LIC 5/15/81

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

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

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manpower assigned to TMI-1 and to GPU's nuclear activities, there appears to be a common understanding among the more senior level managers who testified before the Board of the re-allocation of responsibilities within the new organization. See also, Wegner, ff. Tr. 13,284, at 13. In summary, in an overall sense, the Board finds that the TMI-1 operations, maintenance and technical staffs are qualified, or will be qualified before restart, to operate Unit 1 safely.

B. TMIA Contention 5

61. Intervenor Three Mile Island Alert, Inc. (TMIA) filed a contention, accepted by the Board in its First Special Prehearing Conference Order, on the subject of maintenance practices at TMI-1. 10 NRC 828, 841 (December 18, 1979). This contention, TMIA Contention 5, subsequently was amended by TMIA. TMIA Motion for Revision of Contention 5, July 26, 1980; TMIA Correction of Errors in its Motion for Revision of Contention 5, July 31, 1980. With several clarifying modifications, revised TMIA Contention 5 was accepted by the Board. Memorandum and Order of Prehearing Conference of August 12-12, 1980 at 3 (August 20, 1980); Tr. 2138-53. Several additional modifications subsequently were made to the contention. Tr. 3602 (Selkowitz); Tr. 12,290-91 (Blake, Smith).

62. TMIA Contention 5, as finally revised, states:

> It is contended that Licensee has pursued a course of conduct that is in violation of 10 CFR 50.57, 10 CFR 50.40, 10 CFR 50.36, 10 CFR 50.71 and 10 CFR Appendix

B, thereby demonstrating that Licensee is not "technically . . . qualified to" operate TMI Unit 1 "without endangering the health and safety of the public." This course of conduct includes:

a. deferring safety-related maintenance and repair beyond the point established by its own procedures (see e.g. A.P. 1407);

b. disregarding the importance of safety-related maintenance in safely operating a nuclear plant in that it:

1. [deleted]

2. proposed a drastic cut in the maintenance budget;

3. [deleted]

4. fails to keep accurate and complete maintenance records related to safety items;

5. has inadequate and understaffed QA/QC programs related to maintenance;

6. extensively uses overtime in performing safety-related maintenance.

63. TMIA Contention 5 was not litigated by the parties in the usual evidentiary manner, that is, with Licensee first presenting its case on the subject, followed by the Staff and by any intervenors presenting direct evidence. Rather, because of "a failure by TMIA to respond fully to licensee's interrogatories on the contention" after approximately five months of discovery, motions to compel by Licensee, responses by TMIA, and Board orders granting Licensee's motions to compel, the Board directed TMIA to proceed first with its affirmative case on Contention 5 at the start of the

evidentiary hearing in October, 1980. Memorandum and Order of Prehearing Conference of August 12-13, 1980 (August 20, 1980), at 3-4. In our view, on the basis of TMIA's affirmative case, Licensee would be able to discover the specifics upon which TMIA relied in asserting its Contention 5, and therefore would be able to meet TMIA's affirmative case. Id., at 4, citing Tr. 2,106-28.

64. Beginning on October 15, 1980, TMIA put on its affirmative case on revised TMIA Contention 5. TMIA called fifteen witnesses to testify, thirteen of whom were Licensee employees subpoenaed by TMIA. In addition, during the October, 1980 session on TMIA Contention 5, an additional Licensee employee testified on the subject of overtime practices in the Maintenance Department, at the request of the Board. Tr. 4,017-19 (Smith).

65. Licensee's responsive case on the subjects included in TMIA Contention 5 (as revised) was conducted in February, 1981. Two pieces of direct testimony by a panel of five witnesses and an individual witness, respectively, were introduced into evidence. Shovlin et al. ff. Tr. 13,533; Manganaro, ff. Tr. 13,643. In addition, a third piece of prefiled testimony entitled, "Licensee's Response to Board Question Concerning Maintenance Practices in the Sample Year, 1978," prepared at the request of the Board, Tr. 3,352-58, was admitted as Licensee Exhibit 29, without any cross-examination of Licensee witnesses by TMIA, the NRC Staff, or the Commonwealth of Pennsylvania. Tr. 13,659-61 (Blake, Smith).

66. The NRC Staff prefiled two pieces of testimony, both by witnesses Keimig and Haverkamp, along with a supporting memorandum, directed at issues raised by TMIA and by the Board on the subject of previous and present maintenance practices at TMI-1. These documents also were received into evidence without any cross-examination of the sponsoring witnesses. Tr. 16,408-09; 16,411-12 (Smith, Keimig, Haverkamp).

67. TMIA Contention 5 asserts that Licensee is not technically qualified to operate TMI-1 for a number of distinct reasons, each having to do with the sufficiency of Licensee's past and present maintenance practices, including maintenance record-keeping. Each of these five allegations constitutes a serious charge against both the technical capabilities of Licensee, and Licensee's management practices; consequently, we have evaluated each allegation separately.

68. Deferral of safety-related maintenance and repair beyond the point established by Licensee's own procedures. Historically, corrective maintenance has been performed at TMI-1 by use of a work request (now called a job ticket) system. Tr. 2,638 (Shovlin). In order to initiate a repair on any component or system associated with the plant, an individual originates a work request, identifying the malfunction and the cause, if known. Tr. 2,639 (Shovlin). This identification triggers a chain of events within the Maintenance Department with which Operations is frequently intimately involved, Tr. 2,683-88 (Shovlin), whereby the identified repair is

planned, scheduled for work, approved for work, and fixed. Tr. 2,639-62 (Shovlin). Depending on the nature of the work performed -- e.g., whether an engineering modification is required, rather than a repair in kind -- the work request itself will go through many hands other than those of individuals in the TMI-1 Maintenance Department. After the repair has been completed, a similar chain of approvals and signatures is required, the number of which is also dependent on the nature of work performed, e.g., whether QC must review the work package because the repair involved a component included in GP 1008, the Quality Assurance Systems List, Board Ex. 1. Tr. 2,646, 2,659-62 (Shovlin); Tr. 13,595-97 (Dyckman).

69. It is TMIA's contention that a review of a selected sample of work requests, the forms utilized by the Maintenance Department to perform corrective maintenance, along with a review of the systems in question and the priorities given to the work, per se prove that portion of their contention which alleges that Licensee improperly, and at the expense of the public health and safety, deferred safety-related maintenance. Tr. 3,032-35 (Selkowitz). In TMIA's view, some of these work requests, in and of themselves, would support TMIA's allegation of grievous maintenance deferral practices at TMI-1; other work requests, when considered as a group, will provide evidence of a reprehensible pattern of deferral of safety-related maintenance, a pattern which if true, would present a serious challenge to Licensee's present management capability to operate TMI-1. Tr. 2,567, Tr. 3,341 (Smith).

70. In order to consider the merits of TMIA's first allegation, two preliminary questions must be answered: (1) What constitutes improper deferral? and (2) What is safety-related maintenance?

71. Improper Deferral. TMIA arbitrarily chose one year as a bench-mark indication of improper deferral of safety-related maintenance. Bonetti, ff. Tr. 3,310, at 1. Licensee, on the other hand, declined to formulate a bench-mark, and instead addressed in its testimony the propriety in each particular instance of delays in the repair identified in the work requests admitted into evidence. Shovlin, et al. ff. Tr. 13,533, at 23-27, 52-55, 58-61, 63-68, 75-77.

72. The evidence presented makes clear that the time frame in which maintenance work is accomplished at TMI-1 is not formally or rigidly defined by Licensee's procedures, nor has it been so defined in the past. However, work requests are identified by their assigned priority. Tr. 2 673-82, 2,701-03, 3,061-73 (Shovlin). The manner in which priorities are assigned within the TMI-1 Maintenance Department is radically different now with the promulgation of new definitions of priority work in March, 1980, than the system previously used at TMI-1 to categorize the large numbers of repairs -- from cutting the grass to working on the fuel handling door seal -- with which Maintenance contends. Tr. 2,885-86 (Colitz); 3,071-72 (Shovlin). Prior to that time, a priority system was in effect at TMI-1 which defined priority 1 maintenance work as

urgent, priority 2 work as routine, and priority 3 work as a low priority. Although this system was time-related, as obviously work defined as urgent in theory would be accomplished before routine maintenance, in fact the system did not effectively operate to screen out the truly important maintenance, and thus was not used for that purpose. Tr. 3,674, 3,068 (Shovlin). Rather, "real" priority maintenance work was scheduled for work through the use of regular "plan of the day" meetings attended by Maintenance and Operations personnel, as well as individuals from other appropriate organizations such as QA. Tr. 2,702, 3,085 (Shovlin); Lic. Ex. 29, at 12-14. These "real" priorities were assessed on the basis of the description given in the work request itself of the malfunction needing repair, not on the basis of the priority assigned to the work. Tr. 3,100 (Shovlin). Generally, this system functioned effectively because "real" priority jobs usually were identified initially by Operations, Lic. Ex. 29 at 12, and, in any event, they were the maintenance items that were truly tracked by Operations through the plan of the day and the 1600 hour meetings. Tr. 3,085 (Shovlin).

73. The priority system described above was clearly unsatisfactory, a fact which Mr. Shovlin, the Manager of Plant Maintenance at TMI-1 and the long-time senior member of the Maintenance organization at Three Mile Island, recognized. The numerical system utilized on work requests to identify priority

work inaccurately reflected "real" priorities established at the plant, in part because of the broad definition given to priority 1 work. Tr. 3,063-64 (Shovlin). In addition, because the priority was assigned by the initiator of the work request, a tremendous element of subjectivity entered into the designation of a priority. Tr. 3,071-72 (Shovlin). (As Mr. Shovlin explained, a janitor with a leaky valve that is spilling water all over his floor considers the valve repair to be urgent, and hence a priority 1 job. Tr. 2,677 (Shovlin).) Moreover, a very large volume of duplicative work requests existed because the system permitted a work request to be initiated by any individual; however, no administrative method existed to weed out jobs already identified on a work request, e.g., by a worker on a different shift. Consequently, Mr. Shovlin would "purge" the system on occasion; that is, work requests which were no longer valid because the work had been completed through a different work request or work requests that duplicated other outstanding work requests were discarded. Tr. 2,679-80, 2,698-701 (Shovlin); Shovlin et al., ff. Tr. 13,533, at 30-31.

74. The priority system, as revised, completely changed the definitions of priorities, in addition to adding a fourth category of work, priority 4. Shovlin et al., ff. Tr. 13,533, at 39-45. The new definitions classify maintenance work according to the health and safety of the public and plant personnel, and the operability of the nuclear plant:

Priority 1: Can only be classified by superintendents, department heads or shift supervisors; will cause a plant shutdown; reduce generation; has a time clock of very short duration; is an immediate industrial or nuclear safety hazard; compromises nuclear safety or security, reactor control or power conversion cycle control system in so far as to present a clear threat of initiation of a trip or severe transient; imposes or threatens increased personnel radiation exposure; constitutes one element of a multievent failure which would result in initiation of a trip or transient.

Priority 2: Could cause a plant shutdown if operation is continued too long; redundant component and backup is no longer available; could cause a plant limitation in the near future; time clock on the component that will require it to be repaired in a timely fashion; items that should be repaired when plant conditions allow.

Priority 3: Routine corrective maintenance that does not impact plant operation.

Priority 4: Corrective maintenance to clear minor problems that don't actually affect the operation of any components; all change modifications and any improvements that are not related to plant performances. As the paper work on change modifications become available a suitable priority will be assigned.

Lic. Ex. 2. While a priority assignment is recommended by the initiator of the work request, the actual priority assigned to a job is determined by the Supervisor of Maintenance (now called the Manager of Plant Maintenance) or his designee. Tr. 3,097 (Shovlin).

75. In addition to the revised priority system, however, the Maintenance Department continues to make use of the plan of the day meetings, as well as daily (1600) scheduling meetings, to review with Operations and obtain joint

concurrence on the appropriate schedule of work. Shovlin et al., ff. Tr. 13,533, at 45-47. In addition, Maintenance utilizes planners, who organize the paperwork, and a computer system with numerous printouts, to organize and track all TMI-1 corrective maintenance activities. Among other things, these computer summaries provide a means whereby currently outstanding work can be identified by priority. Id., at 36.

76. In reviewing the maintenance system described by TMIA's witnesses, as well as the testimony of Licensee and the Staff, the Board finds no basis in the record for TMIA's allegation that Licensee has in the past substantially departed from a company standard in failing to perform maintenance in a timely fashion. The Board also finds no evidence of such a practice under the current maintenance system. These determinations are based in part on the fact that Licensee had and continues to have no firm standard defining the time within which work, of whatever importance, was and is required to be accomplished. Rather, through the use of regular meetings as well as currently utilizing computer printouts of outstanding job tickets, it has been Licensee's practice to track what its key Operations and Maintenance personnel perceive to be important maintenance work. Tr. 3,085 (Shovlin); Shovlin et al., ff. Tr. 13,533, at 45-47.

77. Although TMIA failed to show that Licensee ignored its own procedures in improperly deferring safety related maintenance, the Board considers it reasonable to

evaluate on its own whether the alleged examples of improperly deferred safety-related maintenance presented by TMIA, either independently or as a group, indicate a lack of attention on the part of Licensee to significant maintenance work at TMI-1. Similarly, during the proceeding, one of the topics on which the Board requested additional information was whether, prior to November, 1979, Licensee had in place a reliable method of identifying nuclear safety work requests which required maintenance. Tr. 3,352 (Smith).

78. Safety-related Maintenance. TMIA Contention 5 is limited to maintenance which is safety-related. A great deal of time was spent during the hearing attempting to clarify the Board's and the parties' understanding of this concept. TMIA and Licensee agreed that safety-related is not equivalent to and should not be confused with safety-grade, or other terms of art frequently used in the industry. Rather, it was the consensus of the interested parties that the term safety-related, as it pertains to TMIA Contention 5, should be interpreted by what would be a dictionary or ordinary definition of the term; that is, an educated judgment by an individual as to whether or not a particular maintenance item and the systems involved in the maintenance item have some safety significance. Tr. 2,859-68 (Selkowitz, Blake).

79. The parties also agreed, at least initially, to rely upon the expert opinion of Mr. Joseph J. Colitz, the Manager of Plant Engineering at TMI-1 and one of the witnesses

subpoenaed by TMIA, as to whether the particular maintenance activity identified in each work request offered into evidence by TMIA would be safety-related, in light of the component(s) and system(s) involved. Tr. 2,573-79 (Blake, T. Adler); Tr. 2,861-67 (Blake, Selkowitz). During the course of Mr. Colitz's direct and cross examination, however, it became clear that TMIA disagreed sharply with Mr. Colitz's conclusions as to whether particular maintenance activities should be considered nuclear safety-related. Compare Tr. 3,487 (Selkowitz) with Tr. 2,847-50 and 3,134-35 (Colitz); compare Tr. 3,560-61 (Selkowitz) with Tr. 2,948-52 and 3,238-42 (Colitz).

80. Mr. Colitz, who has worked at the plant in a senior engineering capacity for approximately nine years and has been licensed as a senior reactor operator at TMI-1, exhibited an impressive familiarity with the TMI-1 facility. Tr. 3,115-16 (Jordan); Tr. 2,994 (Colitz); Hukill et al., ff. Tr. 11,617, at 40-42. Mr. Colitz testified that he determines whether a particular maintenance activity is nuclear safety-related by looking at the particular component or the problem associated with it and the consequences of doing that job. If the act of doing the repair does not affect the integrity of the reactor coolant system boundary, if the component or system being taken out of service to do the repair is not required for safe shutdown of the plant, and if the inoperable component or system is not required for any accident conditions or mitigation of any consequences and releases to the public, Mr. Colitz

would maintain that the maintenance job is not safety-related. Tr. 2,994-95 (Colitz). Thus, although Maintenance personnel regularly work on safety-related components or systems, the job itself -- considering both the nature of the problem and the work required to fix the problem, e.g., a packing leak -- may not necessarily be a safety-related repair. Tr. 2,995 (Colitz).

81. TMIA offered no alternative means of determining whether a particular maintenance activity was safety-related. Tr. 3,030-39 (Selkowitz). Other than relying on priority designations, no consideration was given to whether the work request activity itself or the system or component which was the subject of the work request activity was safety-related. Tr. 3,317 (Bonetti).

82. While the Board relied heavily upon the testimony of Mr. Colitz in assessing whether particular components or systems are nuclear safety-related for purposes of performing maintenance on those components or systems, the Board also utilized its own expertise in evaluating the testimony, as well as its non-technical judgment, in light of the common usage of the term, safety-related, to which the parties agreed with respect to the evidence presented on TMIA Contention 5. See ¶ 78, supra.

83. The Board admitted twelve exhibits (excluding subparts) into evidence on the topic of deferral of safety-related maintenance: TMIA Exs. 11, 12, 13, 15, 17(a-f), 18,

19, 20, 23, 28, 31, and 39. Each of these exhibits consists of one or more work requests for which the TMI-1 Maintenance organization was fully responsible. According to TMIA, eight of these work requests (TMIA Exs. 11, 13, 17(a-f), 18, 19, 20, 28 and 31) represent a pattern of deferral of safety-related maintenance activities from which one could infer generally that Licensee's management of its maintenance activities was inadequate. Four work requests (TMIA Exs. 12, 15, 23 and 39) in and of themselves support TMIA's allegation of grievous maintenance deferral practices at TMI-1. See ¶ 69, supra. Moreover, TMIA would contend that there is no basis for finding any improvements in current management oversight of maintenance practices. Tr. 2,582-83 (T. Adler). (In addition, two of the exhibits reviewed by the Board in connection with this portion of TMIA Contention 5, TMIA Exhibits 20 and 31, also pertain to TMIA's allegations concerning the adequacy of Licensee's QA/QC programs related to maintenance. See TMIA Contention 5(b)(5). In these two instances, the major deferral of work evident from the face of the work request is not in the performance of the necessary maintenance; rather, it is in the time it took QA to review the paperwork associated with the completed job. Tr. 2,662 (Shovlin); Tr. 3,586 (Jordan); Tr. 3,690-98 (Selkowitz, Smith). (The issue of Licensee's maintenance record-keeping practices is discussed in ¶¶ 98 through 103, infra.)

84. Mr. Colitz was of the view that only two of the twelve work requests at issue here, TMIA Exhibits 19 and 31,

had potential safety-significance. Tr. 3,155-58, 3,252-55 (Colitz). (It should be noted that Mr. Colitz was not asked about the safety-significance of the work identified in TMIA Exhibits 12, 15, 23 and 39, so-called "surprise" exhibits. Tr. 3,470, 3,474 (Smith). This was due to the fact that TMIA's counsel did not question Mr. Colitz about the safety-significance of particular maintenance work, and the Staff's and Licensee's counsel were not aware of the possible admission into evidence of these documents at the time Mr. Colitz testified; hence, no questions were asked of Mr. Colitz along these lines.) In each of the other instances, it was Mr. Colitz's view that the maintenance work identified on the face of the work request, including delay in conducting the maintenance, would not affect the safe operation of the facility, and thus was not safety-related. Tr. 3,118, 3,133-35, 3,239-43, 3,249-51 and 3,175-79 (Colitz).

85. The Board admitted into evidence the exhibits listed above, applying a broad perception of the potential association of the components or systems referenced in the exhibits to the safe operation of the facility. See, e.g., Tr. 3,038 (Jordan). TMIA Exhibits 11, 12 and 13 reference valves in the feedwater system, the system which provides water to the steam generators. Tr. 2,843-50 (Colitz); Tr. 3,491-92 (Jordan). The subject of TMIA Exhibit 15 is hydraulic snubbers, components installed as pipe supports and to protect against pipe breaks under seismic conditions. Tr. 2,874

(Colitz). TMIA Exhibits 17(a-f) and 18 concern the nuclear river water pumps which cool the four nuclear services closed cooling water heat exchangers in order to keep these systems at their design conditions. Tr. 2,949 (Colitz). TMIA Exhibit 19 involves repairs to the manways and handholds associated with openings into the primary side of the once-through steam generators -- openings which constitute part of the primary coolant system boundary. Tr. 3,252-55 (Colitz). TMIA Exhibit 20 concerns the motor-operated coolant block valve, RCV-2, which functions to isol leaks resulting from failure of the power-operated relief valve, or PORV, to close. Tr. 3,250, 2,953-55 (Colitz). TMIA Exhibit 23 involves repairs to the reactor building access hatch interlocks. These access hatch interlocks prevent direct contact of the atmosphere in the reactor building with that of the auxiliary building. Tr. 2,936 (Colitz). The subject of TMIA Exhibit 28 is prefilters located in the makeup and purification system, the system which normally functions, among other things, to maintain the pressurizer level within operating range and to provide makeup water to the reactor coolant system. Tr. 2,898-901 (Colitz). TMIA Exhibit 31 concerns repairs to the fuel handling building door seal. Tr. 2,885-86 (Colitz). In TMIA Exhibit 39, incorrect information was being relayed to the computer in the control room from four control rod drive rmocouples. Tr. 2,893-94, 3,286-90 (Colitz).

86. The time lag involved in these work requests, from date of initiation to final sign-off, ranges from

approximately seven months in the case of TMIA Exhibit 31 to approximately thirty-one months in the case of TMIA Exhibit 12.

87. Although TMIA questioned numerous Licensee employees on the work request process, particularly focusing upon the meaning of the questions included and information provided on the work request forms, see, e.g., Tr. 3,477-87 (Good); Tr. 3,494-99 and 3,511-13 (McGarry), no evidence was adduced as to the reason(s), if known, for the delays identified in the work requests.

88. In its responsive testimony, Licensee explained in detail how the various repairs were conducted in accordance with Licensee's procedures in the case of TMIA Exhibits 11, 12, 13, 15, 19, 20, 23, 31 and 39. Shovlin et al., f. Tr. 13,533, at 25-27, 52-55, 58-61, 75-77. With respect to TMIA Exhibits 17(a-f), 18 and 28, Licensee acknowledged that the documentation of these repairs was improper; however, the work was performed properly, in a manner consistent with current maintenance practices. Id., at 63-68. Also, in the case of TMIA Exhibit 20, both Licensee and the Staff recognized but saw no safety-significance in the QC sign-off delay of nine months, id., at 75-76; Keimig and Haverkamp - TMIA 5,[10] ff. Tr. 16,412, Table B at 8,[11] or the approximately two and a half year delay

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10 "NRC Staff Testimony of Richard R. Keimig and Donald R. Haverkamp In Response to TMIA Contention 5," dated March 17, 1981, will be referred to as Keimig and Haverkamp - TMIA 5.

11 Table B was received into evidence witnout pagination. In order to precisely cite to the table, page numbers (1-20) have been provided.

in completing the design change initiated by TMIA Exhibit 12. Shovlin et al., ff. Tr. 13,533, at 23-24; Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, Table B at 2.

89. In its independent review of the individual work requests offered by TMIA to prove its allegation regarding improper deferral of safety-related maintenance, the Staff evaluated the impact of the delays associated with the work requests received as TMIA exhibits and concluded that, "[t]here appears to be no example of inappropriately deferred safety-related maintenance work." Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 3-4.

90. While the Board found that certain of the exhibits offered by TMIA into evidence were of potential safety significance, there is no evidence supporting TMIA's allegation that, in fact, deferral of these potentially safety significant jobs endangered the health and safety of the public. While the delays identified in the subject work requests initially raised concerns about the adequacy of Licensee's maintenance practices, detailed and reasonable explanations have been provided, without challenge, as to why, in each individual instance, such delays occurred. On the basis of Licensee's explanation, with which the Staff concurs, the Board is satisfied that Licensee has not in the past and does not presently defer safety-related maintenance and repair beyond the point established by its own procedures, thereby endangering the health and safety of the public, as alleged in TMIA Contention 5(a).

91. Proposal of a drastic cut in the maintenance budget. An across-the-board operations and maintenance (O&M) budget cut was proposed by GPU management for the year 1979. Tr. 4,038-40 (Wise). (The proposal was instituted by GPU management at the beginning of 1979, after the original 1979 budget had been developed. Tr. 4,042 (Wise).) It is TMIA's contention that this budget cut proposal was drastic, at least insofar as its impact on the TMI-1 Maintenance Department, and constituted a disregard by Licensee's management of the importance of safety-related maintenance in safely operating a nuclear plant. TMIA Contention 5(b)(2).

92. There is no evidence as to what portion of the 1979 budget cut, as proposed, was ever instituted, nor is it clear what portion of the budget cut items applicable to TMI-1 were costs previously budgeted to the Maintenance Department. TMIA called two witnesses on this subject, Mr. Donald Wise, Assistant Comptroller for Met Ed, and Mr. John R. Knoll, Administrator, Budgets and Reports, Three Mile Island. Mr. Wise was not sure whether or not any of the proposed budget cut items were in fact instituted in light of the proximity in time of the finalization of the budget reductions to the accident at TMI-2. Tr. 4,057 (Wise). Mr. Knoll was of the belief that some, but not all, of the proposed budget cut items were actually reduced. Tr. 4,086 (Knoll); see also, Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 8. The two witnesses did not agree on what percentage of the identified reduction

items were attributable to corrective maintenance, and not other O&M expenditures. Compare Tr. 4,089-91, 4,107 (Wise) with Tr. 4,125 (Knoll).

93. TMIA does not allege nor does the evidence support an allegation that drastic cuts were instituted in the TMI-1 maintenance budget. However, the methods by which the budget would have been cut, but for the TMI-2 accident, and therefore, the manner in which budget cuts might be instituted at TMI-1 today were of interest to the Board in assessing the management competence of Licensee.

94. The 1979 proposed budget cut, applicable to all elements of the GPU O&M system, was divided into two phases. Tr. 4,043 (Wise). That portion of the budget cut applicable to Licensee, Met Ed (one of the GPU subsidiaries), was: $2.5 million cost reduction applicable to 1979 without regard to whether these costs would be deferred to subsequent years; and, a $2.8 million permanent (i.e., non-deferred) Met Ed expenditure reduction. Of these targeted amounts, in the case of phase one, $346,000 was identified as proposed Met Ed budget cuts for TMI-1, out of a total Met Ed TMI-1 budget of $8.6 million. (These dollar figures represent Met Ed's budget for TMI-1. Since there are two other operating companies which support TMI-1, with contributions together which equal the contributions from Met Ed, a like amount would be cut from the budgets of these two contributing companies. Thus, the total phase one budget cut applicable to TMI-1 was $692,000 out of a

total TMI-1 budget of $17.2 million. Tr. 4,118-19, 4,043-44 (Wise).)

95. At TMI-1, as well as within other Met Ed organizational units, the items proposed to management as eligible for inclusion in the proposed budget cut list were initiated and proposed within "root departments," such as the TMI-1 Maintenance Department. These proposed items were reviewed within each organization, re-examined on a production division level at Met Ed, and finally approved by the President of Met Ed. Tr. 4,046, 4,049-50, 4,059-62 (Wise). At TMI-1, management of Met Ed's Generation Division (the production division in which the TMI-1 budget was located) undertook a thorough review of the priority list for budget cuts established by plant personnel. At a series of meetings, these priorities were examined in detail. Tr. 4,059-60 (Wise); 4,096-98, 4,116 (Knoll). This method of identifying potential cuts to the 1979 budget as originally proposed made it possible, at least theoretically, for a department within a division to avoid any cuts to its budget if the department could identify no savings greater than the risks associated with cutting costs. Tr. 4,062 (Wise).

96. The NRC Staff was made aware of the proposed O&M budget cut applicable to TMI-1 through a routine, programmatic Inspection & Enforcement management meeting with Met Ed's Vice President Generation and others on February 9, 1979. Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 6. Because of their

early notification of the proposed budget cut, NRC staff were confident of their ability to monitor the impact, if any, of the proposed budget reductions on the safety of plant operations. On the basis of IE inspection reports for that period, Staff witnesses Keimig and Haverkamp conclude that there is no apparent basis to suspect that budget reductions were having adverse affects on plant safety. Nevertheless, in order to fully respond to the allegation raised by TMIA, an IE Region I inspector conducted interviews with Met Ed personnel, including the Superintendent of (now, Manager of Plant) Maintenance, maintenance supervisors and foremen and reviewed documentation on this issue. The inspector found no discrepancies between the documented material and the verbal information given during interviews. Although some reduction in contracted preventive maintenance support in early 1979 was identified, the inspector found no evidence that the maintenance budget reduction affected any safety-related corrective maintenance. On the basis of the review undertaken by the Staff of its own documentation, as well as the documentation and recollections of Licensee personnel, the Staff witnesses concluded that there is no evidence to support TMIA's allegation that Licensee disregarded the importance of safety-related maintenance in safely operating a nuclear plant by proposing cuts in the TMI-1 maintenance budget. Id., at 7-10.

97. The Board is satisfied with the review undertaken by the Staff to assess the merits of TMIA's budget cut

allegation, and finds no record evidence in support of a contrary conclusion. While a budget cut was proposed in early 1979 which would affect TMI-1 maintenance activities, there is no evidence to support the conclusion that this cut was drastic, or would have been drastic if the TMI-2 accident had not occurred. Nor is there any reason to believe that the method used by Licensee to prioritize items for reduction did not satisfactorily identify items which could not be eliminated from the 1979 budget without affecting safe operation of the plant, and therefore protect these items from inclusion in any cost reduction plan.

98. Failure to keep accurate and complete maintenance records related to safety. In its case-in-chief, TMIA questioned Licensee employees on the record-keeping system used by the TMI-1 Maintenance Department in the past and in the present. See, e.g., Tr. 2,662-72 (Shovlin) (discussion of how work request information is put into the computer, review of differences between computer summary and manual Maintenance Log information, genesis of current procedures); Tr. 3,377-437 (Good) (discussion of Corrective Maintenance Component History Report (TMIA Ex. 9) and Corrective Maintenance Master Job Ticket Report (TMIA Ex. 10), including function of these documents); Tr. 3,839-88 (Dyckman) (discussion of purpose of manual Maintenance Log, explanation of Misplaced Job Ticket Reconciliation Form (TMIA Ex. 42), description of current document control practices). In addition, TMIA offered into

evidence a number of work requests in support of subsection (b)(4) of TMIA Contention 5, which alleges that Licensee's record-keeping practices with respect to safety-related maintenance are inadequate and, as such, contribute to Licensee's disregard of the importance of safety-related maintenance in safely operating a nuclear plant. See TMIA Exs. 16, 21, 22, 33(a-m), 34(a-k), 40 and 43(a-b). These work requests present a variety of record-keeping problems. TMIA Exhibit 16 is a work request that may have been used twice to perform the requested job. Tr. 3,524 (McGarry). TMIA Exhibits 21, 22 and 40 are marked, "cancel, purged" or "cancel" without any explanation given on the face of the work request as to the reason for the cancellation. Tr. 3,592-96 (Shovlin); Tr. 3,797 (Selkowitz). TMIA Exhibit 33(a-m) consists of thirteen work requests identifying the same piece of work; however, whether the work involved is nuclear safety-related is not answered identically in these work requests. Tr. 3,716 (R. Adler). TMIA Exhibit 34(a-k) also involves a series of work requests which identify the same repair; in this group, some of the work requests identify the component involved as a QC component, per GP 1008, while others do not. Tr. 3,722 (Selkowitz). TMIA Exhibits 42, 43(a, b) and 44 all relate to the manner in which misplaced work requests or job tickets are handled. Tr. 3,867-81 (Dyckman).

99. On the basis of the evidence presented to the Board during TMIA's case-in-chief, the Board was motivated to

inquire further into Licensee's past record-keeping system, that is, whether the Licensee had in place a reliable system of records which would identify and assure that the work was either done or made unnecessary for some other reason. Tr. 3,352, 3,896 (Smith). By agreement of the parties and with the Board's concurrence, the year 1978 was chosen as a representative or sample time period for purposes of meeting this Board inquiry. Tr. 3,358-59 (Smith); Tr. 3,835-36 (Blake, Selkowitz).

100. Licensee and the Staff responded to the Board's request for information, in addition to responding to TMIA's case-in-chief. Licensee, in several pieces of testimony, described in detail the maintenance record-keeping system in existence at TMI-1 now, as well as the system utilized in the past, including discussion of the Maintenance Department's interface with the QA Department. Shovlin et al., ff. Tr. 13,533, at 14-23, 29-39, 47-51, 72-75, 77-79; Lic. Ex. 29. The Staff also responded to TMIA's presentation and the Board's inquiry, particularly focusing upon the auditability of maintenance work in the past (the sample year, 1978), and in the present, as suggested by the Board and agreed upon by the interested parties. Tr. 13,662-67 (Smith, Little, Swanson, L. Bradford, R. Adler and Blake). Based on information independently obtained by IE during and in response to the Management Appraisal Inspection 50-289/80-21, described in the management safety evaluation report, NUREG 0680, Supp. 1, App. B (Staff

Ex. 4), as well as routine NRC inspections in those areas conducted during 1978, the Staff concluded that Licensee's prepared testimony was an accurate representation of the Licensee's current and past (1978) maintenance and QA/QC programs and practices. Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 2; Keimig and Haverkamp - Sample Year 1978,[12] ff. Tr. 16,412, at 2-3.

101. With respect to the particular work request exhibits received in evidence in support of TMIA Contention 5(b)(4), Licensee acknowledged that TMIA Exhibit 16 was improperly utilized twice; however, current procedures provide for the use of so-called "blanket work requests" to perform repetitive jobs on a particular component. Shovlin et al., ff. Tr. 13,533, at 61-63; Tr. 13,626 (Dyckman). This position was confirmed by the staff testimony which states: "Use of this work request twice was a poor practice, but did not affect safety because the work was otherwise properly performed and affected systems were properly controlled and returned to service." Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 5, Table B at 4. With respect to TMIA Exhibits 21, 22 and 40, the "purged" or "cancelled" work requests, Licensee explained how the operations-related work identified on TMIA Exhibit 21 was

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12 "NRC Staff Testimony of Richard R, Keimig and Donald R. Haverkamp In Response to the Board Questions Concerning Auditability of Maintenance Practices in the Sample Year, 1978, and Currently," dated March 17, 1981, will be referred to as Keimig and Haverkamp - Sample Year 1978.

completed in short order, with other minor work deferred and eventually cancelled; how TMIA Exhibit 22 identified a modification initially desired by Engineering, but subsequently cancelled and replaced by a better modification, and another work request; and how TMIA Exhibit 40 initially was classified as a high priority item but, upon a closer look, the problem was discovered to be of less importance than originally thought and required an engineering change modification with an associated work request to correct. Shovlin et al., ff. Tr. 13,533, at 55-68, 27-29. In each of these instances, the Staff concurred with the actions taken by Licensee, including the work request cancellations. Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 5, Table B at 8-9, 18-19. According to Licensee, TMIA Exhibits 33(a-m) and 34(a-k) do not involve QC components or nuclear-safety related work, although some of the work requests included in these exhibits incorrectly identified the work to the contrary. Shovlin et al., ff. Tr. 13,533, at 68-69. In the Staff's view, while the ventilation system installation is regarded as QC, the filters which are the subject of these work requests are not within QC scope, and the work involved was not nuclear safety-related. Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, Table B at 11-17. The absence of formal documentation therefore was not a noncompliance with NRC requirements, although this shortcoming did impede the timely Licensee and NRC reviews of these work requests. Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 5.

Finally, TMIA Exhibits 42 and 43(a, b) were discussed in detail by Licensee, including the rationale used to generate the so-called Job Ticket Reconciliation Form in order to correct the absence of work request records on particular jobs. Shovlin et al., ff. Tr. 13,533, at 30-33; see also, Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, Table B at 19-20.

102. Throughout Licensee's explanation of the record-keeping discrepancies associated with the work requests described above, Licensee acknowledged problems where it perceived the existing records to be inadequate, and addressed the methods currently in use to prevent such errors. See, e.g., Shovlin et al., ff. Tr. 13,533, at 68-69 re preventive maintenance program's focus upon timely replacement of filters such as those identified in TMIA Exhibits 33(a-m) and 34(a-k). In addition, the Staff's extensive review of maintenance activities during 1978 found that record-keeping associated with the activities reviewed was complete and auditable. In particular, the work requests showed that all necessary reviews and approvals for work were obtained as required by applicable Technical Specifications, regulatory guides and standards, and Licensee procedures. On the basis of this finding, the Staff concluded that Licensee had in place an acceptable and auditable method of maintaining records which demonstrated that the work was properly identified and either performed or determined to be unnecessary for appropriate reasons. In addition, Licensee's maintenance records provided an acceptable method of

obtaining necessary work review, approval and reporting. Keimig and Haverkamp - Sample Year 1978, ff. Tr. 16,412, at 10-11.

103. Although the Board initially had concerns about the record-keeping system in operation at TMI-1, both in the past and at the present time, on the basis of the investigations conducted by the Staff, as well as the detailed information provided to the Board by the Licensee, the Board's concerns have been satisfied. In addition to having confidence in the current maintenance record-keeping system, see, e.g., Tr. 3,888 (Dyckman), the Board is satisfied that past record-keeping practices did not impact adversely upon plant safety. Moreover, the Board is convinced that the attitude of Licensee management displays a willingness to admit shortcomings in its past record-keeping practices, and to initiate new methods for dealing with record-keeping problems.

104. Inadequate and understaffed QA/QC programs related to maintenance. Closely related to TMIA's allegation concerning maintenance record-keeping practices and to the Board question on that subject is TMIA's allegation that Licensee has inadequate and understaffed QA/QC programs related to maintenance. TMIA Contention 5(b)(5).

105. Quality Assurance and Quality Control personnel are involved on a daily basis, in a number of different ways, with the performance of maintenance at TMI-1. Tr. 11,875-77 (Ballard). The controlling document for purposes of QC

any impact on plant safety. Lic. Ex. 29 at 20; Shovlin et al., ff. Tr. 13,533, at 75-77; Keimig and Haverkamp - TMIA 5, Table B at 8 and 11; Keimig and Haverkamp - Sample Year 1978, ff. Tr. 16,412, at 11.

107. Overall, the Board is satisfied with the extent of QA and QC involvement in the conduct of maintenance at TMI-1. This conclusion is based in part on the maintenance review process now in place at TMI-1 for safety-related repairs, in part on the Staff's conclusion that where past practices, such as quality review and documentation, have been found deficient or marginal, the Licensee has improved these problems through a revised maintenance organization structure, procedures, and management as well as through the institution of a computerized information control system, and in part on the Board's personal observations and discussions with Licensee's senior QA management. Shovlin et al., ff. Tr. 13,533, at 72; Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 5; Tr. 11,758-908 (Clark, Herbein, Kazanas, Ballard).

108. With respect to staffing, no evidence has been presented challenging the sufficiency of Licensee's staffing levels, other than to suggest the inference that delays in QC sign-offs could be attributed to insufficient staffing. In view of the large number of personnel within the QA Department under the new GPU Nuclear organization, and the significant increase in number from the earlier QA organization, the Board finds that Licensee's QA/QC programs related to maintenance are

not understaffed. Tr. 1,181-84 (Kazanas); Lic. Ex. 29, at 7 and Attachment 2; Arnold, ff. Tr. 11,434, at 19-20.

109. Extensive use of overtime in performing safety-related maintenance. TMIA's final allegation charges that Licensee has disregarded the importance of safety-related maintenance in safely operating a nuclear plant in that it extensively uses overtime in performing safety-related maintenance. TMIA Contention 5(b)(6).

110. At issue here is the prudent use of overtime. As the Staff has pointed out, it is important to note that the quality of work and, in some cases, the immediate safety of plant operations is enhanced by the use of overtime. This is particularly true for prompt corrective repairs of safety-related equipment. The maintenance work may be better if the same person or crew starts and completes the repair because specific techniques are sometimes learned during the trouble-shooting and disassembly of a component. Also, overtime may be particularly beneficial where certain specialized qualifications or talents are limited to only a few individuals, such as would be the case for certain welding operations or complex calibrations. Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 12. On the other hand, if the use of overtime is abused, e.g., overtime is used without consideration of the physical and mental condition of the worker(s) involved so that maintenance personnel are exhausted while on the job and cannot properly perform the repairs assigned to them, it no longer

serves a beneficial purpose and, in fact, may jeopardize plant safety.

111. The normal shift lengths for Maintenance personnel working at TMI-1 has varied since the plant went into commercial operation. Tr. 2,688-94 (Shovlin). At its peak, normal shifts during outages went for 12 hours a day, seven days a week. Tr. 2,688-89 (Shovlin); Tr. 4,166 (Reismiller); Tr. 4,140 (McCurdy); Tr. 3,991-92 (Eberle). Currently, Licensee uses daylight maintenance workers on eight hour shifts five days each week, plus six rotating shifts, eight hours each shift. Shovlin et al., ff. Tr. 13,533, at 4. The use of overtime at TMI-1 has also varied. Under Licensee's old overtime policy, the unit superintendent was required to approve overtime for an individual after he had worked sixteen hours. Tr. 2,691 (Shovlin); Tr. 4,169 (Reismiller); Tr. 3,991 (Eberle). Under the current policy, which conforms to the guidelines of NRC IE Circular No. 80-02, the maximum hours allowed, absent special circumstances, are 12 hours a day, 72 hours each week. Shovlin et al., ff. Tr. 13,533, at 70 and Attachments 13 and 14.

112. The Board received conflicting evidence on the burden felt by Maintenance workers from the overtime required of them. Mr. Norman Reismiller, a former Licensee employee, complained bitterly about the long working hours required of him. Tr. 4,178 (Reismiller). On the other hand, Mr. Lawrence E. Eberle, a current Licensee employee, appreciated the

opportunity to volunteer for overtime work. Tr. 3,986 (Eberle). Similarly, Mr. David McCurdy, a current Licensee employee,[13] was of the opinion that the overtime available during refueling outages was optional, Tr. 4,150 (McCurdy), and that he was not forced to stay and work long hours if he did not feel up to it. Tr. 4,144 (McCurdy).

113. While it is clear that maintenance staff worked long hours during plant shutdowns, breaks were taken during the day, and a hot dinner break lasting for one to two hours was provided in the evening. Tr. 4,143, 4,140 (McCurdy); Shovlin et al., ff. Tr. 13,533, at 71-72 and Attachment 11; Tr. 3,992 (Eberle). Overtime was not mandatory; at the same time, absence without prearrangement was not condoned. Shovlin et al., ff. Tr. 13,533, at 71 and Attachment 10; Tr. 4,011-12 (Eberle); Tr. 4,144 (McCurdy). Overtime assignments were made with an effort, as required by management's contract with its employees, to equalize the overtime work offered to personnel of the same classification, e.g., first class instrument men. Shovlin et al., ff. Tr. 13,533, at 70; Tr. 4,006 (Eberle). In its review of Licensee's past and present overtime practices, the Staff considered whether, during IE inspections, an

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13 Mr. McCurdy testified on the subject of overtime as a result of his being randomly selected by the Board from a list of eleven former or present Licensee employees referenced in TMIA Exhibit 44(a-k). Tr. 4,138 (Smith). TMIA Exhibit 44(a-k) lists the overtime hours of these employees from October, 1977 through March, 1979.

inspector had ever made note of the fact that an individual was excessively mentally or physically fatigued, or if Licensee's maintenance history records for TMI-1 revealed any abnormally repetitive maintenance which might indicate the existence of poor workmanship caused by fatigued workers. Keimig and Haverkamp - TMIA 5, ff. Tr. 16,412, at 11-13. However, the Staff found no apparent basis on which to conclude that extensive overtime was used at TMI-1 in a manner which adversely affected the quality of safety-related maintenance work. Id., at 11.

114. In light of the Staff's conclusions after investigating Licensee's overtime practices, as well as the testimony by former and present Licensee employees, the Board is satisfied that Licensee has not in the past and does not now disregard the quality and importance of the safety-related maintenance being performed by improperly permitting or requiring employees to work overtime.

115. In summary, the Board finds Licensee has not (a) deferred safety-related maintenance and repair beyond the point established by its own procedures, or (b) disregarded the importance of safety-related maintenance in safely operating a nuclear plant by (1) proposing a drastic cut in the maintenance budget, (2) failing to keep accurate maintenance records related to safety items, (3) having inadequate and understaffed QA/QC programs related to maintenance, and (4) extensively using overtime in performing safety-related maintenance;

consequently, Licensee's course of conduct with respect to these issues is not and has not been in violation of 10 CFR §§ 50.57, 50.40, 50.36, 50.71 and 50 Appendix B, nor does it demonstrate that Licensee is not technically qualified to operate TMI Unit 1 without endangering the health and safety of the public.

C. Training

116. Training at TMI-1 has been of special interest to this Board. Training has been the subject of considerable attention and discussion since the accident at TMI-2 and was the subject of extensive testimony during the evidentiary hearing. See generally, Tr. 12,126-13,011, 13,108-227, 20,576-639, and 20,686-782 (Long, Knief, Newton, Ross, Gardner, Christensen, Kelly, Boger, Crocker, Allenspach, Aamodt). Licensee presented two panels of witnesses: the first composed of employees, namely Dr. Robert Long who heads all of GPU Nuclear's training, Dr. Ronald Knief, who heads up training at TMI-1, Mr. Samuel Newton, who is in charge of Licensed Operator Training at TMI-1, and Mr. Michael Ross, Manager of Operations at TMI-1; and the second comprised of three Licensee consultants, Dr. Eric Gardner, an educational psychologist with special expertise in educational and psychological measurement, psychometrics, test construction, and curriculum and program evaluations, Dr. Julien Christensen, an engineering psychologist and human factors specialist, and Mr. Frank Kelly, an