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USNRC

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY & LICENSING BOARD

82 MAR -8 NO. 1

In The Matter Of )  
Metropolitan Edison Company )  
Three Mile Island )  
Nuclear Generating Station ) Docket 50-289  
Unit I )

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SUPPLEMENT TO AAMODT PROPOSED FINDINGS OF  
FACT AND CONCLUSIONS OF LAW ON ISSUES RAISED  
IN THE REOPENED TMI-1 RESTART PROCEEDING  
FILED JANUARY 18, 1982

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Table of Contents, contd.

	<u>PAGE</u>
Issue 2 - The Adequacy of NRC Investigations of Cheating at TMI.....	45
Scope NRC Investigations.....	45
Truncated OIA Investigation.....	46
OIE's First Investigation.....	49
Presence of Metropolitan Edison Management Official During Interviews.....	54
Conclusions Regarding First OIE Investigation.....	58
Cross Inadequacies of OIE's Second and Third Investigations.....	59
OIE's Disregard of Trunk Report.....	65
Erroneous Conclusions of OIE.....	66
OIE Withholding of Information.....	67
NRC Proctor Noted O & W Cheating.....	69
Operators Knew About NRC Investigations...	73
Conclusions on Issue 2.....	73a
Issue 3 - (cont) Adequacy of Licensee's Investigation.....	77
Hukill Interviews.....	77
Issue 5 - (cont) The Extent of Licensee Management Knowledge of Encouragement of and Negligent Failure To Prevent Cheating.....	88
Management Knowledge of Cheating.....	88
Management Encouragement of Cheating.....	88
Management Negligent Failure to Prevent Cheating.....	89
Issue 6 - Possible Cheating of Non-Licensed Personnel.....	91
The Licensee and NRC.....	91
Issue 7 - Licensee Constraints on Investigation of Cheating.....	94
Management Presence.....	94

	<u>PAGE</u>
Misrepresentation of Records.....	94
Issue 9 - Administration of Licensee Examinations.....	97
Independent Auditors.....	98
Issue 10 - The Administration of NRC Examinations.....	100
Critique of New Procedures.....	100
Continued Incompetency of OLB.....	103
Inadequate "Special Test" of TMI-2 Events.....	104
Questionable Validity of NRC Examinations.....	107
Valid Examinations Would Improve Operator Attitudes.....	112
Conclusions - Issue 10.....	114
Issue 11 - Staffing TMI-1 With Licensed Operators.....	115
Conclusion - Issue 11.....	120
Issue 12 - Certification of The Operators.....	121
Number of Hours.....	124
Conclusions - Issue 12.....	126

Issue 2. The Adequacy of the NRC Investigations of Cheating  
at TMI

100. There would appear to be no need to consider the adequacy of the NRC's investigations of the cheating at TMI since the reopened hearing was purposed to reinvestigate. However the reopened hearing was constrained in several ways, discussed in paragraphs 12 - 20, which limited investigatory opportunities. NRC continued to support the adequacy of their own investigations, incorporating them into the record of the hearing. Tr. 25, 036 - 7; 25, 276 - 8. Since the NRC is the regulatory agency for nuclear facilities and employs professional investigators, the Board and Commission can be expected to depend on the NRC investigations, particularly where there is no other evidence. The adequacy of the evidence deduced by the NRC is therefore an important issue.

101. The NRC conducted four investigations of the cheating at TMI. One was conducted by the Office of Inspector and Auditor (OIA) of the suspected cheating of two individuals. After two days of investigation, the responsibility for conducting a full investigation was transferred to the Office of Inspection and Enforcement. OIE continued the investigation of the cheating of the two individuals for five days. The OIA and OIE reports were issued on July 31, 1981 and August 11, 1981, respectively. The Board was not satisfied with these investigations and reopened the hearing by an order of September 14, 1981. Subsequently, new information developed which the NRC investigated from September 16 until September 25, 1981 and from October 19 through 22, issuing reports on October 13 and October 28, respectively.



Staff Ex. 26, 27, 28.

102. The number of investigations would appear to be ample, however each investigation was directed toward one or more specific instances or allegations of cheating. The first and second investigations of the cheating of the two individuals reported conflicting information. All of the investigations were conducted with haste; sources of evidence were passed over, and evidence gained was improperly analyzed. The NRC definition of what constituted cheating was not common parlance. The OIE investigators did not use probing techniques as a rule, and they did not proceed or conclude in a skeptical fashion. OIE even diverged from their own standard investigatory procedures to allow management officials to be present during their interviews of witnesses.

103. The evidence and conclusions of the NRC investigations are substantially misleading and inadequate. Each investigation is examined in the following paragraphs.

#### Truncated OIA investigation

104. On July 22, 1981 OIA began the investigation of the suspected cheating of two TMI personnel on the April NRC licensing examination. Staff Ex. 24, at Summary. OIA studied the SRO and RO examinations of these two individuals who had blatantly similar or identical responses to a large number of questions. Id. OIA interviewed members of NRC's Operating Licensing Branch (OLB),

the Chief, Paul Collins, and two proctor-examiners for the April examination at TMI. OIA found NRC proctoring "clearly unsatisfactory" Id., at Analysis, Summary.

105. OIA concluded on July 31, 1981 that the two suspected individuals had cheated extensively on the NRC SRO and RO licensing examinations. Id. At this point, OIA had not interviewed the two individuals or any other TMI personnel. OIA believed that the examinations and the proctoring conditions were sufficient evidence to reach a conclusion and recommended enforcement actions be taken against these individuals. Id.; Covering Letter, Staff Ex. 24, Cummings to Dircks.

106. OIA recommended, in part, that:

- a. the two individuals, and any others found to have cheated, should be appropriately disciplined,
- b. all other licensing candidates be reexamined,
- c. licensee personnel be barred from proctoring NRC examinations.

107. Tacit to these recommendations are the conclusions that OIA was suspicious of extensive cheating at TMI; that further investigation might not ferret out all cheaters; and that Metropolitan Edison management personnel should not be entrusted with proctoring of NRC examinations.

108. The OIA investigation was truncated on the third day in favor of a full investigation by OIE. Id.

Tr. 25, 279 - 81 (Baci). Some mystery surrounds this decision. No reason was known to OIA personnel, who stated that OIA had followed other investigations to completion. Resner ff. 25, 035, at 2, 3; Tr. 25, 045 (Resner).

109. Transfer of the investigation from OIA to OIE was a gross error. OIE was less likely than OIA to be objective. OIE had a working relationship with TMI through their resident inspectors, and Mr. Stello, the Director of OIE, had been in intimate contact with TMI due to the investigation of the TMI-2 accident.

110. The relative objectivity of the two investigatory branches is contrasted in several instances. For example, in determining the proctorship of the April examination, OIE depended on the reports of the TMI operators while OIA asked the proctors. Staff Ex. 26, at 1; Staff Ex. 24, Summary, Third and Fourth Interviews. OIE ended up with a totally erroneous conclusion (that the room in which documented cheating occurred was continuously proctored). Staff Ex. 26, at 1. Another instance concerned seating arrangements for the April examination. OIA, depending on the proctors, reported "shoulder-to-shoulder" seating, while OIE believed the operators' descriptions of two operators seated at each end of an eight foot table. Staff Ex. 24, Third Interview, at 2; Staff Ex. 26, at 9 - 48. Based on their information, OIA concluded that all examinees should be retested. Staff Ex. 24, at Summary. OIE, on the other hand, did not consider retest warranted. Tr. 25, 307 (Ward).

OIE's First Inadequate Investigation

111. Chairman Pallidino, in discussion with Mr. Cummings of OIA and Mr. Stello of OIE, ordered that OIE conduct a full investigation. Tr. 25, 279 - 81 (Baci). OIE, however, stated their purpose as an investigation of the alleged cheating on the NRC examinations given in April at TMI. Staff Ex. 26, at Cover. OIE narrowed the investigation to focus on the cheating of two individuals, O and W. Since the cheating of these two individuals had been established by OIA, OIE's focus is puzzling. Chairman Pallidino had ordered a full investigation, presumably to determine the extent of cheating of other operators and any management involvement. Tr. 25, 279 - 81 (Baci); 25, 428 (Ward).

112. OIE carried through with their purpose. The two individuals, O and W, were interviewed extensively on three occasions. The third interview was conducted in Bethesda, Maryland at NRC headquarters. Mr. Stello met with O and W individually and in a joint meeting.<sup>10</sup> O and W finally confessed to having colluded on the April licensing examination, a fact that had already been established. Staff Ex. 26, at 7 - 11, 41 - 48, Enclosures 2 - 5;

113. OIE's persistence in obtaining the confessions of O and W is distressing in view of purported limited resources and time committed to the investigation. Tr. 25, 428 (Ward); 25, 307 (Baci); 25, 044 (Resner). OIA had no doubt that O and W had cheated, nor did the NRC consultant who detected the

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Footnote 10 - The substance of Mr. Stello's meeting with O and W was not reported.

cheating. Staff Ex. 24, at Summary, Second Interview, at 2. OIA had recommended that resources be devoted to seeking out any other cheating that may have occurred. Cover Letter, Staff Ex. 24, Cummings to Dircks. The priority given to obtaining confessions from O and W limited the scope of OIE's investigation.

114. A limited number of other examinees were interviewed -- 11, in all, of the remaining 34 examinees. Those interviewed were chosen on the basis of their proximity to O and W during the examination. Tr. 25, 308 (Ward). OIE considered these 11 operators to be an adequate sample. Tr. 25, 425 (Ward). In view of the narrow focus of the investigation, as discussed in paragraph 111, the sample may have been ample. It was, however, grossly inadequate in terms of a full investigation. There were 23 remaining examinees and other TMI personnel who worked in the area of the testing rooms who were prime sources of information.

115. Perhaps one of the most severe and unnecessary limitations of the OIE investigation was their investigative techniques. Broad, general questions were asked from a prepared list. Tr. 25, 364 (Baci). The cheating of O and W was not mentioned. Tr. 25, 294 (Baci). No one of the 11 interviewees was sworn, nor were lie-detectors used or suggested. Staff Ex. 26, 19 - 39; Tr. 25, 419 (Ward). The decision not to use those 'persuasive' techniques was made by the Director of OIE, Mr. Stello. Id. Evidently, the Director has to grant that authority. Id.

116. OIE did not recognize that they were being lied to, except in the cases of O and W. When the operators who took the examination with O and W reported, uniformly that proctoring was continuous, OIE did not notice that the proctors had reported extended absences to OIA. Staff Ex. 26, at 1, 19 - 39; Staff Ex. Third Interview at 2.

117. OIE's use of innocuous techniques is puzzling. Surely they were aware of the lengths to which they had to go to get O and W to admit to helping each other. The use of lie-detectors was threatened, as well as retest on sensitive questions. O and W were reinterviewed and signed statements were demanded. Staff Ex. 26, at 7 - 11, 41 - 49. Even with use of these tough techniques, either O or W (or both) persisted in lying. OIE would, evidently, have had to resort to their threats to resolve these disputes. Aamodt Ex. 12.

118. OIE could not conclude on the basis of their interviews that no other cheating had taken place during the April licensing examination. OIE states, in their conclusion, that the interviews "revealed no information", which is a fair conclusion considering the inadequacies of the interviews. It should not mislead the reader to conclude that there was no cheating. The interviews were simply unproductive. OIE realized this. Tr. 25, 333 - 34 (Ward); Staff Ex. 26, at 1.

119. OIA had recommended that all the examinations of the TMI-1 licensing candidates should be reviewed for signs of cheating. Staff Ex.24, at Summary. OIE reviewed all the licensing examinations given in April 1981 and the 'mock' examinations, also given in April 1981, of those who sat in the same room as O and W. Staff Ex. 26, at 16; Tr. 25, 333 -34 (Ward). OIE looked for obvious similarities and blatant copying as on the O and W examinations. Id.

120. OIE found no evidence of blatant copying on the examinations reviewed. This is probably a fair conclusion. OIE is, however, overstating their case in describing their review as "comprehensive". Staff Ex. 26, at 1. The review was far from comprehensive. It did not consider or look for signs of more 'intelligent' copying (rephrasing), use of 'crib-sheets' or verbal aid. Later developments (reports and allegations) affirmed the existence or possibility of these methods of cheating. Tr. 25, 369 (Ward).

121. OIE's summary of their conclusions was misleading. OIE implied that their failure to have discovered evidence of cheating indicated that there was no other cheating than that of O and W:

"A comprehensive review of the other RO and SRO examinations administered between April 21 and 24, 1981 revealed no evidence of additional irregularities/cheating by the remaining examinees."

"Interviews of ...11 of the remaining 34 individuals who took the exams revealed no information indicative of involvement in or knowledge of cheating during the RO and/or SRO exams."

Staff Ex. 26, at 1. The investigative efforts of OIE did not justify these conclusions.

122. Although OIE focused on the cheating of O and W, the investigators were negligent in obtaining an understanding of the 'why's and wherefore's' of the O and W cheating.<sup>11</sup> Answers to the following questions could have provided important clues to the investigators:

a. Why did O and W copy word-for-word and make no attempt to disguise their copying?

b. Were O and W concerned about being noticed by other operators? If not, why not?

c. Why did O consider that allowing W to copy was not cheating?

O and W were long-time employees of Metropolitan Edison, and they were held in high regard by their fellow operators. Licensee Ex. 85, at 3, 4 ; Tr. 26, 510 (KK); 25, 703 (GG); 26. 568 (I). The attitudes of O and W toward their own behavior in taking the licensing examination could have revealed broadly-held attitudes of operators and management personnel.

123. OIE assumed that they knew what behavior the operators would consider to be cheating on an examination. Tr. 25, 364 - 66 (Ward). The investigators overlooked the fact that O did not consider "allowing" W to use his papers to be

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Footnote 11 - The investigators' position was that they only needed to gain enough information to make an enforcement decision. Tr. 25, 387 (Ward); Staff Ex. 26, at 2.



cheating. Staff Ex. 26, at 46, 47, Enclosure 4. This is discussed more fully in paragraphs 162, 163.

Presence of Metropolitan Edison Management Official During  
OIE Investigatory Interviews

124. A serious constraint on the OIE investigation was the allowance of a management official to be present during the interviews. Tr. 25, 430 (Ward); Staff Ex. 26, at 7, 37. The presence of management representatives inhibited the flow of information, particularly information that would inculcate management. Tr. 25, 274, at 18; Staff Ex. 27, at 6; Tr. 25, 430 (Ward).

125. The investigators testified that they believed that they overcame the inhibitions due to the presence of management, however this conclusion is refuted by overwhelming evidence. Tr. 25, 425 (Ward); paragraphs 126 - 134 infra.

126. If the interviewers believed that they overcame the presence of management, why did the investigators request during the conduct of the interviews that Metropolitan Edison management be excluded? Staff Ex. 27, at 6. Obviously, the investigators considered that management presence was stifling information flow.

127. The investigators also protested concerning management presence after the investigation. Id. "This concern was made known to IE management by the investigators before, during and subsequent to the first investigation." Id. The inhibition of information flow, the unproductiveness of the interviews, caused I&E to terminate the investigation prematurely. Tr. 25, 333 (Ward).

128. Mr. Ward revealed that an NRC lawyer, in preparing his prefiled testimony, omitted a section of his narrative in which Ward stated the effects of management presence.<sup>12</sup> Tr. 25, 398 (Ward). The <sup>investigators'</sup> prefiled testimony which states that "the presence of management officials at interviews during the first investigation did not prevent OIE from conducting a thorough and complete investigation" was clearly tainted by this omission.

129. The investigators believed that their investigative techniques mitigated the effect of management presence, however the evidence does not support this assumption. The curative techniques were purportedly "persistent questioning" and reminders to tell the truth. Id. Such techniques were used effectively in the interviews of O and W, however they were notably missing in the other interviews. In interviewing the eleven examinees, the investigators used "basic questions" from

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Footnote 12 - This withholding of information by NRC counsel deserves to be examined.

a prepared list. The questions were checked off after they were asked. Tr. 25, 352 - 53. (Baci). Names of individuals were not mentioned; the cheating of O and W was not discussed. Tr. 25, 410; 25, 294 (Baci). The investigators intentionally refrained from asking assertive questions, such as "Did you cheat?" Tr. 25, 410 (Baci). The interviews were described as very formal, proper and reasonable by Metropolitan management. Tr. 23, 997 (Hukill). Individuals were not reinterviewed in the light of subsequent evidence. Tr. 25, 364; 25, 371; 25, 408 - 9 (Ward). No individuals (other than O and W) were sworn or asked to sign a statement. Staff Ex. 26, 19 - 39. There is no evidence that OIE used techniques which could overcome management presence, except in the interviews of O and W.

130. The OIE investigators regarded the condition of management presence during the interviews to be totally improper for a full and fair investigation of management involvement. Tr. 25, 430 (Ward). The investigators considered refusing to conduct the investigation until NRC exercised their authority to exclude management Tr. 25, 428 (Ward). The Chief Investigator only proceeded because he understood that the "sitting Board" could not accomodate a delay in an investigation which could influence their impending decision. Tr. 25, 428; 25, 388.

131. A Metropolitan Edison management official was present during all but one of the interviews of the examinees. Staff Ex. 26, at 7 - 48. Only Mr. T, whose most frequent response was simply "No" (see Tr. 26, 596. - 26, 622), was interviewed without a management official present. Id., at 37.

132. It is extremely puzzling that OIE would allow management to be present during the interviews. NRC's investigatory procedures do not allow management representation during investigatory interviews. Tr. 25, 433 (Baci). The OIE Chief Investigator, Mr. William Ward, knew that it was clearly inappropriate to have management present or represented during interviews conducted to investigate management culpability. Ward. ff. 25, 356, at 18; Staff Ex. 27, at 6; Tr. 25, 430 (Ward).

133. There is no justification for OIE's failure to exclude management from the investigation in view of the interest of the Board and the Commission in any possible management culpability. OIE's procedural divergency warrants investigation. Why did OIE favor Metropolitan Edison in this manner?

134. OIE offered a preposterous explanation for allowing management presence in the interviews. The Chief Investigator explained that Mr Victor Stello, the Director of OIE, did not understand the NRC policy that granted the investigators the right to exclude management.

Tr. 25, 428 - 30 (Ward). Mr. Stello is reported to have continued in this 'misunderstanding' despite repeated requests by the investigators, who were fully aware of NRC's rights. Staff Ex. 27, at 6; Tr. 25, 430 (Ward); 25, 433 (Baci). Mr. Stello only pursued the legality of the matter at the insistence of the investigators prior to the second OIE investigation. Id.; Tr. 25, 429 (Ward).

Conclusions Regarding the First OIE Investigation

135. The first OIE investigation of the extent of cheating at TMI and management involvement was not adequate to provide any conclusions other than that two first-level management personnel had cheated extensively on examinations and that administration of the examinations was sufficiently loose that other individuals may have cheated. Both of these conclusions were forgone following the prior, brief, truncated OIA investigation.

136. The OIE investigation may, in fact, have served to cover-up information through ineptness, negligence and/or purposefully.

137. OIE overlooked important clues that were revealed by the investigation. These were O's definition of cheating and the peculiarly uniform and erroneous testimony of the operators concerning proctoring.

138. Although the Board did not consider the OIE investigation definitive, no further investigations were instigated by NRC until new information was provided by a graduate engineer formerly employed by TMI. Board Order and Memorandum, September 14, 1981; Staff Ex. 27, at 4, 7. The subsequent investigations did not attempt to address the inaccuracies and omissions of the first investigation.

Gross Inadequacies of OIE's Second and Third Investigations

139. The conduct and conclusions of the second and third OIE investigations were grossly inadequate and misleading, respectively. OIE had important leads, provided by four graduate engineers. This was information which OIE had failed to elicit in their first investigation. Several reports of actual cheating instances and a wide-spread rumor hinted that a system of cheating may have been operative at the time of the NRC examination. The rumor referred to a person who was stationed outside the examination rooms with the knowledge of management and the examinees and who could provide answers to the examination questions. Staff Ex. 27, at 4; Staff Ex. 28, at 1. OIE continued to employ unproductive investigative techniques, limited their inquiry, and allowed management influence to continue.

140. Although management persons were not present during the interrogations of the second and third investigations, all arrangements for the NRC interviews were arranged through Metropolitan Edison attorney, Mr. John Wilson. Staff Ex. 27, at 6. The preparation of these witnesses by Mr. Wilson

is not clear, however, it can be clearly inferred from three instances discussed in paragraph 16 (supra) and paragraphs 141, 143 (infra). In addition, Metropolitan Edison management had discussed cheating on the examinations with all the examinees. The examinees were, in a real sense, 'locked' into testimony they had given to, or in the presence, of Metropolitan Edison management. Tr. 25, 367; 25, 415; 25, 474 (Ward).

141. As in the first investigation, the OIE investigative techniques were ineffective. The interrogators did not overcome management influence or lying by the force of persistent questioning. For instance, suspects were not named (for fear of besmirching reputations or revealing information). Tr. 25, 471 - 2 (Ward). Persistent questioning could have been productive. <sup>such techniques productively</sup> OIE used/ interviewing Messrs. O, W and P. Paragraphs 54-60; 112.

142. The second and third investigations were severely limited in follow-up interviews. Individuals who were interviewed in the first investigation were not reinterviewed unless they were directly named as a suspect or observer. Tr. 25, 472, 4 (Ward). The investigators depended on earlier responses (or none at all) to general questions in the first investigation as being responsive to the new information being probed by the second and third investigations. Fifteen of the examinees were not interviewed during any of the three investigations, nearly one-half of

the remaining 34 examinees who may have cheated. Id.; Ward ff. 25,356, at 11.

143. One of the most puzzling aspects of the second investigation, and possibly the most damaging, was OIE's encouragement of an interviewee to consult with Metropolitan Edison management before providing information that related to a rumor of conspiratorial cheating. Tr. 25, 447 - 8 (Ward).<sup>13</sup> The individual, KK, consulted with the TMI Director of Operations and Maintenance, Mr. Ronald Toole, "to seek his counsel". Tr. 25, 378 (Ward). The matter was then discussed by Messrs. Arnold and John Wilson at TMI prior to KK's providing the information to NRC. Tr. 25, 379 (Ward). Mr. Wilson, an attorney representing Metropolitan Edison, conferred at length with KK. Tr. 25, 380 (Baci). Mr. Wilson was then present during OIE's interview of KK. Staff Ex. 27, at 29; Enclosure 8, at 1, 8. The investigator must have been aware of the impropriety of Mr. Wilson's presence, as was Mr. Wilson. Id. The KK information<sup>14</sup> was potentially a serious matter (Tr. 25, 419 (Ward)) however NRC allowed management to influence and inhibit the flow of this information, as discussed above.

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Footnote 13 - The Region 1 investigator did not include this important information in his report of KK's first or second interviews. Staff Ex. 27, at 24, 29 - 30, Enclosure 6, 8.

Footnote 14 - KK received a telephone call on the third day of the April NRC examination from someone who identified himself as Mr. U, soliciting information for Mr. O. Mr. KK was in the control room at the time. The question was not on the NRC examination. Staff Ex. 27, at 29-30, Enclosure 8. Also discussed at paragraphs 70-75 supra.



144. OIE interviewed only two individuals other than the primary suspect and principals in the KK matter. Id., at 40, 42. OIE believed that KK had provided full, but innocuous, information. Since the primary suspects (U and O) denied involvement, OIE felt that productive leads were missing. Tr. 25, 420 (Ward); Staff Ex. 27, at 47. OIE dismissed the KK matter without appropriate consideration or investigation.

145. OIE's assumptions that the KK information was complete and accurate are incredulous.

The information had been funneled through Metropolitan Edison management and counsel. This counsel, Mr. Wilson, had provided the details of the KK matter to the OIE interviewer prior to KK's interview. Staff Ex. 27, Enclosure 8, at 1. The interviewer's questioning faithfully followed the information provided by Mr. Wilson. Id., at 1 - 8. At one point, the investigator anticipated KK's answer, much to KK's surprise. Id., at 4, 5. "I'm surprised how you know that it was O...I don't know how you know that." Concerning KK's familiarity with his caller's voice, the investigator simply accepted KK's statement, "I don't know him very well", rather than probing for details such as time on shift together, classes together, etc. Id., at 3. The interviewer was not skeptical when KK stated that he had never spoken with the alleged caller, Mr. U, about the incident, although the interviewer expressed surprise. Id., at 9.\* At one point, the interviewer appeared to

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\* KK offered a most unbelievable explanation in the hearing. Tr. 26, 519 - 20.

simply verify the information supplied to him by Mr. Wilson:  
"That's correct," the interviewer assured KK. It is apparent that the interview of KK was not conducted in a manner that was investigative. OIE had no reasons to assume that they had obtained all the facts.

146. Another reason to be skeptical about the KK information was KK's alleged concern about the interview itself. Staff Ex. 27, Enclosure 8 at 8. Why was KK concerned about the demeanor of the interviewer if KK had nothing to hide? KK had already spoken to his management so that a repeat of the same information should not have engendered significant discomfort. KK had feared disciplinary action from Metropolitan Edison, however, he had already told them. The KK information was brief and simple, so that KK should not have been concerned about how "deep it would go". Tr. 26, 502 (KK).

147. The KK information caused a flurry amongst Metropolitan Edison and NRC management. Mr. Toole contacted Mr. Arnold who called Mr. Stello that very evening. Mr. Stello called Mr. Thompson of OIE who contacted Mr. Ward the following morning prior to the interview of KK. Mr. Ward contacted the interviewer, Mr. Matekas, who contacted Mr. John Wilson to obtain all the details. Tr. 25, 411; 25, 448 (Ward); Staff Ex. 27, at 2, 3. This stir appeared to contradict the innocuousness later ascribed to the KK information by OIE. Why did Mr. Wilson take notes during the OIE interview of KK when Mr. Wilson had already been apprised of the simple details? Tr. 25, 380 (Baci); Staff Ex. 27, at 29, Enclosure 8, at 8. Mr. Wilson explained that he wanted to insure the accuracy of the investigator's

report. Id. This explanation is baseless since the interview of KK was tape-recorded. Id.

148. Concerning the denials of the prime suspects in the KK information: OIE was well aware of Mr. O's proclivity for deception. Paragraphs 110, 112 supra. The other suspect, Mr. U, made an incredible denial, which the investigators did not believe. Staff Ex. 27, at 36-38, 44; Tr. 25, 359 (Ward). However, U's denial was accepted because of the "fervor" with which it was expressed.

149. OIE overlooked the fact that somebody did indeed solicit KK. KK had not fabricated a story. Why would he? There was a corroborating witness, QQ. Staff Ex. 27, at 39, Enclosure 10. Strangely, OIE disregarded QQ's witness because QQ expressed some uncertainty about details concerning the transmission of the call. Id., at 3. OIE passed over QQ's clear testimony, "I remember KK telling the caller..." (Id., Enclosure 10, at 2, line 3) to dwell on whether the call was received on a handset rather than the speaker phone, thus not witnessed first-hand by QQ. Id., at 47, 3. KK clearly stated that the call was received on the speaker phone. Id., Enclosure 8, at 3. OIE's conclusions concerning QQ's witness lacked objectivity.

150. An important implication can be drawn from the fact that KK's caller used a circuit which contained a speaker phone, allowing other personnel to overhear the solicitation. Evidently the caller did not fear the consequences of being overheard. This, taken with KK's lack of concern at the time of the call (Tr. 26, 504 - 5), can only mean that the practice of solicitation of answers during examinations was commonplace and accepted by the operators and management. (KK was in a management advisory position as a shift technical advisor.)

151. OIE essentially dropped the KK matter out-of-hand and in the face of subsequent supporting evidence. There were no fewer than two individuals who reported a widespread rumor which paralleled KK's experience. Staff Ex. 27, at 29; Staff Ex. 28, Enclosure 1, at 3. WW reported a similar solicitation during the requalification examination in April of 1980. Id., at 4. And the FF incident was part of the same pattern. Id., at 1, 5, 6. OIE did not follow-up on either WW's or FF's solicitations; since these individuals did not identify their solicitors, OIE concluded that they lacked any logical leads. Id., at 1.

152. The second and third OIE investigations were grossly inadequate considering the logical leads that were provided and seriousness of the matter of possible conspiratorial cheating. In view of OIE's alleged interest in detecting any systems of cheating or management involvement, the conduct of these investigations by highly experienced investigators is extremely puzzling.

OIE's Disregard of Trunk Report on Cheating

153. OIE did not make an independent review of "cheating instances" detected by Licensee's consultant, Mr. Edward Trunk. Ward ff. 25, 356 at 3, 4. Tr. 25, 399 - 40

(Baci). OIE accepted Metropolitan Edison counsel's view that blatantly similar answers on Category T tests administered by the TMI Training Department were the result of memorization of training materials, with the possible exception of the answers of Messrs. G and H. Tr. 25, 400; 25, 443-44 (Ward). OIE could not explain the identicalness of the responses of G and H (or GG and W). OIE did not pursue these instances or come to any conclusion concerning them. Tr. 25, 338 - 39 (Ward).

154. OIE overlooked the culpability of the TMI Training Department or GPU Director of Training, Dr. Robert Long. Dr. Long had assured the Board in the main hearing that weekly tests were being administered by the TMI Training Department in a "closed book format in response to a directive of the Commission. Tr. 12, 740 (Long). That was not the case. "Open-book" and "take-home" quizzes were given, and there was cooperation on the tests. Tr. 26, 608 (T); 25, 975 - 76, 995 - 96 (OO); 26, 099, 153 (W); 26, 232 (O); 26, 806 - 10 (U). The Commission considered the authorship of the weekly tests to be a serious matter. Why wasn't OIE concerned that training management had misled the Board and had not administered their tests as directed by the Commission?

#### Erroneous Conclusions of OIE

155. OIE concluded that cheating at TMI was limited to three individuals, O, W and FF. Ward ff. 25, 356, at 14, 15. Ward admitted that cheating may have been more extensive, but that OIE had no evidence that it was other than limited. Tr. 25, 339 (Ward). Ward overlooked, that with the evidence in hand

and applying the same standards, OIE should have included WW who supplied an answer solicited when he knew an examination was in progress, DD who solicited information, and G, H, GG whose blatantly similar answers could not be explained. OIE overlooked the individuals of unknown number who were involved in the solicitations of KK, WW and FF.

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156. OIE concluded that Metropolitan Edison management was not involved in cheating by reason of default. Ward ff. 25, 356, at 15, 16. OIE chose to ignore the evidence inhand, that the six persons named in paragraph 155 were all first-line management personnel. OIE assumed that management personnel were not involved in the cheating instances uncovered by Mr. Trunk, although the tests on which the cheating occurred were administered by TMI instructors, management personnel. Tr. 25, 411 (Baci; 25, 377 (Ward).

#### OIE Withholding of Information

157. OIE did not report the instance of cheating reported by an operator (P) during the second investigation. Tr. 25, 418 (Ward); Paragraph 55. Mr. Ward explained that DD's solicitation of P during the licensing examination did not fit OIE's definition of cheating. Tr. 25, 418 (Ward).

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Footnote 15 - KK testified concerning his solicitation: "And they said...", "They hung up.", "I hope those guys can understand." Staff Ex. 27, Enclosure 8, at 2 (lines 7 and 4 from the bottom), and at 7 (line 2).

Ward also explained that OIE was interested in conspirational cheating rather than opportunistic cheating. Tr. 25, 340 (Ward). Neither explanation fits the facts. OIE considered FF to have cheated because he supplied a single answer (spontaneously) during the licensing examination. Ward ff. 25, 356, at 14, 15. The responsibility for not including the instance concerning DD rests with Mr. Stello. Mr. Ward had discussed the matter with Mr. Stello who concurred that the DD solicitation should not be pursued. Ward accepted the responsibility for not including the instance concerning DD, however this is suspicious. Mr. Ward did not appear to know, when first questioned, whether the DD-P solicitation had been omitted or included. Tr. 25, 317; 25, 320; 25, 418 (Ward).

158a. The OIE reports did not contain all the information generated in an interview. Since the interview notes were not always attached, there is no certainty that other instances, not considered to be cheating by OIE, were not withheld. Tr. 25, 417 - 8 (Ward). Another instance where important information was not included in a report or noticed in the hearing is reported below in paragraph 159.

158b. The number of instances in which OIE withheld information is troublesome. The known instances are noted at paragraph 118 (Footnote 10); paragraph 128; paragraph 55 and Tr. 25, 418 (Ward), and an indication discussed at paragraph 50 supra.

NRC Proctor Noted O and W Cheating

159. OIE apparently withheld information concerning a proctor's observation of O and W cheating. Although Mr. Ward knew this at the time he interviewed the proctor, Mr. Ronald Maines, this information was not included in the report of the interview. Staff Ex. 27, at 11.

160. Mr. Ward testified in the hearing that, during the course of his discussion with Mr. Maines, "Maines indicated ... that he had seen them." Tr. 25, 412 - 3 (Ward). Ward (and Maines) are clearly referring to O and W. Ward had been asked the question:

Does that strike you as odd, that this methodical cheating between O and W and the proctor did not catch it, and yet the person further away was caught for one isolated incident?

("the person further away" is referring to Mr. A, and "caught" refers to the proctor asking A to turn over his paper. Tr. 25, 412 (Adler).)

Ward replied:

Yes, sir, it strikes me as odd. Id.

Adler asked:

Did you discuss this with the proctor? Id.

Ward:

No, sir. As I recall my interview with Mr. Maines, we did touch upon the general perceptions of cheating, and he indicated during the course of that discussion that he had seen them. So the specific anomaly here of his telling the person to turn the paper over, I do not recall as being a specific point of discussion, but I think it was encompassed by the overall question did he see any cheating. Tr. 25, 412 - 3.



161. This statement of Ward's slipped by Judge Milhollin and the parties, as there was no expression of surprise -- which would have been expected -- on the part of anyone. Id. Later Ward was questioned again concerning the proctors' observations of O and W. Tr. 25, 451 (Blake). Ward stated, "I believe they did not observe them cheating." Id. (Ward). Although this appears to be a contradiction, the riddle may be resolved by what behavior was considered cheating. Consider that Maines discussed "his general perceptions of cheating" with Ward. Tr. 25, 412 - 3 (Ward). It was "during the course of that discussion" that Maines indicated that he had seen O and W. Id. Ward does not add "cheating". Did Maines convey to Ward that he (Maines) did not perceive the behavior of O and W to be cheating?

162. Mr. O did not consider allowing Mr. W to use his papers during the licensing examination to be cheating. Staff Ex. 26, at 46, Enclosure 4. Evidently other operators shared O's perception. One operator, a graduate engineer and a shift technical advisor, had unshakeable faith in O's honesty. Tr. 26, 510 (KK). Others did not consider O's behavior serious enough to warrant termination. Tr. 25, 703 (GG); 26, 570 (I); 24, 058 (Hukill); 24, 194 (EE). A shift supervisor indicated that O's behavior was not necessarily cheating -- that it depended on your definition of cheating. Tr. 26, 575 (I). The operators were not aware of what the company would consider cheating prior to the O and W incident. Tr. 26, 608 (T); 26, 574 (I).

163. An opinion widely-held at TMI was that providing or receiving the answer to a question or two on the licensing examination was not cheating. Tr. 25, 714 (GG); 26, 352 (FF); 26, 837 - 39 (U). Neither FF nor the person who solicited FF during the April examination was nervous or hesitant. Tr. 26, 357 (FF). FF did not consider the aspect of helping someone on the examination at the time he provided the answer or at anytime until he spoke with Mr. Hukill five months later. Tr. 26, 357 - 58 (FF). Hukill reported that FF considered the solicitation a normal occurrence. Tr. 23, 988. The operators were used to 'cooperating' on their weekly tests given by the TMI Training Department. They did not consider this cooperation to be cheating. Tr. 26, 452, 458 - 90 (WW); 25, 696 (GG); 26, 807 (U); 25, 968 - 69, 671 (OO); 26, 608 (T).

164. When Mr. Maines was interviewed by OIA, he reported "that he did not see anything out of the ordinary on Friday which indicated there was cheating." Staff Ex. 4, Third Interview, at 2. The phrase "out of the ordinary" may indicate that what Mr. Maines observed taking place between O and W was not out of the ordinary, and that Maines finally realized that this kind of behavior was not considered cheating at TMI. Maines was a trainee-proctor and his general perceptions of what constituted cheating may have altered to encompass 'the way things are done'. Herein may lie the explanation of Maines' single warning (to Mr. A) to turn over his answer sheet, although Mr. O, who sat closer to the proctor and left his answer sheets face-up, was not warned. Staff Ex. 26, at 31; Tr. 25, 412 (Ward).

165. The OIE investigators' definition of cheating appeared to change over the course of the investigation. At the time of the first OIE investigation, the following acts were considered reportable and related to cheating:

- providing information to anybody
- receiving information from anybody
- exchanging papers
- facilitating cheating of anyone Tr. 25, 365 (Baci).

This contrasts with Ward's testimony in the hearing. Mr. Ward considered that obtaining the answers to a question or two was "opportunistic" and was not the subject of the investigations. Tr. 25, 340 (Ward). An unsuccessful solicitation or attempt to copy was not considered cheating. Tr. 25, 415 (Ward). Ward could not provide an NRC definition of cheating; the investigators had come to "an informal concensus. Tr. 25, 427 (Ward).

166. There are indications that the attitudes held at TMI are common industry-wide. The Chief Examiner described the lack of proctoring during the April examination as the way things are done. Staff Ex. 24, Third Interview, at 3. The investigators considered the proctoring during the April examination to be within NRC guidelines. Tr. 25, 391 - 92 (Gilbert); 25, 473 (Ward); Aamodt Ex. 12. The investigators did not feel that it was the proctor's responsibility to detect cheating. Tr. 25, 473 (Ward). This could explain why the OLB graders were not alert to the extensive copying of O and W on the RO examinations and why O and W did not disguise their copying. It could also explain the apparent lack of concern the resident inspectors exhibited toward the proctoring of the licensing examination. Tr. 25, 505 (Wilson).

Operators Knew About NRC Investigations

167. There is evidence that the operators were aware of the OIA investigation at its inception, despite efforts by OIA to conceal their investigation at that time. Staff Ex. 24, First Interview, at 3. One operator (I) testified that EE, the Operations Supervisor, had reached him (in New York by telephone) on Thursday so that the operator would not first learn of the investigation of O and W through the news. Tr. 26, 540 - 42 (I). The story broke into the news on Tuesday, July 28, so that EE must have contacted Mr. I the previous Thursday, July 23 at the time of the OIA investigation and four days prior to the interviews at TMI by OIE. OIA had made a caveat with the OIE resident inspector to inquire discreetly which examinees were smokers and non-smokers in order to determine associative seating during the NRC examination. Staff Ex. 24, First Interview, at 3. The resident inspector felt that it was necessary to inform the Operations Supervisor, in order to obtain the information. Id. Evidently the caveat was broken, and the TMI operators and management were aware of the investigation before the OIE investigators arrived on July 27, 1981. This may account for the uniform (but erroneous) testimony of the operators who sat with O and W for the examinations concerning the proctoring. It also reflects on the resident inspector's lack of independence from the Licensee's interests. EE testified that he first learned of the O and W cheating on July 27, "the day before my interview", which suggests that EE was defensive about his prior knowledge. Tr. 24, 190 (EE).

Conclusions on Issue 2

168. The Board cannot help but develop the haunting suspicion that the NRC investigations were purposefully limited both in scope and depth because full exposure of the extent of cheating at TMI would have shown a situation where the "team" concept was applied to all examinations, even NRC licensing examinations, that this pervasive cheating had been supported by management from the beginning of operation at TMI, and that this kind of cheating was commonplace throughout the nuclear industry for years, and that NRC condoned it.

ISSUE 3, CONTD. ADEQUACY OF LICENSEE'S INVESTIGATION

Hukill Interviews

207. Although OIE investigators assumed that Mr. Hukill's failure to elicit the identity of FF's soliciter meant that further effort on their part would be futile, FF did not find Mr. Hukill particularly probing in that area. Tr. 25, 374 (Ward); 26, 401 - 2 (FF).

208. Although WW reported that rumors of cheating have been prevalent since 1977, Metropolitan Edison's attorney, Mr. John Wilson, did not ask WW a specific question concerning cheating. Tr. 26, 438 (WW). Mr. Wilson simply checked if WW knew his responsibility concerning cheating. Tr. 26, 439 (WW).

209. Does Not Exist

210. In a general meeting of the operators with Mr. Arnold, KK did not remember an inquiry concerning knowledge of cheating. Tr. 26, 515.

211. Management began their investigation after the Board had made it clear that the hearing would be reopened. The realization that further evidence of cheating may be elicited by the hearing sparked Metropolitan Edison's investigation. Lacking the impetus of the reopened hearing, it is a forgone conclusion that there would have been no further investigation.

212. Management is not pursuing any investigation of cheating of non-licensed personnel although they are aware of a report of an allegation and numerous rumors that cheating was widespread and commonplace.

213. Management witnesses misrepresented the administration of tests in the TMI Training Department. Tr. 24, 739 (Brown) 24, 739-40 (Newton).

ISSUE 4 - COMBINED WITH ISSUE 3

Pages 78-85 do not exist

Pages 86 & 87 were serviced Jan. 20, 1982

ISSUE 5, CONTD. THE EXTENT OF LICENSEE MANAGEMENT KNOWLEDGE  
OF ENCOURAGEMENT OF AND NEGLIGENT FAILURE TO PREVENT CHEATING

Management Knowledge Of Cheating

Management personnel, shift supervisions and foreman were aware of rumors of cheating, if not actual instances of cheating. Tr. 26, 464 (WW).

Management Encouragement Of Cheating

255. Instructors in the TMI Training Department did not take the Category T test seriously Tr 25, 696 (GG) although they were aware of this Lessons Learned requirement by the Commission.

256. Weekly tests were proctored poorly, if at all. There were no prohibitions against talking during the tests. Tr. 25, 696 (GG).

257. The operators "learned" in the TMI Training Department that open-book tests, group effort and discussion of questions were not considered cheating. Tr. 26, 566, 584 (I); 26, 462 (WW). Take home training packs were given where it was difficult to distinguish the quiz from the training material. Tr. 26, 417 (FF).

Licensee certified operators who, two weeks before the examination, had been examined orally and found to have significant weaknesses in knowledge, thereby creating a need to cheat. Aamodt Ex. 10. Mr. W. was one of the operators who was diagnosed as having weaknesses two weeks before the examination on which he copied answers of another operator word-for-word.

Management Negligent Failure To Prevent Cheating

259. The training program was not adequate. Tr. 25, 703 (GG). The instructors were not adequately informed on the subject matter they were teaching. Tr. 25, 704 (GG). This was also true of instructors of auxiliary (non-licensed) operators. Tr. 25, 718 (GG).

260. The training schedule was conducive to taking the training week as a vacation. Tr. 25, 705 (GG). The company recognized the problem but did not rearrange the rotation of the training week. Tr. 25, 706 (GG). Work schedules prevented some operators from attending training. Tr. 26, 056 (A). (This appears related to the TMI-2 accident cleanup.)

261. The tests, following a week of training, did not follow the training sufficiently. Therefore, discussion of questions during the quiz was necessary. Tr. 26, 462 (WW). Evidently the training instructors do not construct proper quizzes and management appears unaware of this problem. Tr. 24, 939-40 (Long).

262. Management did not clearly define their rules as in the Navy Nuclear Program. Tr. 25, 403 (FF).

263. Inadequate rooms were provided for the April NRC examination. The rooms were small. TMIA Ex. 61. Management requested 2 sections for each examination, smoking and non-smoking, disregarding the effect on proctorship, particularly in view of OLB's understaffing. Management did not accept any responsibility for seeing that the testing rooms were proctored. Staff Ex. 24.



264. It is beyond operators' ability to assimilate all the new material generated daily. The material is not arranged in a manual for ready reference.

Issue 6. Possible Cheating on Non-Licensed Personnel Tests

265. This important issue was given short shrift at the hearing, Judge Milhollin finding the Aamodt's witness' testimony concerning other matters "incredible" and failing to support general discovery in the area.

266. The hearing and the NRC investigations were concerned with management involvement in cheating, however all investigations looked only at the evidence surrounding the testing of licensed personnel. This is understandable in view of the haste with which all these proceedings were conducted. However, evidence of cheating on non-licensed personnel tests, or lack of evidence after a legitimate investigation, would have provided additional confidence in conclusions concerning management involvement.

267. Operators described cheating as "commonplace and accepted at TMI". TMIA Ex. 58; Staff Ex. 28, Enclosure 1. Neither operator limited this statement to the tests given to licensed personnel (the questioning was however limited). TMI administered at least two tests to non-licensed as well as licensed personnel. These are the Radiation Worker Permit (RWP) tests and the General Employee Training (GET) tests. Long ff. 24, 925 at 22, 23. TMI management admitted that cheating could have occurred on the RWP test, blaming the confusion after the TMI-2 accident. Also, where a management witness was questioned concerning cheating, he knew of two cases on the GET test. Tr. 23, 863 (Arnold).

The Licensee and NRC

268. The Commonwealth was the single party, aside from the Aamodts, who expressed interest in the administration of tests to non-licensed personnel. Tr. 25, 030 (Adler). The Commonwealth considered corroborating testimony (of Mr. Harry Williams' testimony) needed. Id. Such testimony appears

to have existed, but was not brought to the Aamodt's attention during the course of the hearing. A "control room personnel" (apparently TMI-2) reported in an interview with the Paxton Herald on May 16, 1979 that answer sheets for the RWP tests were handed-out before the test:

- (1) The Paxton Herald was told that a test was given by Health Physics Dept. of TMI last March for Restricted Work Permits to work in restricted areas, and ANSWERS handed out BEFORE the test by a white-hatted supervisor.

The article also reported:

- (2) According to plant employees, TMI maintained very loose internal security. This paper was told by a TMI employee that often there was nobody on site to log him in or out or take his rem reading. Explosives could have been taken into the Hatch. Workmen filled out their OWN WORKSHEETS sometimes.

These items corroborate Mr. Williams' testimony concerning his experience taking the RWP test, and to some extent, his report of the discovery of papers laying in disarray in Mr. Herbein's office and entering that office to take them to the Security Department, testimony which Judge Milhollin consider "incredible".

269. The identity of the control room personnel who was interviewed by the Paxton Herald should be discovered and the matter pursued by the NRC in an open manner. The OIA would be the appropriate branch in view of the possibility of criminality.

270. The Licensee's witness, Dr. Long, was at TMI-2 in the recovery phase after the incident. Long ff. 12,140 at 8. However, Dr. Long's answers during cross-examination lacked authenticity. Dr. Long did not recall whether the RWP instructor to whom he spoke was Mr. LaVie or Mr. Moore. Tr. 24, 941. He did not recall which of these two individuals thought the RWP test answer key may have been seen. Tr. 24, 941 -2. He did not know at what point in time this happened. Id. These and Dr. Long's pre-filed testimony which corroborates Mr. William's experience, should be pursued with the appropriate witnesses, Mr. LaVie, Mr. Moore and others.

271. The NRC proposed to deal with any possible cheating on non-licensed tests through future vigilance of OIE inspectors. Ward ff. 25, 274 at 16, 17. The NRC simply elected to not investigate the allegations of Mr. Williams because of limited resources. Id., at 17.

272. The hearing cut off a vital source of information concerning management (vs individuals). If cheating was prevalent in non-licensed testing, the culpability of management would have been more clearly demonstrated. Several thousand people could not all have been guilty and management been free of complicity.

Issue 7. Licensee's Constraints on Investigations of Cheating

273. This issue is discussed in paragraphs 14, 15, 16, 27, 29, 34 124 - 134 and 143, supra.

Management Presence

274. Metropolitan Edison management persisted in offering representation to interviewees during the NRC investigations until OIE exercised their right to exclude management. Staff Ex. 27, at 6.

275. Mr. Hukill who represented management during a number of the interviews of the first OIE investigation recognized that individuals might feel constrained to reveal all they knew for fear of retribution. Tr. 23, 921 (Hukill).

276. Metropolitan Edison Counsel resisted providing the names of former employees to the Aamodts. Counsel agreed to contact these employees prior to the Aamodt's contact. Paragraph 30. This issue is discussed at paragraph 34 supra.

Misrepresentation of Records

277. Licensee provided incorrect data in the main hearing concerning the passing or failing of the Kelly examination. Tr. 24, 645 - 50 (Bauser, Blake); Lic. Ex. 64. This data had been the subject of numerous "debates" concerning accuracy of it. See generally Tr. 12, 159 - 69 (Long, et. al); 12, 607 - 16 (Kelly, Gardner, Long); 12, 696 - 711

(Kelly); 13, 212 - 18 (Long; 20, 576 - 639 (Newton); 20, 717 - 23 (Crocker). The chart (Lic. Ex. 64) was prepared as an authentic and accurate representation of the pass/fail data to clear all disputes. Tr. 20, 578 (Newton). Three changes of "pass" to "fail" were made in order to bring the chart into line with the examination grades which were provided during discovery in the reopened hearing. Tr. 24, 645 - 50 (Bauser, Blake).

278. The chart entered at Tr. 20, 577 was to have provided an accurate record of the passes and fails in the PQS audit of April 1980. The Board had ruled that Licensee was to provide such a record for the parties to use in findings. Considering the hearing time devoted to obtaining an accurate record, Licensee's incorrect figures cannot be regarded as benign. The apparent deliberate representation of Licensee, that there were more passes than actually occurred, is a serious indication of an attitude of cover-up.

279. The deliberateness of Licensee's deception is particularly apparent concerning the number of "passes" on the Category T test. The flip-flop of Licensee's statistics, between 15 or 16 who failed, was noted. Tr. 20, 315 - 6 (Aamodt). Licensee maintained that 15, and not 16, had failed despite the facts. Id. Tr. 24, 649 (Bauser). The operator, (I), who was alleged to have passed, took a Category T make-up, so that the TMI Training Department was aware that Mr. I had failed. Lic. Ex. 63.

280. Mr. Newton, Supervisor of Training, disclaimed responsibility for the errors. Tr. 25, 645, 47 (Newton). When asked if the original chart was prepared by him or under his direction, Mr. Newton replied:

Yes, it was, in the sense that we furnished to the preparers of the chart the information necessary to make the chart. Tr. 25, 645.

The preparers of the chart were not identified, however they were in all likelihood Metropolitan Edison management or counsel.

281. Further preparation by Licensee counsel appeared to surface in the Testimony of Operator I. Operator I testified that he did not know that he had not passed the Category T until the November 1981 retakes were given and did not remember retaking the test in January 1980. Tr. 26, particularly so since 583 (I). This testimony is preposterous, and Operator I's Category T test results was the subject of the misrepresentation. Paragraph 279 supra.

Issue 8 - Not Submitted

Issue 9. Administration of Licensee Examinations

282. The Licensee revised their test administration procedures in October 1981 after the issue was raised in the prehearing conference of the reopened hearing. Lic. Ex. 73 ff. 24, 927. These procedures replaced Unit 1 Administrative Procedure 1006 which were reviewed by the Commission after the TMI-2 accident.

283. The new procedures do not address a comment of the Commission concerning the superceded procedures. Tr. 12, 598-99 (Little). The Commission did not consider "open-book" format appropriate for the weekly quizzes given by the TMI Training Department. Id.

284. The Commission comment on the administration of weekly quizzes was as follows:

2.1(q) Open book quizzes administered for periodic evaluation of an operators knowledge of the subject matter do not appear appropriate. Since these are periodic quizzes and are normally administered at the conclusion of a short series of lectures, we cannot accept the concept of an open book examination testing the licensee's knowledge of a subject. This portion of the requalification program should be changed to reflect this requirement. This change should also be made on page 6.0 with reference to the annual written examinations.

285. The new procedures do not reflect any change in policy or practice from the superceded procedures. Failure of the new procedures to eliminate the option of the "open-book" format is puzzling in view of the Commission's comments. It is



troublesome as well since the TMI instructors misused the "open-book" format.

286. Dr. Long testified in the reopened hearing that he did not know the details of test administration for TMI-1. Tr. 24, 948 (Long), but expressed the opinion that "open-book" format was used infrequently. Tr. 29, 947 (Long). The operators testified, contrary to Dr. Long's testimony, that "open-book" format was frequently used or the format was not specified allowing operators to use reference material. This looseness in administration of tests at TMI led to cooperation among the operators in obtaining answers. Tr. 26, 452, 458 - 90 (WW); 25, 696 (GG); 26, 807 (U); 25, 968 - 69, 71 (OO); 26, 608 (T). Paragraph 254 supra.

#### Independent Auditors

287. A facet of this issue was whether Licensee should be required to use independent auditors to administer their tests. Dr. Long supported the administration of tests by the TMI Training Department according to the new procedures. Long ff. 24, 925 at 24 - 27. When questioned about the objectivity of testing by the instructors, Long supported the position that the instructor knows best what he wants his students to learn. Tr. 24, 940 (Long). The point of the questioning, which was missed and not pursued, was whether testing by the instructor was objective in terms of absolute standards for knowledge of a subject. Mr. Kelly, an auditor, felt that continued use of the same examiners would result in bias and lack of objectivity. Tr. 24, 900 (Kelly). Mr. Kelly's opinion, which was contrary to his own interests as a contract auditor with TMI, is the better evidence. We conclude that

the Licensee should be required to use independent auditors for requalification testing and other important tests, including the Category T tests and sensitive weekly tests.

ISSUE 10. THE ADMINISTRATION OF NRC EXAMINATIONS

288. The administration of NRC examinations at TMI was a legitimate concern of the reopened hearing. OIQ recommended that new procedures for the administration of NRC examinations be drafted. Staff Ex. 24, Cover Letter, Cummings to Dircks. New procedures were written and the licensing examinations were readministered at TMI-Unit 1 in October 1981. Staff Ex. 30; Staff Ex. 32. The new procedures replaced those revised in February 1969. Staff Ex. 29.

Critique of New Procedures

289. The new procedures were expanded in the amount of detail, compared to the superceded procedures. The instructions the proctors are required to give to the licensing candidates and ways to achieve 100% proctoring were spelled out. Staff Ex. 32, at 15 - 18. The superceded procedures carried the same messages, however the details were left to the descretion of the Chief Examiner. Staff Ex. 29, at 2, 3.

290. The superceded procedures implied that proctoring should be continuous:

It is desirable that the examiner oversee the examination personally.

Use of facility proctors is permitted when circumstances require but should be avoided if possible.

The examiner should make use of available facilities in the manner he consider most satisfactory, to ensure the integrity of the examination. Staff Ex. 29, at 3.

It is puzzling how the NRC Examiner could have allowed some examination rooms to be unproctored for periods of four or more hours during the April examination at TMI, in view of the procedures

then in effect.

291. The Chief Examiner for the TMI April examination explained that the procedures followed then were common practice, "the way things are done". Practice <sup>precedence</sup> took/ over written procedure . Staff Ex. 24, Third Interview, at 3.

292. The new procedure requires the Chief Examiner to submit a written description of arrangement for proctoring. This may provide a safeguard against the precedent of custom over procedure. However, the method whereby the proctors are to have "a clear understanding of their responsibilities" was left to the discretion of the Examiner. Staff Ex. 30, at 15. There is no indication how we can be assured of the seriousness with which the Chief Examiner will interpret this responsibility, in view of his past performance. The force of the new procedure depends on the attitude and manpower (reportedly still lacking) <sup>25, 637 (BOger)</sup> of the licensing branch. No evidence of significant changes in OLB were produced in the reopened hearing. While consultants have been engaged to write and grade examinations, the Chief Examiner was assigned to write, type, oversee, proctor, review and grade the examinations as well as train new proctors and certify consultants. The Chief Examiner administers written, oral and simulator examinations, and makes all arrangements with the licensee. Tr. 25, 491 - 95; 25, 577 - 78; 25, 616 (Wilson). See Paragraph 325 infra.

293. The new procedure leaves open the option to use licensee personnel to proctor. OIA had recommended that no licensee personnel be used for proctoring NRC examinations. Staff Ex. 24, Cover Letter, Cummings to Dircks. Considering the laxity with

which the TMI Training Department administered tests, there is no evidence to support use of licensee personnel. See paragraph .

294. The new procedures still allow the use of loose answer sheets which can be left face-up or passed. Id., at 18. Those possibilities could have been eliminated by requiring answer booklets (like college 'blue books').

295. The integrity of the administration of the NRC examination will depend on the attitude of OLB. Have OLB's attitudes remained unchanged since the TMI-2 accident concerning the seriousness with which the NRC examination should be administered? Yes, as the administration of the April examination indicated. Have their attitudes changed since the cheating incident? Apparently not. Why would OLE maintain that the proctoring of the April examination was within the guidelines of the the procedures at that time? Tr. 25, 391 - 92 (Gilbert). Or why would NRC consider the main role of the proctors answering questions of the examinees? Tr. 25, 473 (Ward). (This view is shared by the Licensee and an auditor contractor. Tr. 24, 821 (Newton); Kelly ff. 24, 894, at 4.)

296. For the October examinations at TMI, OLB used professors from Penn State to proctor. The proctors evidently took their responsibilities very seriously according to several reports. Employment of individuals who are experienced in administering tests, and who, by virtue of their positions, command respect and are able to exert their authority, was appropriate. Wilson ff. 25, 481, at 4, 5.

297. The new procedure does not require proctorship as experienced and reliable as that at the October examination. Suggested is use of "OIE part-time secretarial help", "federal/state or local employees" and "OIE resident inspectors". Staff Ex. 30, at 15. All of the forgoing categories of people could provide adequate proctors, however there is less surety than with use of professors. In using inexperienced proctors, the quality of proctorship would depend on the attitude of the Chief Examiner in instructing and overseeing the affair. See Paragraphs 291, 295 supra.

Continued Incompetency of OLB

298. During the April examination, the Chief Examiner was away from the room he was proctoring for one to four hours on each day in order to review the examination with Licensee personnel. Staff Ex. 24, Third Interview. The reviews took longer than presumed, partly due to changes in plant procedures and training materials that had not been sent to OLB for use in writing the examinations. Tr. 24, 243 (Ross).

299. The new procedure addressed this problem of communication between the licensee training department and OLB in more imperative tones than the superceded procedure did, however a notable exception occurred on the October licensing examination concerning the High Pressure Injection System. The Board found that the answer which OLB believed was acceptable in terms of TMI-1 plant procedures and training was too limited in terms of operators' understanding and required more detail than operating conditions required. Board Memorandum and Order, February 3, '982.

300. OLB's failure to assure a proper question-answer about the HPI system is serious. Premature throttling of the HPI system was causal to core damage of the TMI-2 plant during the accident. Id., at 13. The Commission ordered that the operators be trained and tested in the TMI-2 events. Commission Order CLI - 79 - 8, Item 1(e). NRC depended on the licensing examination to test the operators' knowledge of TMI-2 events. Tr. 25, 654 (Boger). NRC's failure to construct a valid test of this important information reflects on the competency of OLB.

Inadequate 'Special Test' of TMI-2 Events

301. In the sensitive area of TMI-2 events, OLB showed little interest in the 'special test' (Category T) required by the Commission. CLI - 79 - 8, Item 1(e). Although NRC promised in April 1981 to evaluate Category T tests administered by an auditor and the TMI Training Department, OLB did not take any steps toward an evaluation until the matter was highlighted by the reopened hearing. Partial Initial Decision, August 27, 1981, paragraph 583, License Condition No. 1; Tr. 25, 634 - 36 (Boger).

302. Even after the administration of the Category T test was questioned by the Trunk investigation, NRC had no interest in the way Licensee administered or graded the test. Tr. 25, 636 (Boger). NRC did not require Licensee to readminister the test. Licensee offered to do this, based on the embarrassing suspicions raised by the Trunk investigation. When the operators were retested, OLB did not object to the use of the same form for two testing sessions separated by four days, thereby depending on the examinees

to refrain from discussing the questions. Tr. 24, 734; 24, 822 (Newton); 25, 333 - 34 (Boger).

303. The seriousness with which OLB evaluated the content of the readministered Category T test is questionable. Mr. Boger testified, "Well, I looked at the two makeup examinations that were given in November." Tr. 25, 635 (Boger). Did he? Only one was given. See Paragraph 302 supra.

304. A nuclear engineer, who had experienced the TMI-2 accident, felt that the Category T did not ask " a real lesson-learned " from the accident. Tr. 26, 409 (FF). This same engineer "resented" the pointless questions of the Category T tests. Id. He stated that he finally passed by memorizing the answers to the questions. Tr. 26, 407 (FF). The operators generally did not respect the Category T test as an indication of their knowledge of TMI-2 events. Tr. 26, 406 (FF); 25, 695 (GG); 25, 983 (OO); 24, 021 (Hukill). Nor did the instructors. Tr. 25, 695 (GG). A relationship between attitude and cheating/memorization/coaching is suggested by the number of parallelisms on the Category T retests.

305. NRC plans to accept the Category T testing of PQS Corp. (Kelly) where an operator passed. although these tests were administered nearly two years ago (April 1980). More importantly, a number of clues indicate that the Kelly test was administered in an open-book fashion. This is the evidence:

(a) Mr. U discussed use of a "notebook" during the Kelly examination at the time of U's meeting with Metropolitan Edison management concerning rumors of cheating. Tr. 26, 858 (U). (b) Mr. Kelly



gave conflicting testimony regarding the administration of the examination in the main hearing. In answer to a question from Dr. Little:

Mr. Kelly, were those written examinations open book or closed book?

Kelly: They were open book.

Dr. Little: They were?

Kelly: Yes.

Dr. Little: So fast fingers would get you a long ways.

Kelly: I did not hear that.

Dr. Little: Fast fingers would help out on an open book exam, from my experience. (Laughter).

After some other irrelevant discussion, Dr. Little repeats:

I asked him if those written examinations he was describing were open book or closed book, and he said they were open book.

Then Kelly reverses himself and states that the examinations format was "closed-book" except for steam tables (and calculators). Tr. 12608 - 9 (Little, Kelly). This reversal of testimony seems irregular in view of the certainty with which Mr. Kelly initially testified. (c) The procedures for test administration at TMI-1 allowed 'open-book' format at the time of the Kelly test. Tr. 12, 598 - 99 (Little). Dr. Long testified that an 'open-book' format might even be appropriate for a requalification test. Tr. 24, 947 (Long). (d) The distribution of grades on the Kelly examination are skewed to the high side compared to/ subsequent comparable examinations. For instance, twelve operators received grades over 90% compared with two or three on the following three examinations. Lic. Ex. 64.

Questionable Validity of NRC Examinations

306. In the very important area of TMI-2 events, the NRC is accepting a test that may be invalid and test results that may be compromised by their administration and coaching of the examinees. Paragraphs 301 - 305.

307. As with the Category T test, the operators did not regard the written portion of the licensing examination as a valid test of their capabilities to operate the plant. Tr. (T); 26, 411 (FF); 25, 708, 25, 712 (GG); 26, 467 (WW); 23, 978 - 79 (Hukill). One objection was that the test required details which were readily available in reference material in the control room and which the operators considered an unnecessary burden to memorize. Tr. 26, 411 (FF); 26, 157 - 58 (A); 26, 814 (U).

308. OLB does not formally evaluate their tests for validity, following instead a test structure of an audit of equally-weighted categories. The factor of possible unequal significance of various categories in terms of knowledge needed to operate the reactor is not reflected in the grading.

309. There was no evidence presented in either hearing to substantiate the 'new' licensing examination as a valid measure of an operator's ability to operate the plant, other than the opinion of an OLB examiner. Tr. 12, 797 ("oger). The matter of validity rests with OLB's selection of questions which are presumed to be sufficiently piercing and adequately broad so that passing 80% of them provides a measure of assurance of a capable operator.

The operators did not share that perception, which may have caused O and W to compromise their integrity and copy during the April examination.

310. Some factors which the operators considered invalid are as follows: Partial credit is given for answers that do not reflect any real understanding of the material. Tr. 24, 708 (GG). This is confirmed by OLB. Tr. 25, 678 - 80 (Wilson). Memorization can take an operator through a significant portion of the test. Tr. 25, 708 (GG). Coaching is employed. Tr. (OO). Licensee confirmed that it is effective Tr. 24, 734 (Newton). The operators are familiar with the kinds of questions that are asked; one operator estimated that 50% of the questions asked during the October examinations were on the April tests. Tr. 26, 352 (A). The same faults characterized the Category T testing and other Licensee administered tests. Tr. 24, 801 - 8; 24, 810 - 12 (Newton); 24, 789 (Brown). 24. 762 - 63 (Adler - Brown); 24, 776 - 67 (Brown).

311. OLB appeared unaware of the operators' familiarity with the NRC licensing examination questions. The examiners for the TMI examinations felt that there were very few questions repeated from the April to the October examinations. Tr. 25, 585 (Wilson); 25, 589 (Boger). They had not considered how many of the questions would be familiar to operators who studied past NRC examinations. Tr. 25, 537 (Boger).

312. OLB appeared to be locked into/a predictable examination by their procedure of repeating 50% of the prior examination given at another site. Tr. 25, 586 (Wilson). The examiner assumed that an examination would be "almost completely

new" by the time examinations were rescheduled at the facility. Id. The impressions of the operators indicate otherwise. Paragraph 310 supra. The operators obtain past examinations and study from them. Tr. 26, 845 (U). Past examinations are available in the TMI Training Department. Id. Also, the 'mock' examinations were given by former NRC examiners and were described as similar in content to the NRC examinations, adding to the operators' familiarity. Kelly ff. 24, 894, at 3.

313. The circumscribed quality of the NRC examinations would be of little consequence if the examinations contained all the information that an operator needed to know in order to operate the plant safely, and the operators were required to know it all. That is not the case. Tr. 12, 852 (Boger). The examinations are audit-types; the operator needs to pass 80% of the questions overall, or 70% in any one category. Boger ff. 12, 770, at 3. An examination used in this sampling fashion as a predictor of understanding of a larger body of knowledge must be scientifically constructed to assure validity. A considerable number of questions amenable to straight memorization, coupled with pre-knowledge of questions and coaching, can substantially defeat the purpose of the examinations. This holds true for the NRC examinations. Tr. 24, 734 (Newton); Kelly ff. 24, 814 at 6, 7. It also is true, as well, for the Category T test. Tr. 24, 762 (Newton).

314. Generally two forms of the NRC written examination are given. At TMI for the both the April and October examinations, approximately 1½ days expired between the administration of the A and B forms. The two forms used did not differ in substance.

Tr. 24, 165 (Ross). Operators who had taken the A form discussed the examination with those who were to take the B form. Tr. 26, 879 - 80 (U). Specific questions were discussed. Id. It is reasonable to assume that such discussion would center on question which posed some difficulty. Such a question was the HPI question. See Paragraphs 299, 300. That such discussion influenced the examinee's answers is suggested by the grading of the October examination. Of the 17 candidates who took the A examination, eight failed whereas only 3 of the 16 candidates who took the B examination failed. This was discussed in an Aamodt Motion, December 21, 1981, to receive and examine the responses to the HPI question into the record of the reopened hearing. This motion was denied by Judge Milhollin's order of February 10, 1982. The Board had ruled that the incorrect responses were improperly graded due to ambiguity of the question and changes in TMI-1 procedures. Board Order and Memorandum, February 3, 1982. Although this may be the case in this instance, we find that similarity of two forms of an examination administered successively affords the opportunity for coaching of examinees. This is clearly inappropriate, and particularly so where a single question, as the HPI question, audits the total knowledge of a system.

315. While NRC's grading procedures have been changed to include a search of 50% of the examinations for blatant similarities, this method would not detect 'coaching provided by the construction of the examinations, or other defeats of the validity of the examination.

316. The operators testified that 'coaching' is effective in passing the oral NRC examinations. Tr. 26, 524 (KK). The examiner's style and proclivity for certain questions allows preparation of the candidates. Boger ff. 25, 480, at 10; Tr. 25, 542 (Boger). Written versions of particular examiner's oral examinations are available to the candidates. Tr. 26, 866 - 68 (U). A file of these notes on prior orals may be kept by an individual in the TMI Training Department. Tr. 26, 870. (U).

317. The characteristics of the NRC examination described in paragraph 311 - 315 call into question testimony in the main hearing concerning the choice of the critical score of 80% overall and 70% in each category. The licensing examinations were purported to vary significantly from one individual to another. Not only are the forms of the examination nearly identical, but the B form can be compromised through communication among the operators.

318. OLB grading of the written examinations lacked objectivity. When the graders depended on the frequency of an answer as an indicator of the correct answer. Tr. (Collins). The assumption is that the frequency of a response indicates that the operators were trained to provide such a response. OLB does not take into account that training can be improper and that the licensing examination was supposed to evaluate (not track) the training at TMI. Staff Ex. 4, at 21.

Valid Examinations Would Improve Operators' Attitudes

319. Judge Milhollin considered the operators' attitudes toward the examination process an important part of the case concerning cheating. Tr. 23, 978 (Milhollin). The NRC cannot solve the problem of operator attitude by simply informing the operators that the examination is important. The operators are not a test-oriented, with the exceptions at TMI of Messrs. O and H, whom the operators considered outstanding in their proclivity for study. Whereas engineers considered examinations part of their work experience, operators resented frequent examinations. Tr. 23, 978; 24, 065 (Hukill).

320. Several operators considered the oral examination a better measure of their capabilities. Tr. 24, 709 (GG); Tr. 24, 467 (WW). However, an experienced Shift Supervisor (A) of disagreed. He felt that the effects/stress in a dynamic situation could not be measured by the oral examination; he and others believed that the simulator examination afforded a more valid measure of operators' capabilities to cope with emergencies. Tr. 26, 052 (A); 26, 550; 26, 586 (I); 26, 467 (WW).

321. Evidently a simulator examination (of a crew) would meet with more acceptance by operators. Id. They believed that their examinations should be used to test their ability to think through routine and emergency situations, rather than testing memory for details of readily available reference material. Tr. 25, 712 (GG); 26, 057 - 58 (A). The Manager of Training at TMI testified that the training of the operators should go to their understanding of the "why's" and "what-if's" of control room and

plant operation. Long et al. ff. 12, 140, at 15. Testing following such a pattern may have more validity and, in any case, would be more acceptable to the operators.

322. Unless NRC can offer some concrete evidence concerning the validity of the examination or adjust the examination process to assure validity and acceptance by the operators, NRC's plans to advance a more rigorous schedule for reexamination of licensed operators will be of no benefit, but will further erode the morale of the operators. The NRC reexamination of already licensed operators in April, in response to the Commission Order following the TMI-2 accident, was a deleterious effect on morale. Tr. 25, 702 (GG); 24, 177 (EE).

323. The TMI operators were "bitter" about the April examination. Tr. 26, 717 (P) ; Tr. 26, 559 (I); Tr. 25, 687 (GG); 24, 114 (Hukill); 24, 177 (Ross) Staff Ex. 27, at 40. The reexamination was considered "merely one more obstacle set up by the NRC ... to get...out of the way anyway they could and not spend an inordinate amount of time studying." Staff Ex. 27, at 33. Mr. Toole, Director of Operations and Maintenance at TMI-1, felt that this attitude was causal to the cheating at TMI. Staff Ex. 27, at 33.

324. Mr. Toole felt responsible for the cheating in that he did not emphasize the importance of the NRC examinations to the operators. Id. Management was aware of the bitterness of the operators. Paragraph 323 supra. However the NRC examinations were not considered particularly valid by TMI management. Mr. Arnold (President GPU Nuclear) believed the examinations called for



more knowledge than the operators needed to operate the plant. Tr. 23, 875 (Arnold). However, Mr. Hukill, Vice-president of TMI-1, considered the examinations a minimum of requisite knowledge. Tr. 23, 977-8 (Hukill).

Conclusions- Issue 10

325. The adequacy of the new procedure for administering NRC examinations will depend on the people interpreting and implementing the procedures. The superceded procedures were not inadequate; they were simply set aside in favor common practice. There is no evidence that the attitude of the licensing branch has changed so that the new procedures will not be set aside after the interest in the cheating issue has subsided. The TMI-2 accident and the recommendations which followed did not have that effect, and the accident was a more serious event.

326. The NRC examinations have not been shown to be valid. The operators do not accept the examinations as valid measures of their capabilities. There is no assurance that the operators' continued disrespect for the examinations will not lead to further attempts and success in defeating the examination process beyond that inherent in <sup>their</sup> construction.

327. OLB is too weak and understaffed to administer more than routine examinations. (Also see Aamodt Findings, May 15, 1981, paragraphs 27, 30, 31, 34, 36.)

ISSUE 11. STAFFING TMI-1 WITH LICENSED OPERATORS

328. The issue of the number of operators who would be available to staff the plant for startup is moot at the present time due to the steam generator problem. However evidence concerning staffing presented in the reopened hearing/is relevant to the capabilities of management. Does Metropolitan Edison have the management capability to staff TMI-1 with an adequate number of competent operators? The answer appears to be : No.

329. The attrition rate was high last year. Ten of the 36 operators and shift technical advisors left Metropolitan Edison's employment. Seven were among the 29 operators who took the April licensing examination on which cheating was discovered. The other two were <sup>among seven</sup> shift technical advisors. Tr. 23, 965 (Hukill); Licensee Ex. 64.

330. The cheating incident was an important factor in attrition although only two of those who left were directly tied to acts of cheating. Tr. 23, 695; 24, 074 (Hukill). Morale of the operators hit an all-time low following the OIE investigations of the cheating incident.

331. The operators' morale <sup>had already been</sup> was hurt by the Commission's requirement that all licensed operators be retested in view of the lessons learned following the TMI-2 accident concerning inadequate operator training at TMI. Tr. 25, 702 (GC); 24, 177 (EE)

332. Management was aware of the bitterness of the operators about the <sup>relicensing</sup> initially scheduled for April 1980

and then postponed until April 1981. Staff Ex. 27, at 33; Lic. Ex. 27; Tr. 24, 177 (EE); Paragraph 323 supra. The operators considered the requirement meaningless, in terms of assuring safe operation of the plant, and resented their management's volunteering for the relicensing prior to the Commission's decision. Paragraphs 319-322; Tr. 24, 192 (EE); 26, 578 (I); 24, 065 (Hukill).

333. A special training program was instituted to prepare the operators for the licensing examination, however the program was not adequate. The Operator Accelerated Retraining Program covered volumes of material in a short time, and some of the material was not relevant to the operation of the TMI-1 plant. Tr. 26, 856 (U); 25, 703-4 (GG); 25, 611; 25, 670 (Wilson).

334. Management considered preparation for the licensing examination to be the responsibility of the individual operators. Tr. 24, 931 (Long). Some operators found it difficult to attend training classes due to long work hours, evidently due to the clean-up activities at TMI-2. Tr. 25, 687-8 (GG).

335. Management did not take any steps to improve the operators attitudes toward the licensing examination. A last minute attempt was made to bolster the operators' competence to take the examination through an evaluation and tutoring two weeks beforehand, however it was not sufficient to give Mr. W. enough confidence to do his own work.

336. Company policy concerning conduct during examinations had not been made clear to the operators. Paragraphs 162-163 supra.

Operators cheated. The subsequent termination of two shift supervisors of long-standing was resented by the operators. Tr. 25, 686 (GG). The subsequent requirement of yet another examination, due to the questions raised by the cheating incident, was also resented.

337. Metropolitan Edison management demonstrated insensitivity of the attitudes of their operators. They failed to provide adequate training or schedules conducive to training and preparation for the examination. Management's policies did not state standards of conduct and penalties, and management practices and wide-spread rumors suggested conduct during examinations generally considered cheating.

338. Licensee management seemed generally disinterested in the causes of attrition, as did the NRC. Tr. 23, 964 - 98 (hukill) Crocker ff. 25, 062 - 3, at 3.

339. Another management issue that apparently contributed to attrition was the weekly shift rotation. Tr. 24, 223 (Ross); 25, 331 (Clewett). The adverse effect of shift rotation on operator tenure was brought to the attention of management over a year ago. Tr. 12, 450 - 1 (Christensen); Tr. 12, 244 - 45 (Adler, Ross); Lic. Ex. 27, at 147, 148. Licensee continued to support the weekly rotation in the face of evidence that such a schedule leads to poor performance, dissatisfaction and low motivation. Id.

340. Although Licensee has recruited RO trainees and promoted some /from the ranks of the auxiliary operators, this may not be adequate to overcome continued attrition due to incompetent management practices. Also these trainees have no experience as an operator during the 'hot' operation of the plant. Continued flux of operators will result in experienced personnel running the plant. This is clearly contrary to the safe operation of the plant in view of the variety and complexity of conditions which can arise.

341. The Supervisor of Operations, Mr. Ross, considered the minimum experience operating the controls to be nine months for an operator and at least one additional year, or 21 months, for a senior operator. These figures assume prior experience of the auxiliary operator training program. Otherwise Mr. Ross would add three years to each minimum, requiring four years for an operator and five years for a senior operator. Tr. 24, 231 (Ross).

342. During the restart phase, Mr. Ross would like to have more and higher-quality people on each shift than minimally required. Tr. 24, 254 (Ross). He would like to have 18 licensed operators and 12 senior operators and would be willing to operate with four shifts. Tr. 24, 250 (Ross).

343. Mr. Hukill, Vice-President of TMI-1, considered a four shift rotation unsafe. Tr. 24, 075 - 76 (Hukill). He would strongly oppose starting up the plant with fewer personnel than needed to man five shifts/ to provide for sickness and other unpredictable

events. Id. The Board would allow four shifts for a limited period, without regard for the phase of operation. Partial Initial Decision, August 27, 1981, at 331 - 2, paragraph 9(e). In view of Mr. Hukill's testimony in the reopened hearing, the Board needs to consider the health and safety implications of Condition 9(e).

344. The 'lessons-learned' shift-staffing requirements will be in effect for all facilities after July 1982. These standards set a minimum of two senior reactor operators and two reactor operators for each shift. In order to man five shifts, TMI-1 would require a minimum of ten SROs and ten ROs. NUREG-0737, I.A.1.3-7.

345. NUREG-0737 clearly considers the two SROs and 2 RSs per shift minimum (not optimum) requirements:

At any time a licensed nuclear unit is being operated in Modes 1-4 for a PWR (Power Operation, Startup, Hot Standby, or Hot Shutdown respectively) or in Modes 1-3 for a BWR (Power Operation, Startup, or Hot Shutdown respectively), the minimum shift crew shall include two licensed senior reactor operators (SRO), one of whom shall be designated as the shift supervisor, two licensed reactor operators (RO) and two unlicensed auxiliary operators (AO). (emphasis added) at I.A.1.3-7.

346. In view of the assurance of health and safety which the Board has sought for the people living in the vicinity of TMI, the optimum staffing, not the minimum staffing, should be established and required. This optimum should take into account the number of 'new' operators inexperienced in the

hot operation of the plant and the number of operators needed during a worst possible transient.

347. Licensee can never be expected to provide more than the minimum requirements of NUREG-0737. Licensee considered the lesser requirement, the Board's Condition 9(a) - one SRO and three ROs (one with SRO training) - to be the optimum! Id. The Licensee signaled their intention to begin operation with four shifts and non-operations personnel in line position if necessary to operate. Tr. 25, 327 - 28 (Blake).

Conclusion - Issue 11

348. The Board has heretofore failed to give adequate weight to the concept of optimum staffing to provide sufficient assurance of safe operation to the population at risk. Rather, the Board has given undue weight to Licensee's difficulties in providing adequate numbers of sufficiently trained operating personnel. In light of the evidence of the reopened hearing, the Board fails to find adequate assurance that borderline staffing arrangements can be expected to adequately provide for safe operation of the plant.

ISSUE 12. CERTIFICATION OF THE OPERATORS

349. The operators were to be certified by the highest level of management to be eligible to sit for the licensing examination. Long ff. 12, 140, at 32; 12, 066 - 67 (Haverkamp); 12, 177 - 78 (Long); Lic. Ex. 27, at 163; NUREG-0737 I.A.2.1-7. The highest level of management at TMI-1 is Mr. Henry Hukill.

350. Mr. Hukill depended upon the recommendations of Mr. Ross, Supervisor of Operations, and the TMI Training Department. Tr. 24, 105 - 06 (Hukill).

351. Mr. Hukill did not personally meet with the candidates before he certified them for the April licensing examination. Tr. 24, 054 (Hukill).

352. NRC had always required facility certification of candidates for licensing (10 CFR 55), however <sup>lesson learned from</sup> a/ the TMI-2 accident was that

The corporate management of each licensee should establish a definitive presence and involvement in the selection, training, and qualification of operations personnel. To assure that this has been accomplished, the NRC should require, as part of the application for operator and senior operator licenses, that corporate management certify the competence and fitness of the applicants. Such certification should be required by the highest level of corporate management responsible for plant operation (for example, the Vice-President for Operations). TMI-2 Lessons Learned, Final Report, NUREG-0585 (Emphasis added).

Mr. Hukill's dependence on the recommendations of others was circumventing the intent of the certification by the highest level of management on site. That was that corporate management should be involved in the selection, training and qualifying of the operators.



353. Mr. Hukill plans to meet with the operators every six months (or so) to assess their readiness to take examinations and other attitudes. Tr. 24, 007 (Hukill). He will continue to depend on Mr. Ross's recommendations concerning control room performance and on the Training Department's attendance records. Tr. 24, 053 (Hukill); Hukill ff. 23, 913, at 19. This is hardly what the 'lessons-learned' intended. Corporate management was to be involved in the selection, training and qualifying of the operators.

354. NRC also stated that facility certification would depend, in part, on the audits of independent examiners:

The licensee has contracted with an outside firm to evaluate the competency of licensed operators and senior operators. The licensee will use the findings of this organization as one factor in determining who will be permitted to sit for the NRC examination. Boger ff. 12770, at 4.

355. However, Mr. Hukill will not require passing grades on weekly training tests or weekly audits for an operator to be eligible for certification. Tr. 24, 052 (Hukill).

356. NRC had planned to oversee the facility certification by examining the audits made by the independent examiners. Tr. 12, 066 (Haverkamp); Staff Ex. 1, at C1-16; Tr. 12, 824 (Boger). NRC was to strictly monitor adherence to certification criteria. Tr. 12, 833 - 34; 12, 805 (Boger). "Operators who satisfactorily complete the OARP and audit exams will be eligible to sit for an NRC administered examination for an Operator or Senior Operator license." Staff Ex. 1, at C1-16.

357. NRC changed their position concerning certification criteria at the time of the April licensing examination. Tr. 20, 688 - 89 (Crocker). NRC did not require that candidates needed to pass an audit of any kind to be eligible for the licensing examination. Tr. 20, 706 (Crocker); 20, 697 (Swanson).

358. One of the individuals involved in the cheating incident on the April examination blamed his lack of confidence in passing the examination as the reason for his cheating. Staff Ex. 26, at 48. This individual (W) was rated on the ATTS oral audit just two weeks prior to the licensing examination as requiring a great deal of work to succeed on the licensing examination. Aamodt Ex. 10.

359. The ATTS oral audit targeted a number of operators who were unsuccessful on the October licensing examination (where proctoring was continuous and adequate). Operator S was evaluated in April 1981 to require considerable time and effort to pass the licensing examination. He failed all NRC examinations in April and October. Aamodt Ex. 10. The ATTS oral audit targeted all three operators who failed the October RO written examination and two of the four operators who failed the SRO examination. (Operators G, R, V, S and F). Id.

360. NRC would save time and effort of their licensing branch by eliminating candidates for licensing who had not confidently passed an independent audit. This procedure would also eliminate the need to cheat on the licensing examination.

361. Mr. Hukill considers the NRC examination as a measure of the "minimum knowledge to be qualified as an operator".<sup>Tr. 23, 957 (Hukill)/</sup> If Mr. Hukill is correct, what assurances are there that the operators have the required knowledge to operate the plant safely? Mr. Hukill evidently depends on the judgement of Mr. Ross and the records of attendance at the Training Department. See Paragraph 350 supra.

362. Mr. Ross makes a subjective evaluation of the operators performance in the control room and their attitude. Ross ff. 24, 127, at 7 - 9. Mr. Ross prefers that this evaluation be subjective and not reduced to a rote procedure. I., at 9. It is, quite frankly, incomprehensible that Mr. Ross can evaluate up to 30 individuals on a range of traits in his day-to-day contacts with the operators. The nature of day-to-day contact would tend to lessen objectivity and the reliability of subjective evaluation is low.

#### Number Of Hours

363. The operators spent an impressive number of hours, ranging from 182 to 324 during the "1980 - 1981 training cycle".<sup>Lic. Ex. 80.</sup> However, in comparing these numbers with a Summary of Primary TMI-1 Operator Examinations Given Since March 28, 1979, it appears that the hours in training in Lic. Ex. 80 may be in errors. Lic. Ex. 63. Between April 1980 and April 1981, there were six training cycles. Id. These are general 40 hours in length and include the administration of a test. Only 6 operators appear under the column, Participants, for all six cycles (F, I, P, S, W, X) These operators are listed as attending approximately 300 hours in training in the 1980 - 1981 training cycle (289, 324,

295, 297, 300, 262). These figures include hours at the simulator, however that would only add an additional 40 hours. The figures are even more puzzling in the cases of Messrs. A, BB, CC, DD, EE and FF who are listed as participants from zero to two times and are shown to have between 183 and 244 hours in training. Lic. Ex. 63 and 80. When Judge Milhollin

364. When Judge Milhollin asked Operator A:

You did participate in the various training programs which the company administered for the purpose of preparing candidates for the NRC examinations, did you not?

Operator A answered: As best as I was able to do that, yes.

Tr. 26, 048.

Judge Milhollin was referring to the specific training period covered by the charts. When A was asked to clarify his statement, he responded:

There were times when I was filling in for someone when I could not attend the normal training for the week I was scheduled for it. That is what I was referencing when I made that statement.

Tr. 26, 056.

365. Lic. Ex. 80 was entered into the record without affording an opportunity for cross-examination of the sponsoring witness, Mr. Newton. Mr. Blake stated that it was his "understanding" that the hours listed were spent in the classroom or at the simulator. Tr. 26, 429(Blake). There appears the possibility a misunderstanding exists.

366. The hours in training would only be as good as the quality of the training. One operator was outspoken in his criticism of the quality of instruction. Tr. 25, 704 (GG). Another felt that the training "could have been better". Tr. 26, 543 (I).

367. Two degreed engineers took the OARP training, attending all but 5- 10% of the classes, however both individuals failed the licensing examination given in October. Tr. 26, 465 (WW); 26, 494 (KK); Memorandum Kramer to Denton, November 30, 1981. One of these shift technical advisors has been in training since 1976 and the other since 1977, at TMI. Staff Ex. 27, at 24; Tr. 26, 463 (WW).

368. Operators were not sufficiently trained in an emergency procedure for loss of DC power supply, subject of a question on the October 1981 licensing examination. Tr. 25, 670 (Wilson).

369. The training received in the OARP was, in some cases, not relevant to the TMI-1 plant. Tr. 25, 611 (Wilson).

#### Conclusions - Issue 12

370. The training program is inadequate to meet the needs of candidates for licensing examinations.

371. The quality of instructors is inadequate.

372. The training program lacks necessary control over hours of operator attendance.

373. The accelerated retraining program failed to provide adequate training to raise the level of competency of candidates with demonstrated deficiencies to a level where certification was warranted.

374. Certification does not provide assurance that operators possess the required knowledge to operate the plant safely.

375. The criteria used by Mr. Ross to recommend candidates for certification lacks adequate objectivity and quantitative measure of requisite skills.

376. Mr. Hukill's certification lacks adequate personal presence and involvement in the certification process.

Respectfully submitted,

A handwritten signature in cursive script, reading "Marjorie M. Aamodt". The signature is written in dark ink and is positioned above a horizontal line.

Marjorie M. Aamodt

March 1, 1982

AAM 3/5/82

'82 MAR -8 AIO:40

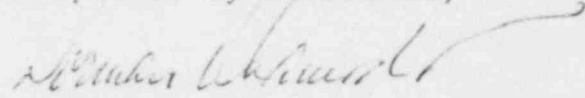
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BRANCH

This is to certify that the following documents  
were served this day on the attached service list:

MOTION FOR RECONSIDERATION OF AAMODT MOTION FOR  
ADMISSABILITY OF FINDINGS OF JANUARY 20, 1982  
AND ADMISSABILITY OF ADDITIONAL FINDINGS.

SUPPLEMENT TO AAMODT PROPOSED FINDINGS OF FACT  
AND CONCLUSIONS OF LAW ON ISSUES RAISED IN THE  
REOPENED TMI-1 RESTART PROCEEDING FILED  
JANUARY 18, 1982.

Respectfully submitted,



Norman O. Aamodt

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