis training given to other personnel. Licensee's Decision Analysis training session was developed to train individuals in handling complex, unanticipated situations, under circumstances of uncertainty, stress, and conflicting information. This training was given to all SROs and STAs, but not to higher level management. Long, et al., ff. Tr. 12, 140, at 40. This is contrary to the recommendations of Licensee's own

experts. Tr. 12, 734-35 (Gardner); Licensee Ex. 27, at 13. Licensee provided no explanation of why all operating personnel should not receive this training.

100. Licensee attempts to counter these arguments by asserting that all TMI-1 employees meet the applicable requirements of Reg. Guide 1.8 (May 1977) and ANSI/ANS 3.1-1978. Hukill, et al., ff. Tr. 11, 617, at 3. The Staff agrees with this assessment. Crocker and Allenspach, ff. Tr. 12, 653, at 5. The record, however, does not completely support the conclusion that compliance with these standards alone is adequate evidence of the qualifications of Licensee's management personnel.

101. Mr. Hukill, as Vice-President for TMI-1, is the plant manager for purposes of compliance with ANSI standard 3.1-1978. According to §4.2.1 of ANSI 3.1-1978, the plant manager must have the experience and equivalent training of a senior reactor operator. Tr. 12, 654-55. Mr. Hukill does not have an NRC Senior Reactor Operator license. Tr. 12, 656 (Crocker/Allenspach).* ANSI 3.1-1978 does allow credit for military experience. Tr. 12, 667 (Crocker/Allenspach). However, while Mr. Hukill's naval experience provides him with the general background required to perform his duties at TMI-1, it does not provide him with adequate specific operating knowledge necessary to perform as emergency director. Literal compliance with ANSI 3.1-1978, therefore, does not provide adequate assurance that Mr. Hukill is qualified to perform his duties without further training.

102. The plant manager is also included in the NRC's definition of "operating personnel." For example, the March 28, 1980 letter to all

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* In fact, the highest Licensee official with a current SRO license is Mr. Ross, the Supervisor of Operations of TMI-1. Tr. 11, 673 (Toole). Hukill, et al., ff. TR. 11, 617, at 12. Therefore, none of the potential designated emergency directors have current SRO licenses.

power reactor applicants and licenses, which identifies training requirements for operating personnel, includes the plant manager. The March 28, 1980 letter includes six categories of training that must be given to operating personnel, including in-core instrumentation, ex-core nuclear instrumentation, vital instrumentation, primary chemistration, radiation monitoring, and gas generation. Tr. 12, 699-70 (Crocker/ Allenspach). To meet these requirements, Licensee must provide formal training in these areas to all operating personnel, including the plant manager. Reliance on self-education is not sufficient.

103. Despite the need to train new senior management personnel in the design and operation of TMI-1, Licensee has established no formal training or education program in this area. For example, Mr. Hukill is relying exclusively on a self-education program. Tr. 11, 620 (Hukill). Absent a formal training and testing program, there is no way to assure that Licensee's senior management personnel who have little or no experience in commercial nuclear power reactors can perform their jobs adequately, particularly during an emergency.

104. The Board directs Licensee to remedy this deficiency in the site-specific training of its management personnel prior to restart. Licensee's training department should identify those management officials whose backgrounds demonstrate insufficient knowledge of TMI-1 design and operation to perform their functions in a manner consistent with the protection of public health and safety. This review should focus in particular on officials who are new to Licensee's organization, and on personnel with significant plant safety-related responsibilities. Training programs should then be designed and implemented for these individuals. The Board further directs that the Staff to review this program and to certify its implementation to the Commission prior to restart.

105. Absent satisfactory implementation of this program, the Board cannot conclude that Licensee has demonstrated the adequacy of training of its senior management personnel. The above-stated remedies are necessary to provide reasonable assurance that TMI-1 can be operated without endangering the health and safety of the public.

Training in Anticipated Transients Operator Guidelines

106. Licensee intends to meet the requirements of Recommendation 2.1.9C of NUREG-0578 (Transient and Accident Analysis) through the implementation of the Anticipated Transients Operator Guidelines (ATOG) program. Broughton, ff. Tr. 10, 941, at 2.*

107. According to the Staff's witness, Licensee's proposed ATOG program will change the general method by which an emergency procedure is handled. The emergency response will change from an accident-oriented to a symptom-oriented approach. Tr. 12, 874 (Boger). Yet the Staff does not intend to examine Licensee's operators in the ATOG procedures. Moreover, Licensee will examine operators in ATOG only during periodic requalification exams rather than prior to implementation. Tr. 12, 875-78 (Boger).

108. Licensee acknowledges the extensive procedural changes caused by the implementation of ATOG, and consequently the need for supplemental operator training in this area:

> Since the procedure is applicable during forced or natural circulation, with or without offsite power, and with normal or emergency feedwater, several existing plant procedures will require modification and some may be eliminated. Furthermore, since the approach to event

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* The Board's findings on compliance with Recommendation 2.1.9.C, which was the subject of Board Question 11, are included in another section of this decision. This section relates only to operator training on the ATOG program.

> diagnosis is altered by this procedure, a revised program to train operators in this approach, in the use of this specific procedure and in the use of other modified procedures is required.

Broughton, ff. Tr. 10, 941, at 4.

109. At this point, Licensee has "contracted with B&W" for B&W's ATOG manual. Long, et al., ff. Tr. 12, 140, at 33. Some instruction has been initiated on the ATOG program. Tr. 12, 189 (Newton). No information has been provided, however, on the extent or adequacy of this training.

110. Although ATOG training will not affect plant safety until ATOG is implemented, the Board wants to be assured that adequate ATOG training is conducted in a satisfactory manner prior to implementation. The Staff's approach to ATOG implementation and training is not acceptable. The Staff merely states that retraining of operators in ATOG procedures will be completed by September of 1981. Staff Ex. 14, at 46.

111. The Board finds that retraining in ATOG procedures is at least as important as many other aspects of Licensee's operator retraining program required prior to restart and for which direct NRC Staff review is required. The Board concludes that steps to ensure adequate ATOG training are necessary to provide reasonable assurance that TMI-1 can be operated without endangering the health and safety of the public. Consequently, the Staff is directed to (1) conduct a thorough review of Licensee's ATOG retraining program; (2) require Licensee to include ATOG in the reexamination provision of short-term order item 1(e); and (3) include ATOG procedures in the oral examination scheduled for approximately 30 days prior to restart.

Training in Class 9 Accidents

112. The NRC's regulations governing both operator and senior operator tests include "the necessity for a careful approach to the responsibility associated with the safe operation of the facility." 10 C.F.R. §55.23(1). Thus, the regulations recognize the need to include in the operator training program concepts of proper attitude and responsibility.

113. Licensee has no specific training program or courses designed to instill in employees a sense of responsibility to protect the public health and safety. Rather, responsibility is conveyed as a part of the general training and education program. Tr. 12, 308-09 (Long).

114. No specific training is given to general employees on the possible consequences of nuclear accidents. Tr. 12, 310 (Long). Operational personnel, including control room operators, are trained in accident analysis as scoped by Chapter 14 of the TMI-1 Final Safety Analysis Report. Tr. 12, 328 (Long). No training is given, however, in Class 9 accident results or in WASH-1400-type maximum hypothetical accidents. Tr. 12, 326-27 (Long). Rather, Licensee assumes that all personnel trained in the nuclear emergency field are familiar with such consequences. Tr. 12, 327 (Long).

115. The TMI-2 accident was officially classified by the Staff as a Class 9 accident. Rosenthal and Check, ff. Tr. 11158, at 8 (citing NRC Staff response to Board Question No. 4 regarding the Occurrences of a Class 9 Accident at Three Mile Island, in the Matter of Public Service Electric and Gas Company, August 24, 1979).

116. While it may be true that trained nuclear engineers and physicists are generally familiar with the consequences of Class 9 and

maximum hypothetical accidents, the Board does not necessarily believe that the same is true for control room operators or other operational personnel.

117. The Board concludes that it is necessary for all operational and emergency personnel to have a full understanding of the public health and safety consequences of their actions, or, more appropriately, misactions, in order to provide reasonable assurance that TMI-1 can be operated without endangering the health and safety of the public. Therefore, Licensee is required, prior to restart, to train all of its operational and emergency personnel in the potential consequences of Class 9 accidents that might occur at TMI-1. The training should stress that inadequate attention to duties, particularly by personnel with key safety-related tasks, might lead to these consequences. The Staff is directed to review the substance of this training program and to certify its completion to the Commission prior to restart.

III. Operational Resources

118. In the August 9, 1979 Order and Notice of Hearing, the Commission directed that Licensee's demonstration of its managerial capability include "the adequacy of...the management and technical capability and training of operations staff..." Slip op. at 7. The Commission expanded on this inquiry in its March 6, 1980 Order on management issues, asking:

(1) whether Metropolitan Edison's command and administrative structure, at both the plant and corporate levels, is appropriately organized to assure safe operation of Unit 1;

(2) whether the operations and technical staff of Unit 1 is qualified to operate Unit 1 safely.

CLI-80-5, March 6, 1980, at 2.

119. The Board finds a number of deficiencies in the qualifications and numbers of Licensee's current operational staff.

Shift Staffing Requirements

120. The Board finds that a requirement for two licensed Senior Reactor Operators (SRO's) per shift is necessary for the safe operation of the plant.

121. Licensee's management agrees with the technical judgment that there should be a licensed Senior Reactor Operator (SRO) in the control room at all times. Tr. 11, 665, 71 (Hukill). However, Licensee does not view this as a firm commitment until July 1, 1982. Tr. 11, 666-67 (Hukill). Existing shift foremen will maintain their positions regardless of whether they pass the NRC's SRO examination, Tr. 11, 668 (Hukill), despite the fact that it would be possible to have a shift foreman as the senior official present in the control room. Tr. 11, 633 (Ross). Licensee does not explain why it is appropriate in the interim not to require an SRO in the control room at all times and not to require all shift foremen to pass the SRO examination.

122. The Board has some difficulty reconciling this position with commitments stated elsewhere in Licensee's testimony. According to Licensee's written testimony, the "TMI-1 Supervisor of Operations, shift supervisors, and shift foremen are required to hold a senior reactor (SRO) license...." Long, et al., ff. Tr. 12, 140, at 37 (emphasis added). When the reactor coolant temperature exceeds 200°F, Licensee "normally" has on shift an SRO-qualified shift supervisor and an SRO-qualified shift foreman. Hukill, et al., ff. Tr. 11, 617, at 13. The OARP Report also indicates that both shift supervisors and shift foreman

must hold SRO licenses. Licensee's Ex. 27, at 10. The inconsistency in Licensee's position is not explained in either the written or oral testimony.

123. In Supplement 1 to the Restart Safety Evaluation Report (SER) (NUREG-0680, Supp. No. 1), the Staff took the position that two SRO's were required per shift. Staff Ex. 4, at 11. In Supplement 2, dated March, 1981, the Staff apparently had not changed this position. Staff Ex. 13, at 4-5. In Supplement 3, dated April, 1981, the Staff suddenly extended the deadline for providing two SRO's per shift to July, 1982. Staff Ex. 14, at 22.

124. The Staff's rationale for its changed position relates to the Commission's Order of March 23, 1981 (CLI-81-3), which stated:

> The Commission believes that Unit One should be grouped with reactors which have received operating licenses, rather than with units with pending operating license applications. It emphasizes though that it expects the Board to find to the contrary when the record so dictates.

Slip op. at 7. The Staff found no reason to treat TMI-1 differently from other operating reactors for purposes of this requirement. Staff Ex. 14, at 23. The Board finds that the Staff did not adequately examine the differences between TMI-1 and other operating reactors.

125. The Staff did not give adequate weight to the fact that TMI-1 has been in a cold shutdown made for over two years. Tr. 20, 748 (Crocker).

126. The Staff's witness cited the requirement for two licensed senior reactor operators on each shift as one of the reasons for not requiring 100% examination of all operating individuals. Boger, ff. Tr. 12, 770, at 4-5 (Aamodt 2). Yet the Staff argues the qualifications of operating personnel as the rationale for not requiring two licensed

SRO's per shift, Staff Ex. 14, at 23. The Staff cannot use the argument both ways. Moreover, the Staff personnel who decided to extend the shift manning requirement did not evaluate Licensee's retraining program to determine whether Licensee's operators are in fact better qualified than NTOL operators. Tr. 20, 714-16 (Crocker).

127. Most importantly, the Staff failed completely to evaluate the effect of the SRO requirement on Licensee's site-specific emergency response plan. Tr. 20, 763-65 (Crocker). Under Licensee's emergency plan, during the initial phases of emergency response, the shift supervisor serves as Emergency Director. Under Licensee's emergency plan, "the Emergency Director has the authority and the responsibility to immediately and unilaterally initiate any emergency action, including providing protective action recommendations to authorities responsible for implementing offsite emergency measures." Licensee Ex. 30, at 5-6. If the shift supervisor is unavailable or incapacitated, the shift foreman becomes Emergency Director. Id. Rogan, et al., ff. Tr. 13, 756, at 26-27. Thus, according to Licensee's position, there are circumstances where a non-SRO licensed shift foreman could become Emergency Director. The Staff acknowledges that, with only one SRO per shift, there are times where the control room would be without an SRO. Tr. 20, 757 (Crocker).

128. During the initial response to an emergency, the shift supervisor and the shift foreman conduct all major functional responsibilities in the control room, serving as Emergency Director, Operations Coordinator and Radiological Assessment Coordinator. This condition could persist for as long as one hour. Chestnut, ff. Tr. 15, 007, at 22-24. The Board notes that, under Licensee's emergency plan:

> The Operations Coordinator is responsible for coordinating operations and maintenance

> activities through the Shift Supervisor and the Emergency Maintenance Coordaintor. The Operations Coordinator may not relieve the Shift Supervisor or specifically direct plant operations unless he is a licensed Senior Reactor Operator. The Operations Coordinator will report to the Emergency Director.

Licensee Ex. 30, at 5-8 (emphasis added). The Radiological Assessment Coordinator is directed to "coordinate initial radiological assessment activities, review results, and report findings and make recommendations to the Emergency Director." Id. at 5-10.

129. This allocation of emergency responsibilities is particularly critical during the back shift. The back shift poses unique problems in terms of the responsibilities of shift personnel, since the shift supervisor is the senior official at the plant. Licensee provides no additional or different training, however, on operator performance during the back shift. Tr. 12, 728-29 (Long).

130. The Staff determined that this arrangement is acceptable since it is "consistent with the NRC guidance contained in Table B-1 of NUREG-0654." Chestnut, ff. Tr. 15,.077, at 22-23. Table B-1 denotes both the Shift Supervisor and the Shift foreman as SRO's. Staff Ex. 7, at 37.

131. Even under Licensee's management structure under normal operations, the shift foremen should be licensed SRO's. The shift foremen are responsible for overseeing the activities of the control room and auxiliary operators. This includes "ensuring that all control room activities are executed in accordance with prescribed requirements, guidelines, and operating procedures." Hukill, et al., ff. Tr. 11, 617, at 18.

132. Under the NRC's rules of practice, direction of control room operating personnel is a function performed by a senior operator. 10

C.F.R. Part 55, "Operator's Licenses," applies to all individuals who "manipulate the controls of" any licensed facility and who are "responsible for directing the licensed activities of licensed operators." 10 C.F.R. §55.2. A "senior operator" is defined as "any individual designated by a facility licensee... to direct the licensed activities of licensed operators." 10 C.F.R. §55.4(e) (emphasis added). By Licensee's own definition of the functions of its shift foremen, the shift foremen are senior operators.

133. The Staff, in addition to not considering these factors, justifies treating Licensee as an operating reactor for purposes of the shift staffing requirement by arguing that "the previous experience, the special training, and the [NRC] reexamination all should assure a well-qualified group of operators that may be expected to be more capable than a group of operators assigned to a newly licensed plant." Staff Ex. 14, at 23. Neither the Staff nor the Licensee support this statement with any evidence demonstrating that Licensee's operators are better qualified than NTOL operators.

134. The record does not support the assertion that Licensee's operating staff has a significant amount more experience than the staffs of new plants. First, 4 out of 16 Licensee's RO candidates are new. Tr. 20, 581; 20, 591 (Newton). More importantly, 3 of Licensee's 6 shift supervisors and 3 of 7 of Licensee's shift foremen have no experience serving in their respective positions while the plant was operational. The remaining 4 shift foremen each have less than one year's experience serving as shift foremen while the plant was operational. Hukill, ff. Tr. 11, 617, at 16-22. Therefore, while Licensee's operational staff has some additional operating experience over NTOL staffs, the Board

does not feel that this experience is sufficient to offset the two-years of TMI-1 shutdown.

135. The "special training" referred to by the Staff does not place TMI-1 in a superior position to NTOL plants. All operational personnel for NTOL plants can be expected to undergo intensive training. Tr. 20, 768 (Crocker). There is no evidence that this training is any less adequate than Licensee's requalification training program. In fact, NTOL operating candidates are not hindered by the added burden of unlearning old procedures and control room design.

136. The NRC reexamination of Licensee's personnel similarly does not put TMI-1 in a position superior to NTOL plants. All reactor operators are required to pass NRC examinations prior to receiving a license. 10 C.F.R. Part 55.

137. The Board concludes that there is ample evidence on the record to justify the treatment of TMI-1 as an NTOL rather than as an operating reactor for the purposes of shift staffing requirements. This treatment is necessary to provide reasonable assurance that TMI-1 can be operated without endangering the health and safety of the public.

Operational Personnel

138. Licensee intends to operate TMI-1 on a six shift rotation, staffed with "six shift supervisors, six shift foremen, 18 control room operators (at least 12 of which shall be licensed), and 36 auxiliary operators. Hukill, et al., ff. Tr. 11, 617, at 13.

139. The Staff at one point was extremely concerned with the number of qualified senior reactor operators on Licensee's staff, particularly to support a six-shift rotation. This provides little

allowance for attrition among SROs. The Staff witness found the total number of SROs on Licensee's staff to be "barely marginal", even if all candidates pass the SRO examination. Tr. 12, 060-61; 12, 063 (Crocker) (response to Chairman's concerns). In fact, the Staff witness expressed some concern that Licensee would not have an adequate number of qualified SROs for restart. Id.

140. Licensee relies on six incumbent shift supervisors to staff its six-shift rotation. This leaves no leeway for attrition. Moreover, three of the six shift supervisors have no experience serving in this position while the plant was operational.* Hukill, et al., ff. Tr. 11, 617, at 16-17.

141. Licensee relies on seven incumbent shift foremen to staff its six-shift rotation. This leaves little room for attrition. Two of these shift foremen currently do not have a Senior Reactor Operator's License (Incumbents D and G). Three shift foremen have no experience serving in this position while the plant was operational (Incumbents D, E, and G). Of the remaining four, each has less than one year's experience serving as shift foreman while the plant was operational. Hukill, et al., ff. Tr. 11, 617, at 19-22.

142. Licensee relies on six shift technical advisors to staff its six-shift rotation. This leaves no room for attrition. Hukill, et al., ff. Tr. 11, 617, at 28-29. Although there are also two additional "STA Trainees," these individuals apparently are not sufficiently qualified to serve as an STA. Id. at 28.

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* Incumbents A and B became Unit 1 shift supervisors in July, 1979. Incumbent F became a Unit 1 shift supervisor in May, 1980.

143. The intent of the QARP was to prepare approximately 40 licensed ROs and SROs for an NRC licensing examination. Licensee Ex. 27, at 31. But only 27 ROs and SROs and 4 RO candidates took the POS examinations in April of 1980. Id. at 67. Only 16 ROs and 13 SROs (in addition to 7 nonoperational personnel) took the NRC licensing examinations in April of 1981. Tr. 20, 581 (Newton). The Board's evaluation must rest on the assumption that Licensee will operate the plant with a maximum of these 29 operational personnel.

144. In Supplement 1 to the SER, the Staff found that Licensee had provided no plans for training additional operators to account for attrition. Staff Ex. 4, at 11. The Staff expressed concerns regarding the numbers of qualified ROs and SROs on Licensee's staff. This was based on 20 projected RO candidates and 13 projected SRO candidates. Id. In Supplement 2, the Staff found that Licensee has sufficient ROs and SROs to restart on a five-shift operation. This was based on 17 projected RO candidates and 13 projected SRO candidates. Staff Ex. 13, at 4-5. The Staff did not explain why its review was based on a five-shift rotation, when Licensee intends to implement a six-shift rotation. Nor did it explain why it reversed its position despite the reduced projections of candidates who would sit for the NRC examinations.

145. Moreover, the Staff concluded that Licensee has made adequate plans for training operators for the long term. This position is not sufficiently supported. Licensee merely stated that the "current authorized manning permits 12 individuals to be in training..." Staff Ex. 13, at 5 (emphasis added). There is no evidence that the Licensee is training any ROs or SROs beyond those cited for existing shift rotations.

146. The Staff pointed out that Licensee could revert to a five-shift rotation if necessary for safe operation. However, this would, in the Staff's opinion, adversely affect requalification training, and would not completely resolve the Staff's concerns about the number of qualified SROs. Tr. 12, 064-65 (Crocker/Allenspach). Reducing the number of shifts to five would also require a rearrangement of shift personnel, producing other undesirable results. Licensee deliberately attempted to train shifts together, as they would operate in the control room. Moreover, Licensee's expert testified that "stress can be induced in the members of a team who are not accustomed to working with one another. Questions arise regarding division of responsibilities, competence, etc." Christensen, ff. Tr. 12, 409, at 10-11. Thus, reduction of shifts or rearrangement of shift personnel is not a desirable solution.

147. The Board concurs with the Staff's immediate conclusion that, assuming that all of Licensee's candidates receive operators licenses, Licensee will have sufficient qualified personnel to restart <u>in the short-term</u>. Staff Ex. 13, at 5. However, the Board does not agree that Licensee has demonstrated sufficient arrangements for training of additional ROs and SROs.

148. Therefore, the Board directs that a license condition be imposed requiring a minimum of 13 licensed SROs and 16 licensed ROs on Licensee's <u>operational staff</u> whenever the plant is critical. This is based on Licensee's proposed six-shift rotation, since no evidence has been produced on the effect of a five-shift rotation on Licensee's training program and operator performance. Finally, training of 12 additonal operational personnel shall become a long-term restart requirement. Licensee must demonstrate reasonable progress, prior to

restart, toward training 12 additional operational personnel. Reasonable progress shall be defined as the selection and hiring of 12 qualified candidates.

149. These measures are necessary to provide reasonable assurance that TMI-1 can be operated without endangering the health and safety of the public.

Radwaste Staff Requirements

150. Item (5) in Commission Order CLI-80-5 (March 6, 1980) inquires "whether the Unit 1 Radiation Waste system is appropriately staffed with qualified individuals to ensure the safe operation of the facility."

151. The TMI-1 Radwaste organization consists of 25 individuals: the Supervisor of Radwaste, a radwaste engineer, three radwaste foreman and 20 radwaste workers. These individuals are responsible for all decontamination, storage, and preparation for shipping of radwastes at TMI-1. Hukill, et al., ff. Tr. 11, 617, at 26.

152. The position of radwaste engineer is currently vacant. The radwaste engineer is responsible for "writing procedures and trouble-shooting the system when problems arise which need immediate evaluation." Hukill, et al., ff. Tr. 11, 617, at 26 (emphasis added). Licensee has not committed to filling this position prior to restart, and provides no explanation for their determination that this position can be vacant at the time of restart. Tr. 11, 673 (Hukill, et al.). Similarly, the Staff's review of Licensee's radwaste staffing failed to address the vacancy in the position of radwaste engineer. Staff Ex. 4, at 24-26.

153. In light of the lack of depth at the top of this organization, the importance of maintaining an adequate radwaste organization, and

the need to separate Unit 1 radwaste capabilities from Unit 2 decontamination, this vacancy is not acceptable. The Staff is directed to certify to the Commission prior to restart that Licensee has hired a qualified, degreed radwaste engineer. An engineer may not be transferred from the TMI-2 radwaste program to fill this vacancy.

154. The Board concludes that filling the position of radwaste engineer is necessary to provide reasonable assurance that TMI-1 can be operated concurrently with TMI-2 decontamination without endangering the health and safety of the public.

IV. Staff Review of Financial Qualifications

155. In the August 9, 1979 Order and Notice of Hearing, the Commission required as short-term item 7 that "licensee shall demonstrate his financial qualifications to the extent relevant to his ability to operate TMI-1 safely." The Commission expanded on this directive in the March 6, 1980 Order on management issues, asking "whether Metropolitan Edison possesses the financial resources necessary to safely operate Unit 1 in addition to cleaning up Unit 2." CLI-80-5, item 12.

156. The NRC Staff proposed that financial issues be eliminated as an issue to be litigated in the proceeding. NRC Staff's Suggestions on Methods to Expedite Completion of Restart Proceeding and Issuance of a Recommended Decision to the Commission (February 3, 1981), at 3. The Commonwealth agreed that financial issues need not be considered in the hearing as a short-term restart issue, but noted that it is still important for the Licensee to demonstrate its financial ability to operate TMI-1 simultaneously with the clean-up of TMI-2 in the long run. Tr. 11, 857-60; CLI-81-3, at 8.

157. The Commission ruled that litigation of the financial issue in the hearing would not be productive. However, the Commission also directed the Staff 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." CLI-81-3, March 23, 1981, at 9. Therefore, financial issues have not been eliminated from Staff review; they have simply been eliminated as a litigable issue in the proceeding.*

158. The Board notes with concern that, as of June of 1980 (TMI-1 Restart SER), the Staff concluded that "there are insufficient bases to support a finding on the financial qualifications of the licensees to operate TMI-1 safely... revised statements by the licensees are required to demonstrate their financial qualifications to safely operate and eventually decommission TMI-1." Staff Ex. 1, at C7-18 to C7-19. Moreover, the Staff review was based on the assumption that TMI-1 would resume commercial operation in 1981, and depended on future regulatory actions by the Pennsylvania Public Utility Commission and the New Jersey Board of Public Utilities. Id. at C7-15 to C7-19.

159. As of November, 1980 (SER Supplement 1), and March, 1981 (SER Supplement 2), the Staff still had not made the requisite findings relative to Licensee's financial qualifications to operate TMI-1 and decontaminate TMI-2. Staff Ex. 4, at 38; Staff Ex. 13, at 10.

160. Supplement 3 to the Staff's TMI-1 Restart SER contained no evaluation of financial qualifications. Staff Ex. 14, at 1. Complete elimination of financial qualifications from Staff review is contrary to

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* It may be argued that CLI-81-3 remove all financial questions from the jurisdiction of the Board. The Board is not, however, making any determinations relating to the merits of financial issues, as prohibited by the Commission. Rather, the Board is simply ruling on the scope of the Commission's ruling in terms of post-hearing staff review. The Commission will, of course, automatically review this ruling of the Board.

the Commission ruling that the issue not be litigated in the proceeding, but that continuous staff review be maintained. Therefore, the Staff is directed that financial considerations remain as 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.

161. Notwithstanding the fact that financial issues may no longer be litigated in the proceeding, the Staff is still required to determine prior to restart "that the licensee satisfies the financial qualification criteria imposed on an applicant for an operating license." August 9, 1979 Order and Notice of Hearing, slip op. at 14. The applicable criteria are set forth in 10 C.F.R. §50.33(f), and 10 C.F.R. Part 50, app. C. Similarly, the Staff must also determine prior to restart that Licensee "possesses the financial resources necessary to safely operate Unit 1 in addition to cleaning up Unit 2." CLI-80-5, item 12.

162. These findings must be based on realistic and up-to-date information. Logically, the findings need to be based on Licensee's financial ability to meet the restart requirements prescribed by this Board and the Commission. The "reasonable assurance" standard of 10 C.F.R. §50.33(f) requires a showing that the utility has a reasonable financing plan in light of the relevant circumstances. Kansas Gas & Elec. Co. (Wolf Creek Generating Station, Unit No. 1) ALAB-462, March 9, 1978, 2 NUC. REG. REP. (CCH) ¶30,277.

Respectfully submitted,

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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
(Three Mile Island Nuclear	)	(Restart)
Station, Unit No. 1)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the attached "Commonwealth of Pennsylvania's Proposed Findings of Fact and Conclusions of Law on Management Issues" were served on the parties on the attached service list, this 18th day of May, 1981. Parties with an interest in management issues were served by Express Mail.

Robert W. Adler

ROBERT W. ADLER
Attorney for the Commonwealth

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